

SPECIFICATIONS

FOR

PROJECT NO. 9558960
EAST WING TOWER AND RADIOLOGY SPC 4D COMPLIANCE
MATERIALS AND CONDITIONS ASSESSMENT PROGRAM
HCAI NO.: S251130-34-00

FACILITIES PLANNING AND DEVELOPMENT DIVISION
UC DAVIS HEALTH

SACRAMENTO, SACRAMENTO COUNTY
CALIFORNIA

10/15/2025

**DIVISION 1 – GENERAL REQUIREMENTS
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SECTION 01 11 00
SUMMARY OF THE WORK

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Description of the Work
- B. Contractor Warrants
- C. Contract Document Intent and Relationships
- D. University Furnished/Contractor Installed Products
- E. University Furnished/University Installed Products
- F. Concurrent Work Under Separate Contracts
- G. Site Condition Survey and Protection of Existing Improvements
- H. Contractor Use of Site and Premises
- I. University Beneficial Occupancy (if applicable)
- J. Project Phasing (if applicable)

1.02 DESCRIPTION OF THE WORK

- A. Project is titled: EAST WING TOWER & RADIOLOGY SPC 4D COMPLIANCE
- B. University Project No.: 9558960
- C. Project is located at 2315 Stockton Blvd., UC Davis Health, Sacramento, California, as shown on the vicinity map.
- D. Project is Seismic compliance to achieve structural performance category (SPC) 4D. Both East Wing Tower and Radiology buildings are currently rated SPC 2, which is defined as a building that may not be repairable or functional following a seismic event. A classification of SPC 4D is required to remain as an acute care building beyond January 2030. Project consists of structural retrofit, which could include strategic strengthening of wall cladding panels, existing shear walls, floor slabs, and structural framing.
- E. A description of areas, types of construction and general nature of the Work are described on drawing G001.
 - 1. C1-SS (Alt), C-7-SS (ALT), C-9-SS (ALT), C-10-SS (ALT) shall not be included in the base bid.
- F. Not used.

G. Special Constraints and Criteria:

1. Refer to Section 011400 Work Restrictions for dates and hours when the building is occupied and operational, and work-shift hour requirements and restrictions.
2. Noise Mitigation shall be required when the building is occupied.
3. Egress shall not be restricted or impacted unless scheduled when the building is not occupied.

1.03 CONTRACTOR WARRANTIES

- A. Contractor warrants that it is skilled and experienced in the use and interpretation of Contract Documents such as those included in the bid documents for this Contract. The Contractor further warrants that it has carefully reviewed the Contract Documents for this Work and has found them to be free of ambiguities and sufficient for bid purposes.
- B. Contractor warrants that it has inspected the Project Site and based on these observations, has satisfied itself as to the nature and location of the Work; and any special conditions likely to be encountered at the site which may affect the performance of the Work.
- C. Contractor warrants that its bid is based solely on the Contract Documents provided, its own observations, and written explanations and interpretations obtained from University's Representative and not on any explanation or interpretation, oral or written, from any other source.

1.04 CONTRACT DOCUMENT INTENT AND RELATIONSHIPS

- A. Contract Documents Intent: Provide all labor, material, equipment, tools, transportation, insurance, services, and all other requirements necessary to construct the project described in the Contract Documents.
- B. Relationship of Contract Documents: Drawings, Specifications and other Contract Documents in the Contract are intended to be complementary. What is required by one shall be as if required by all. What is shown or required, or may be reasonably inferred to be required, or which is usually and customarily provided for similar work, shall be included in the Work. For example, the drawings may not show every variation of an anchor clip that is required to support a curtain wall from its structural support; it can be reasonably inferred that variations of or additions to these clips are necessary to complete the installation of the working system and therefore all such clips are understood to be included in the Work.

- C. Discrepancies in Contract Documents: In the event of error, omission, ambiguity, or conflict in the Contract Documents, Contractor shall bring the matter to University's Representative's attention in a timely manner, for University's Consultant's determination and direction in accordance with provisions of the General Conditions of the Contract.
- D. Bidding and Contract requirements: Information for bidding, Conditions of the Contract and other Contract documents will be produced by University and may be included in the Contract Documents for convenience. Such documents are not Specifications. Specifications are found in Divisions 1 through 48 of the Contract, as listed in the Table of Contents of the Contract.
- E. Contract Drawings: The Drawings provided with and identified in the Contract are the Drawings referenced in the Agreement.
1. Drawings produced for this project may encompass Civil, Landscape, Architectural, Structural, HVAC, Plumbing, Piping, Fire Protection, and Electrical portions of the Work. Interior Design drawings may also be provided for product selection and installation information.
 2. The location, extent and configuration of the required construction and improvements are shown and noted on the Drawings. A list of Drawings is included in the Contract Documents.
 3. Drawings are arranged according to design discipline. Such organization and all references to trades, subcontractor, specialty contractor or supplier shall not control the Contractor in dividing the work among subcontractors or in establishing the extent of the work to be performed by any trade.
 4. Where the terms "as shown", "as indicated", "as noted", "as detailed", "as scheduled" or terms of like meaning, are used in the Drawings or Specifications, it shall be understood that reference is being made to the List of Drawings and the Specifications as bound in the Contract Documents.
 5. Where reference to the word "plans" is made anywhere in the Drawings, Specifications and related Contract Documents, it shall be understood to mean the Drawings listed in the List of Drawings.
- F. Contract Specifications: The Specifications provided as a part of the Contract Documents are the Specifications referenced in the Agreement.
1. The Specifications are organized by Division and Sections in accordance with recommended practice of the Construction Specifications Institute. Such organization shall not control the Contractor in dividing the work among subcontractors or in establishing the extent of the work to be performed by any trade.
 2. Specifications are included in the Contract, which also includes other Bidding and Contract Documents. Contents of the Contract are listed in the TABLE OF CONTENTS.
 3. Information for bidding, Conditions of the Contract and other Contract documents will be produced by University. Such documents are not Specifications. Specifications are found in Division 1 through 48 of the Contract.

1.05 UNIVERSITY-FURNISHED, CONTRACTOR-INSTALLED (UFCI) PRODUCTS

- A. University-Furnished Products: University will furnish, for installation by Contractor, products which may be identified on the Drawing and in the Specifications as UFCI (University-Furnished/Contractor-Installed).
 - 1. None
 - 2. None
- B. Relationship to Work Under the Contract: Work under the Contract shall include all provisions necessary to fully incorporate such products into the Work, including, as necessary but not limited to: fasteners, backing, supports, piping, conduit, conductors, and other such provisions from point of service to point of connection, and field finishing, as shown on the Drawings and/or Specified herein. See Section 013100 - COORDINATION for additional requirements.

1.06 UNIVERSITY-FURNISHED, UNIVERSITY-INSTALLED (UFUI) PRODUCTS

- A. University-Furnished Products: University will furnish and install products which may be identified on the Drawing and in the Specifications as UFUI (University-Furnished/University-Installed).
 - 1. None.
- B. Relationship to Work Under the Contract: Work under the Contract shall include all provisions necessary to provide all rough-in requirements into the Work, including as necessary but not limited to fasteners, backing, supports, piping, conduit, conductors and other such provisions from point of service to point of connection, and field finishing, as shown on the Drawings and/or specified herein. See Section 013100 - COORDINATION for additional requirements.

1.07 CONCURRENT WORK UNDER SEPARATE CONTRACTS

- 1. Not used

- B. Relationship to Work Under the Contract: Work under the Contract shall include all provisions necessary to make such concurrent work under separate contracts complete in every respect and fully functional, including field finishing. Provide necessary backing, supports, piping, conduit, conductors, and other such provisions from point of service to point of connection for additional requirements.
- C. Related Contract Documents: University will make available, in a timely manner, Contract Documents of work under separate contracts for coordination and further description of that work. Such drawings and other data required for the coordination of the work of separate contracts with the Work of this Contract may be included with the Contract Documents. If so, they are provided for convenience only and are not to be considered Contract Documents.

1.08 SITE CONDITION SURVEY & PROTECTION OF EXISTING IMPROVEMENTS

- A. Site Condition Survey: Prior to commencing work, the Contractor, University's Representative and other University representatives shall tour the Project site together to examine and record the existing condition of site, adjacent buildings, and improvements. This record shall serve as a basis for determination of damage (if any) due to the construction process. The record shall be signed by all parties participating in the tour.
- B. Protection of Existing Improvements: Locate all known existing utilities prior to proceeding with construction. Existing utilities shall be kept in service where possible and protected by the Contractor from damage. If any structure or utility is damaged, take immediate action to ensure the safety of persons and University property and effect repair. If previously undiscovered structures or utilities are encountered, request University's Representative to provide direction on how to proceed with the work. Cracks, sags or damage to adjacent structures or improvements not noted in the original survey shall be reported to University's Representative.
- C. University does not normally charge for its shutdown support services. However, if poor planning or execution of a shutdown by Contractor causes excessive time and effort for University, University reserves the right to back charge Contractor for additional work.

1.09 CONTRACTOR USE OF SITE AND PREMISES

- A. Site Access: Limit access to site as indicated on the drawings. If routes and access points are not indicated, access shall be as directed or approved by University's Representative.
- B. Hours of Operation: Construction activities are limited to the hours of 7:00 a.m. to 5:00 p.m., Monday through Friday. Prior University approval is required for Contractor construction work at any other time or day.
- C. Construction Limit: Limit construction activities to areas indicated on Drawings as Project Area or, if not indicated, to areas immediately adjacent to buildings and as necessary for immediate construction or utility services and sitework, See Section 015100 - TEMPORARY UTILITIES for additional requirements.
- D. Utility Outages and Shutdowns: Schedule utility outages and shutdowns to times and dates acceptable to University's Representative. Duration of outages and shutdowns shall not hinder University normal business operations. Provide fourteen (14) calendar days' notice of all utility outages and shutdowns.

1.10 UNIVERSITY BENEFICIAL OCCUPANCY - NOT USED

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PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not applicable to this Section

END OF SECTION 01 11 00

SECTION 01 14 00
WORK RESTRICTIONS

PART I - GENERAL

1.01 WORK HOURS



- A. No Work shall be done outside of standard Monday through Friday 7:00 a.m. to 5:00 p.m. working hours, on holidays or weekends unless prior written approval has been retained from the University's Representative.

1.02 PROJECT PHASING

Contractor shall include 30 calendar days for preplanning of the work, prior to starting any construction/testing work. This shall commence immediately after NTP. This time will be used for: schedule planning of sequences, disruption notifications to user groups, and RFS's, MOP's, ICRA's, ILSM, and temporary power planning,
Excluding concrete cores and containment cube(s), no more than 4 containments will be up at any given time, throughout the duration of the project.

1.03 WORK SEQUENCE and WORK RESTRICTIONS

- 1.04
- A. Contractor should assume no on-site storage or debris bins will be available at the campus. A request for storage can be submitted after award, but request may not be approved.
 - B. All Contractor and Subcontractor personnel will be required to purchase parking passes.
 - C. Contractor shall utilize Procore or similar PM software for management of project documentation including, but not limited to: RFI's, submittals, meeting minutes and inspection requests.
 - D. In areas where a rate assembly is opened for work, the assembly must be returned to a rated condition at the end of the shift, or fire watch shall be put in place with competent staff.
 - E. Disruptive work (exceeding 80 dBA at a distance of 10') shall be coordinated with UCDH user groups in advance of work.
 - F. Contractor is responsible for all abatement required to completed the work. Refer to Hazardous Material Report as bid reference.

1.04 CONTRACTOR'S USE OF PROJECT SITE

- A. Contractor's use of the Project site for the Work and storage is restricted to the areas designated on the Drawings.

1.05 UNIVERSITY OCCUPANCY

East Wing Tower (HCAi BLD-01436) and East Wing Radiology (HCAi BLD-01437) are both fully occupied and will remain occupied throughout the project.

1.06 SUBSTANTIAL COMPLETION

- A. Substantial Completion shall be applicable to the entire Work.

1.07 PROTECTION OF PERSONNEL

- A. Patients, University of California Davis (UCD) personnel and Students, will be occupying parts of the adjacent buildings during the construction period. Contractor shall take proper precautions to ensure the safety of all persons during the construction period.

1.08 WORK SITE DECORUM

- A. Extreme care to limit noise shall be taken at all times that the building is occupied. Loud or unnecessary conversation shall be avoided. The playing of radios, or any audio devices shall be strictly prohibited. Noise, that in the sole opinion of the University's Representative, is disturbing or disruptive to occupants of the building shall be scheduled for periods when the building is not occupied.
- B. Contractor shall control the conduct of its employees so as to prevent unwanted interaction initiated by Contractor's employees with UCD staff, patients, students or other individuals, adjacent to the Project site. Without limitation, unwanted interaction by Contractor's employees includes whistling at or initiating conversations with passersby. In the event that any Contractor's employee initiates such unwanted interaction, or utilizes profanity, Contractor shall, either upon request of University's Representative or on its own initiative, replace said employee with another of equivalent technical skill, at no additional cost to the University.

- C. SMOKE AND TOBACCO-FREE ENVIRONMENT: The University of California Davis is committed to a healthy campus and workplace culture and environment. Effective January 2, 2014, the University of California Davis is a Smoke and Tobacco-Free environment. Smoking and the use of smokeless tobacco products (e.g., e-cigarettes and other unregulated nicotine products) is strictly prohibited on all University of California Davis-controlled properties, owned or leased and regardless of location. This policy is intended to provide a healthier, safer, and productive work and learning environment for the entire University of California Davis community. For more information on the Smoke/Tobacco-Free Policy, please visit (<http://breathefree.ucdavis.edu>). For more information on the President's Mandate and other related resources, please visit <http://uctobaccofree.com/>.
- D. Alcoholic beverages are prohibited on the University's Project site.

1.09 INTERRUPTION OF BUILDING SERVICES

- A. Planned utility service shutdowns shall be accomplished during periods of minimum usage. In some cases, this will require Work activities before 8:00 a.m. and after 5:00 p.m. and weekend Work, at no additional cost to the University. At least 14 calendar days advance notice shall be given to the University's Representative before interruptions to utility service (refer to Utility Service Interruption/Shut Down Request) and other interferences with use of existing buildings, surrounding hardscape and roads.
- B. Shutdowns critical to the completion of the project shall be listed as Milestones on the project schedule. The Contractor shall program Work so that service will be restored in the minimum possible time and shall cooperate with the University in reducing shutdowns of utility systems.
- C. The University reserves the right to deny shutdown requests based on scheduled workload, research projects, and usage of surrounding buildings or other activities planned on campus.
- D. University's costs for initial planned utility service shutdowns shall be borne by the University. If repeat utility service shutdowns are required due to work necessary to correct Contractor's defective work, mistakes in new work layout such as misalignment or installation conflicts with other new work, University's costs for repeat shutdown(s) will be deducted from Contract Sum.

1.10 SITE INGRESS AND EGRESS

- A. Access to Project site shall be as indicated on the Drawings. Access to Project site is limited to designated routing on existing access roads. The Contractor and their employees, subcontractors, suppliers or delivery personal must stay on the designated roads and may not drive, ride or walk to other locations unless prior permission is provided in writing by the University's Representative.
- B. Contractor shall take all necessary precaution to ensure the safety of the bicyclists and pedestrians that use the campus roads.

- C. Contractor shall clean the site access and roads affected by the Work and shall maintain such in a dust free and safe and usable condition for motorists, bicyclists and pedestrians. During inclement weather Contractor shall closely monitor conditions to prevent slickness of roads.
- D. Contractor shall be permitted to block only 1/2 of a street at a time for momentary site access, unless specified otherwise. The street shall be operational and usable by the University at all times.

1.11 MOTOR VEHICLE AND BICYCLE TRAFFIC CONTROL

- A. Contractor shall adopt all practical means to minimize interference to traffic. Access to other facilities in the area shall be maintained at all times. The Contractor shall provide a schedule of any activity that will impact traffic, or any planned lane or street closure, for approval by the University's Representative and shall give a minimum of 14 business days notice before closing any street or access.
- B. Contractor shall furnish at its expense all signage barricades, lights, and flaggers required to control traffic and shall provide and maintain suitable temporary barricades, fences, directional signs, or other structures as required for the protection of the public; and maintain, from the beginning of twilight through the whole of every night on or near the obstructions, sufficient lights and barricades to protect the public and Work.
- C. Contractor shall provide directional signs for use throughout the duration of the Project. The quantity shall be determined by the University's Representative and Contractor during a mandatory Pre-construction site meeting. Contractor shall prepare a mock-up of the sign for approval by the University's Representative.
- D. It is the responsibility of the Contractor performing Work on, or adjacent to, a roadway or highway to install and maintain such devices which are necessary to provide reasonably safe passage for the traveling public, including pedestrians and bicyclists, through the Work, as well as for the safeguard of workers. Before Work begins, a site meeting shall be held to discuss motor vehicle and bicycle traffic control plans for handling traffic through a construction or maintenance zone. Traffic control plans shall be submitted for review by the University's Representative and public agency or authority having jurisdiction over the roadway or highway. These traffic control plans shall be prepared by persons knowledgeable about the fundamental principals of temporary traffic controls and the work activities to be performed. The design, selection, and placement of traffic control devices for the traffic control plan shall be based on engineering judgment and in accordance with Part 6 of the California Manual on Uniform Traffic Control Devices for Streets and Highways.

- E. All metal plating and metal bridging shall be non-skid with waffle-patterns or right-angle undulations or shall be coated with a non-skid product. Plating shall be installed with no protruding edges or corners sticking up and with no bouncing or shifting.

PART II - PRODUCTS – Not applicable to this Section.

PART III - EXECUTION – Not applicable to this Section.

END OF SECTION 01 14 00

SECTION 01 22 00
ALLOWANCES

PART I - GENERAL

1.01 GENERAL

- A. The Contract Lump Sum Base Bid as entered in Article 4.0 of the Bid Form shall include the amounts for all Allowances required in this section and elsewhere in the Contract Documents. All Allowances shall be provided by the Contractor for the amounts indicated.
- B. The following shall apply to the Allowances, unless otherwise indicated in the Contract Documents:
1. Allowance amounts shall be for the full amount of compensation, both direct and indirect, and contain all overhead costs including but not limited to supervision, support, taxes, bonds, insurance, and profit.
 2. Allowances shall be for complete compensation to the Contractor for all materials and equipment delivered at the Project site, including all overhead, taxes, insurance, shipping, and handling.
 3. Allowances shall be for complete compensation to the Contractor for all labor amounts and shall include all overhead, supervision, support, tools and equipment to perform the work directed by the University's Representative.
 4. Allowances for tradesmen in labor amounts will be utilized and directed by the University's Representative. These amounts are for work not included in the scope of the contract documents and are solely for the use and direction by the University's Representative
 5. Upon project closeout, adjustments for any remaining quantities of the amounts included in the Allowances will be deleted from the contract sum on a per unit basis.

1.02 DESCRIPTION OF ALLOWANCES

- A. 1. Contractor shall include in the base bid, an allowance of \$20,000 for finish materials (flooring, wallcovering) to replace existing where removed at test site locations. The allowance is to cover the cost of the finish material only. All other costs such as removal, installation, incidentals for installation, shipping, etc. shall be included in the base bid. Any damages to finishes, not specifically required to be removed for testing shall be

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included in the base bid. All labor and material costs for painting shall be included in the base bid.

PART II – PRODUCTS – Not Applicable to this section.

PART III – EXECUTION – Not Applicable to this section.

END OF SECTION 01 22 00

012200-2

ALLOWANCES

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SECTION 01 23 00

ALTERNATES

PART I - GENERAL

1.01 GENERAL

- A. This Section identifies each Alternate and describes basic changes to the Work only when that Alternative is made a part of the Work by specific provision in the Agreement.
- B. Lump Sum Base Bid and Alternates shall include costs of all supporting elements required, so that combination of Lump Sum Base Bid and any Alternates shall be complete. Scope of Work for all Alternates shall be in accordance with applicable Drawings and Specifications.
- C. Except as otherwise specifically provided by University, Work described in Alternates shall be completed with no increase in Contract Time.
- D. This Section includes only non-technical descriptions of the Alternates. Refer to Sections of Division 2 - 48 of the Specifications for technical descriptions of the Alternates.
- E. Coordinate related Work and modify surrounding Work as required to integrate Alternates into the Work properly and completely.

1.02 DESCRIPTION OF ALTERNATES

- A. Not used.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not applicable to this Section

END OF SECTION 01 23 00

SECTION 01 25 00

CLARIFICATION/INFORMATION PROCEDURES

PART I - GENERAL

1.01 DESCRIPTION

- A. This Section contains the procedures to be followed by Contractor for submitting a Request for Information (RFI) upon discovery of any apparent conflicts, omissions, or errors in the Contract Documents or Drawings or upon having any question concerning interpretation.
- B. Section Includes
 - 1. RFI Administrative requirements
 - 2. RFI Procedures
 - 3. RFI Execution

1.02 RELATED DOCUMENT SECTIONS

- A. Conditions of the Contract: Governing requirements for changes in the Work, in Contract Sum and Contract Time.
- B. Section 016100 – PRODUCT REQUIREMENTS: Product options, substitutions, omissions, and improper descriptions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Description: Section provides procedure for Contractors to obtain interpretation or clarification of the Contract Documents, or identify apparent conflicts, omissions, or errors in the Contract Documents.
- B. Responsible Person for Contractor: Submit name of the individual authorized to receive Requests for Information documents, and who is responsible for forwarding Request.
- C. RFI Format: Submit all Requests for Information on the form attached at the back of this Section, or electronic and/or web-based construction administration software provided or accepted by the University.

1.04 RFI PROCEDURES

- A. RFI Format, Numbering and Subject:
 - 1. RFI Format: Submit all requests for clarification or additional information in writing to University's Representative using the RFI Request for Information form provided at the back of this Section or obtained from University's Representative.
 - 2. RFI Numbering: Number RFIs sequentially. Follow RFI number with sequential alphabetical suffix for resubmissions. For example, the first RFI is numbered

"001". The second RFI is numbered "002" and so on. The first resubmittal of RFI "002" will be numbered "002a".

3. RFI Subject: Limit each RFI to one (1) subject only.

B. RFI Submittal conditions:

1. Discovery of unforeseen condition or circumstance not described in the Contract Documents.
2. Discovery of an apparent conflict, discrepancy, or inconsistency in or between portions of the Contract Documents.
3. Discovery of a situation, direction or apparent omission that cannot be reasonably inferred from the intent of the Contract Documents.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 EXECUTION OF RFIs

- A. Email the University's Representative the RFIs. Emailed RFI requests received after normal business hours and/or received on non-normal workdays, as defined in Specification Section 013100–COORDINATION, Item 1.07.F.4.A will begin notification time starting at 7:00 a.m. the following workday.
- B. Failure to provide proper information: RFIs will not be recognized or accepted if, in the opinion of University's Representative, one of the following conditions exist:
 1. Contractor submits the RFI as a request for substitution.
 2. Contractor submits the RFI as a Submittal.
 3. Contractor submits the RFI as a Contract Document discrepancy or omission without through review of the Documents (Capricious submission).
 4. Contractor submits the RFI assuming portions of the Contract Documents are excluded or by taking an isolated portion of the Contract Document in part rather than in whole.
 5. Contractor submits the RFI in an untimely manner without proper coordination and scheduling of Work of other Trades.
- C. Response Time: Request clarifications or information immediately upon discovery of need. Submit RFI's in a timely manner allowing full response time to avoid impacting Contract Schedule.
 1. University's Representative, whose decision will be final, shall resolve issues and respond to questions of Contractor, in most cases, within fourteen (14) calendar days. Actual time may be lengthened for complex issues, or shortened for expedited situations, as mutually agreed in writing.
 2. After submission of an RFI by Contractor and prior to receipt of the RFI response from University, the Contractor proceeds with effected Work at own risk. Any

portion of the Work not constructed in accordance with University's interpretation, clarification, instruction or decision is subject to removal and replacement at Contractor's expense.

- D. Failure to Agree: In the event of failure to agree to the scope of the Contract requirements, Contractor shall follow procedures set forth in Article 4 of the General Conditions of the Contract.

3.02 Refer to the following Attachment

- A. Request for Information

END OF SECTION 01 25 00

REQUEST FOR INFORMATION

Project #: _____ **Project Title:** _____
RFI #: _____ **Date:** _____ **HCAI #:** _____

UC Davis Health Facilities Design & Construction 4800 2 nd Avenue, Suite 3010, Sacramento, CA 95817 Attn.: Casey Lubawy P: 916-612-3617 C: ###-###-#### Email: calubawy@health.ucdavis.edu	From:	

SUBJECT: _____

SPEC SECTION/DRAWING #: _____ **PARA:** _____ **DETAIL:** _____
RM # _____ **GRID #** _____

TRANSMITTAL RECORD	Requestor to FD&C	FD&C to A/E	A/E to FD&C	FD&C to Requestor	Notes
Date Submitted					

INFORMATION NEEDED: _____

CONTRACTOR'S PROPOSED RESOLUTION: _____

REQUESTOR SIGNATURE: _____ **REPLY REQUIRED BY:** _____

ATTACHMENTS: _____

REPLY: _____

REPONDER SIGNATURE: _____ **DATE:** _____

UNLESS OTHERWISE INDICATED ABOVE, THE REPLY TO THIS RFI IS NOT INTENDED TO BE A CHANGE DIRECTIVE. SHOULD THE CONTRACTOR, SUBCONTRACTOR, OR SUPPLIERS FEEL THAT THE REPLY WILL IMPACT THE PROJECT COST OR SCHEDULE; IT SHOULD IMMEDIATELY BE CONVEYED TO THE UNIVERSITY'S FD&C PROJECT MANAGER IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

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SECTION 01 25 50

CONTRACT MODIFICATION PROCEDURES

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Change Order Administrative Requirements
- B. Documentation of Change in Contract Sum and Contract Time
- C. Change Procedures
- D. Field Orders
- E. Stipulated Sum Change Orders
- F. Unit Price Change Orders
- G. Time and Material Change Orders
- H. Cost Proposals and Supporting Documentation
- I. Execution of Change Orders
- J. Reconciliation of Change Orders

1.02 RELATED DOCUMENT SECTIONS

- A. General Conditions of the Contract: Governing requirements for changes in the Work, in Contract Sum and Contract Time.
- B. Section 012500 – CLARIFICATION/INFORMATION PROCEDURES
- C. Section 012900 – MEASUREMENT AND PAYMENT: Applications for Payment.
- D. Section 016100 – PRODUCT REQUIREMENTS: Product options, substitutions, omissions, and improper descriptions.
- E. Section 017700 – CLOSEOUT PROCEDURES: Project record documents.

1.03 DEFINITIONS

- A. Total Wage Rate: Base rate paid to the worker, including his/her fringe benefits, workman's compensation insurance and subsequent payroll taxes paid by the employer.
 - 1. Use Wage Rate Calculator issued with Division One.
 - 2. Projects in the University Controlled Insurance Program (UCIP) should not include workman's compensation in the wage rates.

- B. Consumables: Material purchased in bulk and not expressly accounted for in the listed materials on a change order request. These include but are not limited to, rags, washers, screws, nuts, small bolts, lubricants, cleaning materials, pens, chalk, pencils, tie wire, caution tape, etc. Compensation for consumables shall be incorporated as a 3% percentage increase on direct material costs for trades where these items are routinely used.
- C. Non-working Supervision: Non-working supervision is not allowed to be included on a change order per GC article 7.3.3.

1.04 SUBMITTALS

- A. Submit the items listed below prior to submitting the 2nd Application for Payment.
 - 1. Total Wage Rates: Provide a wage rates for each key worker of the General Contractor and all Subcontractor tradespeople using the University's digital form for review and in compliance with the general conditions article 7 for approval by the University. Approved rates will be used in the Exhibit 7 Labor Rate Breakdown forms submitted with each Cost Proposal.

1.05 CHANGE ORDER ADMINISTRATIVE REQUIREMENTS

- A. Responsible Person for Contractor: Submit name of the individual authorized to receive construction change documents, and who is responsible for informing others in Contractor's employ of subcontractors of changes in the work.
- B. Exhibit 7 of the Contract includes the following Forms:
 - 1. COST PROPOSAL Form
 - 2. SUPPORTING DOCUMENTATION FOR THE COST PROPOSAL SUMMARY Form
 - 3. CHANGE ORDER Form
 - 4. REPORT OF SUBCONTRACTOR INFORMATION Form

1.06 DOCUMENTATION OF CHANGE IN CONTRACT SUM AND CONTRACT TIME

- A. Documentation of Changes in Contract Sum and Contract Time: Provide full information required for evaluation of proposal, of proposed changes and to substantiate costs of changes in the Work.
 - 1. Maintain detailed records of Work completed on time and material basis.
 - 2. Document each quotation for a change in Contract Sum and Contract Time with sufficient data to allow evaluation of the quotation.

- B. Additional Data: Upon request, provide additional data to support computations.
 - 1. Quantities of products, labor, and equipment.
 - 2. Taxes, insurance, and bonds.
 - 3. Overhead and profit.
 - 4. Justification for change in Contract Time, if claimed.
 - 5. Credit for deletions from Contract, similarly documented.

1.07 CHANGE PROCEDURES

- A. University's Supplemental Instructions: Minor changes in the Work, not involving adjustments to the Contract Sum or Contract time, as authorized by the General Conditions of the Contract, may be presented using Supplemental Instructions or correspondence containing similar information.
- B. University Initiated Changes: A Request for Proposal may be issued by University's Representative, which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications.
 - 1. The Request for Proposal may include an estimate of additions or deductions in the Contract Sum or Contract Time for executing the change and may include stipulations regarding overtime work and the period of time the requested response from the Contractor shall be considered valid.
 - 2. Contractor shall prepare and submit a response to the Request for Proposal within fourteen (14) calendar days.
- C. Contractor-initiated Changes: Contractor may propose a change by submitting a request for change to University's Representative, describing proposed change and its full effect on the Work.
 - 1. Include statement describing reason for change, and full description of effects on Contract Sum, Contract Time, related Work and work being performed under separate contracts.
 - 2. Requests for substitutions shall be included under this category, with procedures as specified in Section 016100 – PRODUCT REQUIREMENTS.

1.08 FIELD ORDER

- A. Field Order: University's Representative may issue a Field Order, signed by University's Representative, instructing the Contractor to proceed immediately with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. The document will describe changes in the Work, and will designate the method of determining what, if any, change is due in the Contract Sum or the Contract Time.
 - 2. Promptly execute the change in the Work indicated in the Field Order prior to acceptance of a Cost Proposal for the Work by the University.

- B. Cost and Time Resolution: Costs and time adjustments for changes in the Work shall be per provisions of the General Conditions of the Contract, unless otherwise agreed to prior to issuance.

1.09 CHANGE ORDERS

- A. Stipulated Sum Change Orders: Contractor's response to Request for Proposal or Field Order will be considered and a mutually acceptable adjustment in Contract Sum and Contract Time will be determined. Change Order for this stipulated amount will be prepared by University's Representative for execution by University and Contractor.
- B. Unit Price Change Order: Change Order will be prepared by University's Representative for execution by University and Contractor, based on mutually acceptable quantities and pre-determined unit prices.
 - 1. For unit cost or quantities not pre-determined, the Work shall be accomplished under a Stipulated Sum Change Order, if there is no dispute over the estimated or stipulated maximum cost and time for the change.
 - 2. If the amounts are not defined or are disputed, a Field Order will be prepared and issued by University's Representative.
- C. Time and Material Change Orders: As directed for changes for where amounts are not defined or are disputed, Contractor shall execute the Work, keeping accurate records of time, both labor and calendar days, and cost of materials.
 - 1. Contractor shall prepare and submit an itemized account and supporting data after completion of the change, within the time limits indicated in the Conditions of the Contract.
 - 2. University's Representative will determine the change allowable in Contract Sum and Contract Time, as provided elsewhere in the Contract Documents, and make recommendation to University for acceptance of Change Order.
 - 3. Contractor shall provide full information as required and requested for evaluation of proposed changes, and to substantiate costs for changes in the Work.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 CONTENT OF COST PROPOSALS

- A. Cost Proposals shall include the following:
 - 1. Detailed description of the work involved including:
 - a. What work is being performed?
 - b. Where the work is performed?
 - c. When the work was performed if already completed?
 - d. When the work is scheduled to be performed if not yet completed?

- e. Why this work is a change to the contract?
 2. Detailed description of any time impacts associated with the work; refer to General Conditions, paragraph 8.4.
 3. Materials
 - a. Material shall be submitted at the cost paid by the contractor.
 - 1) Invoices may be required to validate that meet the following criteria:
 - a) Invoices may be from different projects if the following conditions are met:
 - (1) The COR is before the contractor would reasonably have the material on site to accomplish the COR.
 - (2) Recent, within last 6 months.
 - (3) There must be at least enough of the material in question to accomplish the work in the proposed COR.
 - b) The invoice shall not be modified from the version provided by the vendor.
 4. Labor unit breakdown backed up by some sort of industry standard (NECA for electrical, MCAA for plumbing and mechanical, SMACNA for mechanical, Etc.) These standards shall be used at their base rate, with no added percentages nor adjustments. This has been found to be a fair representation of the man-hours required to do these types of work.
 - a. This project has been determined as NECA normal.
 5. Wage rate back up matching the submitted back up as described in 1.03.A.
- B. Submittal of a Cost Proposal using the Cost of the Work plus Contractor Fee described in General Conditions paragraphs 7.3.5 and 7.3.6 shall include the following items in addition to those listed above:
1. Field Order instructing the change. Only a field order may instruct work to be completed using this basis.
 2. Material invoices shall be provided for any item used in Extra Work.
 3. Job site work tags identifying daily labor and material usage shall be submitted with:
 - a. Specific description of the work performed on that tag.
 - b. Identification of large equipment used
 - c. Identification of labor class for each individual

- d. Location - room number, gridline or distinct location.
 - e. Signed by the Contractor and University's Representative.
- C. Any coordination required for implementation of a change into the work, documents, or model is and shall be considered part of the allowable markups provided in General Conditions paragraphs 7.3.3.1-18 and 7.3.4.

3.02 EXECUTION OF CHANGE ORDERS

- A. Execution of Change Orders: After the University's Representative has accepted the Change Order Proposal; the University's Representative shall prepare Change Order documents for signature by parties as provided in the Conditions of the Contract.

3.03 RECONCILIATION OF CHANGE ORDERS

- A. Schedule of Values: Promptly revise the Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjustment to the Contract Sum.
- B. Schedules: Upon completion of the Change Order, promptly revise progress schedules to reflect changes in Contract Time, revising sub-schedules to adjust time for other items of Work as may be affected by the change. Submit revised schedules with next Application for Payment.

END OF SECTION 01 25 50

SECTION 01 27 00**UNIT PRICES****PART I - GENERAL**

1.01 DESCRIPTION

- A. Unit price quotations are to be inserted in the appropriate spaces in the Bid Form for each unit price item of Work described herein.
- B. Unit prices stated in the Agreement shall be used to complete adjustments of the Contract Sum for approved unit price items of Work. Such adjustments shall be made by Change Order.
- C. Unit prices shall include all labor, materials, tools, equipment, direct and indirect costs necessary to complete the item of Work and coordinate the Work and shall include all overhead and profit. Contractor shall accept compensation computed in accordance with the unit prices as full compensation for furnishing such Work.
- D. Compensation will be paid for those items of Work described below in sub-Section 2.01.

1.02 SPECIFIED WORK

- A. Applicable Sections of the Specifications describe the materials and methods required for the various unit price items of Work.

PART II - PRODUCTS

2.01 UNIT PRICES

- A. Not used
 - 1.

PART III - EXECUTION

3.01 UNIT PRICES

- A. Immediately notify University's Representative when conditions require use of unit price items.
- B. The applicability of measurement methods for, documentation of, and final adjustment of, the Contract sum for unit price items of Work shall be determined by University's Representative. The applicability of measurement methods for, documentation of, and final adjustment of, the Contract sum for unit price items of Work shall be determined by University's Representative.

- C. After performing unit price items as described by University's Representative, Contractor shall take necessary measurements in the presence of University's Representative and shall submit calculations of quantities to University's Representative for approval. Contractor shall notify University's Representative seven (7) calendar days in advance of taking measurements.

END OF SECTION 01 27 00

SECTION 01 29 00**MEASUREMENT AND PAYMENT****PART I - GENERAL**

1.01 SECTION INCLUDES

- A. Procedures for preparation and presentation of Application for Payment.
- B. Procedures for preparation and presentation of Schedule of Values.

1.02 RELATED DOCUMENTS AND SECTIONS

- A. GENERAL CONDITIONS of the Contract: Progress Payments and Final Payment.
- B. Section 013200 – CONTRACT SCHEDULES
- C. Section 017700 – CLOSEOUT PROCEDURES
- D. Section 017800 – CLOSEOUT SUBMITTALS

1.03 PAYMENT APPLICATION FORM

- A. Payment Application Form: Prepare Applications for Payment using Exhibit 4 provided in the Contract.

1.04 SCHEDULE OF VALUES

- A. Coordination. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Contract Schedule and as directed by the University's Representative.
 - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
 - a. Contractor's Contract Schedule.
 - b. Application for Payment form.
 - c. List of Subcontractors.
 - d. List of products (where/if appropriate).
 - e. List of principal supplier and fabricators.

- f. Submittal Schedule
 - g. Construction Cost Breakdown Sheet.
 2. Submit the Schedule of Values to the University's Representative at the earliest feasible date, but in no case later than 7 calendar days before the date scheduled for Submittal of the Initial Application for Payment.
- B. Format and Content. Use the Specification Table of Contents as a guide to establish the format for the Schedule of Values.
 1. Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of the University's Representative.
 - c. Project Number.
 - d. Contractor's name and address.
 - e. Date of Submittal.
 2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
 - a. Generic name.
 - b. Performance Specification or University Specification section.
 - c. Name of Subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier (if appropriate).
 - f. Change orders (number) that have affected value.
 - g. Dollar value. (Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.)

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
4. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 - a. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance and bonded warehousing, if required.

6. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Contractor's General Conditions overhead and profit shall be a separate line item per month.
8. Allowances (if applicable). Show the line item value of allowances.

1.05 PREPARATION OF APPLICATIONS

- A. Preparation of Applications for Payment: The following requirements supplement the provisions of the General Conditions of the Contract. Refer to the GENERAL CONDITIONS OF THE CONTRACT.
1. Present required information in PDF electronic file on the required forms. Media-driven forms are acceptable.
 2. Execute certification by verified electronic signature of authorized officer of the Contractor.
 3. Use data from the approved Schedule of Values. Provide dollar value in each column of application for each line item and portion of Work performed and for products stored, if permitted.
 - a. List value of each major item of Work and each subcontracted item of Work as a separate line item to serve as a basis for computing values for progress Payments. Round off values to nearest dollar. Listed items of work shall be identified by Specification Section number.
 - b. List products and operations of each major subcontract as separate line item.
 - c. Include Work Allowances (if any) within line item of Work.
 - d. Coordinate percentage complete with Progress Schedule.
 - e. Provide separate line items for each area of work such as but not limited to floors, zones, wings, or other areas that can be clearly identified.
 - f. The sum of values listed shall equal total Contract Sum.
 4. List each authorized Change Order as an extension on the continuation sheet, listing the Change Order number and dollar value as for an original item of Work. Change Order shall be broken down same as Application for Payment.

5. No Change Order shall be included with Application for Payment until approved in writing by University and University's Representative.
 6. Refer to 1.05 for other items required for the Application for Payment.
- B. Final Payment: Prepare Application for Final Payment as specified in Section 017700 – CLOSEOUT PROCEDURES.

1.06 SUBMISSION OF APPLICATIONS FOR PAYMENT

- A. Submission of Applications for Payment: The following requirements supplement provisions of the General Conditions of the Contract. Refer to the GENERAL CONDITIONS OF THE CONTRACT.
1. Submit one (1) PDF electronic file of each Application for Payment with verified electronic signature, such as DocuSign. Round values to nearest dollar or as specified for the Schedule of Values.
 2. Submit an updated Construction Progress Schedule with each Application for Payment and specified in Section 013200 – CONTRACT SCHEDULES.
 3. Submit one (1) PDF electronic file of Schedule of Values in accordance with the General Conditions of the Contract. Form and content shall be acceptable to the University. Transmit under PDF electronic transmittal letter. Identify University's Project Name and University's Project Number.
 - a. List installed value of each major item of Work and for each subcontracted item of Work as a separate line item to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar. Listed items of Work shall be identified by Specification section number. Each value will be based on a percent complete of that line item.
 - b. For each major subcontract, list products and operations of that subcontract as separate line items.
 - c. Coordinate listings with Progress schedule. Contractor project General Conditions plus overhead and profit shall be a separate line item in the Application for Payment; and be divided in an equal amount for each month part of the Contract Time period.
 - 1) At 50 percent completion of the work, or at other times the University's Representative deems appropriate, the University's Representative may request the monthly amount of overhead and profit be adjusted, if the contract schedule indicates going beyond the Contract End Date.

- d. For items on which payments will be requested for on-site stored products, list sub-values for cost of on-site stored products with taxes paid. If stored products are not on-site, they must be stored in a bonded warehouse or location approved by the University's Representative prior to including on the Application for Payment.
 - e. Submit a sub-schedule for each separate Phase of Work specified in Section 011100. Include scheduling of sequences within each phase indicated on the drawings.
 - f. The Sum of values listed shall equal total Contract Sum.
 - g. When University's Representative requires substantiating information, submit data justifying line-item amounts in question.
 - h. Provide one (1) PDF electronic file of data with cover letter for each copy of Application. Show Application number and date, and line item by number and description.
4. Submit Applications for Payment, Continuation Sheets and Schedule of Values under PDF electronic transmittal letter. Contractor shall identify all payment application documents by University's Project Name and University's Project Number.

1.07 SUBSTANTIATING DATA

- A. University's Representative may request substantiating information. Submit data reconciling line-item amounts in question.
- B. Provide one (1) PDF electronic file of data with cover letter for each copy of submittal. Show Application number including date and line item by number with description.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not Applicable to this Section

END OF SECTION 01 29 00

SECTION 01 31 00

COORDINATION

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Project Meetings
- B. Submittals Requirements
- C. General Contractor Coordination
- D. Coordination of Subcontractor and Separate Contracts
- E. University Criteria

1.02 RELATED REQUIREMENTS

- A. Section 011100 – SUMMARY OF THE WORK: Description of Contract Documents.
- B. Section 013200 – CONTRACT SCHEDULES
- C. Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- D. Section 013500 – SPECIAL PROCEDURES: Interim Life Safety Measures (ILSM).
- E. Section 014500 – QUALITY CONTROL
- F. Section 014550 – INSPECTION AND TESTING OF WORK
- G. Section 015100 – TEMPORARY UTILITIES
- H. Section 015200 – CONSTRUCTION FACILITIES
- I. Section 015500 – VEHICULAR ACCESS AND PARKING: Traffic Regulation.
- J. Section 015600 – TEMPORARY BARRIERS, ENCLOSURES AND CONTROLS
- K. Section 015610 – AIRBORNE CONTAMINANTS CONTROL
- L. Section 016100 – PRODUCT REQUIREMENTS
- M. Section 017300 – CUTTING AND PATCHING
- N. Section 017700 – CLOSEOUT PROCEDURES: Coordination of completion reviews, inspections, and submission of documents.

- O. Section 017800 – CLOSEOUT SUBMITTALS: As-Built Documents.
- P. Division 21 - Fire Protection Systems.
- Q. Division 28 - Fire Alarm Systems

1.03 MEETINGS

- A. Pre-Construction/Site Mobilization Conference: University's Representative will administer site mobilization conference at Project site for clarification of responsibilities of University, University's Representation and Contractor, use of site and for review of administrative procedures. Site mobilization conference shall be held within fourteen (14) calendar days of Notice to Proceed, unless otherwise directed by University's Representative.
 - 1. Agenda: Pre-Construction/Site Mobilization Conference shall cover the following topics at a minimum:
 - a. Special Project Procedures: Implementation of requirements as specified in Section 013100 – COORDINATION.
 - b. Subcontractors List: Provide PDF electronic file. Distribute and discuss list of subcontractors and suppliers.
 - c. Construction Schedule: Provide per Section 013200. Distribute and discuss initial construction schedule and critical work sequencing of major elements of Work, including coordination of University furnished/ Contractor installed (UFCI) products, University furnished/University installed (UFUI) products, and work under separate contracts, by utility agencies and companies and University.
 - d. Designation of Key personnel: Designate key personnel and update project directory for University, University's Consultants, Contractor, major subcontractors, major materials suppliers, serving utility agencies and companies, other contractors performing work under separate contracts and governing authorities having jurisdiction.
 - e. Project Communication Procedures: Review requirements and administrative requirements for written, electronic and oral communications.
 - f. Change Procedures: Review requirements and administrative procedures for Change Orders, Field Orders, University's Representative's Supplemental Instructions, and Contractor's Requests for Information.
 - g. Coordination: Review requirements for Contractor's coordination of Work; review sequence and schedule for work being performed for University under separate contracts.
 - h. Submittals Administration: Provide per Section 013300 and Section 016100. Review administrative procedures for shop drawings, project data and sample submittals and review of preliminary submittals schedule.

- i. Project As-Built Documents: Provide per Section 017700 and Section 017800. Review requirements and procedures for project as-builts, specifications and other documents.
 - j. Construction Facilities and Temporary Utilities: Provide per Section 015100 and Section 015200. Designate storage and staging areas, construction office areas; review temporary utility provisions; review University requirements for use of premises.
 - k. Materials and Equipment: Review substitution requirements; review schedule for major equipment purchases and deliveries; review materials and equipment to be provided by University (UFCI and UFUI products).
 - l. Site Access by University's Representative and University's Consultants: Review requirements and administrative procedures Contractor may institute for identification and reporting purposes.
 - m. Testing and Inspection: Provide per Section 014550 and other sections of the Contract. Review tests and inspections by independent testing and inspection agencies, manufacturers, and governing authorities having jurisdiction.
 - n. Permits and Fees: Review Contract requirements; review schedule and process for obtaining permits and paying fees.
 - o. Hours of Work and Work Restrictions per Section 011400.
 - p. Hot Works Permit.
- B. Billing Meetings: A billing meeting will be conducted by the University's Representative each month prior to submittal of the Application for Payment. Agenda: review of the percent complete relating to the submitted Schedule of Values. Prior to the Billing Meeting the Contractor will submit a draft of the Application for Payment for review by the IOR and University Representative.
- C. Progress Meetings: Progress meetings shall be periodically scheduled throughout progress of the Work. Frequency shall be as determined necessary for progress of Work. Generally, it is intended progress meetings be held once a week as designated by the University's Representative.
- 1. Attendance: Contractor's Project Manager and jobsite Superintendent shall attend each meeting. Contractor's subcontractors and suppliers may attend as appropriate to subject under discussion. University will have a representative at each meeting. University's Consultants, as appropriate to agenda topics for each meeting and as provided in University/Consultant Agreement, will also attend.
 - a. Suggested Agenda for Progress Meetings:
 - 1) Building Code/Fire Marshal Issues
 - 2) Design Issues
 - 3) Submittals and Long Lead Items
 - 4) UFCI and UFUI products.

- 5) Request for Information
 - 6) Safety Issues
 - 7) Scheduling Status/1 Week Prior and 32 Week Look Ahead
 - 8) Potential Schedule Delay Issues
 - 9) Incomplete or Non-Conforming Work
 - 10) Inspection Requests
 - 11) Utility Shutdowns and Dig Notifications
 - 12) Instructional Bulletins and Field Orders
 - 13) Change Orders/Cost Proposals
 - 14) Payment Applications and As-Built Documents
 - 15) Miscellaneous Business
 - 16) Other items affecting progress of the Work
- D. Guarantees, Bonds, Service and Maintenance Contracts Review Meeting: Eleven months following the date of Substantial Completion, a meeting will be conducted by University's Representative to review the guarantees, bonds and service and maintenance contracts for materials and equipment.
- E. In addition to meetings listed above, Contractor shall hold coordination meetings and pre-installation conferences to assure proper coordination of Work.
1. Pre-installation Conferences: When required in individual Specification Sections, convene a pre-installation conference prior to commencing Work.
 - a. Require attendance by representatives of firms whose activities directly affect or are affected by the Work specified.
 - b. Review conditions of installation, preparation and installation procedures and coordination with related Work and Work under separate contracts.
- F. Location of all meetings will be as designated by University's Representative. Participants at all meetings shall be University's Representatives, Consultants and/or Vendors, Contractor, Superintendent, Subcontractors and others as appropriate.

1.04 SUBMITTALS

- A. Coordination of Submittals: Schedule and coordinate submittals as specified in Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES, Section 017700 – CLOSEOUT PROCEDURES and Section 017800 – CLOSEOUT SUBMITTALS.
1. Coordinate submittal effort of various trades, subcontractors and suppliers having interdependent responsibilities for installing, connecting, and placing into service such equipment, materials or installations as necessary for the Work.

2. Coordinate requests for substitutions to assure compatibility of space, operating elements, and effect on work of others.
 3. Contractor shall submit the following submittals to the University's Representative who will forward directly to the appropriate State Agencies for their review and approval:
 - a. None
- B. Coordination/Engineering Drawings: Submit in accordance with Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES and as specified herein.
- C. Work Plans: Submit as specified herein.

1.05 COORDINATION

- A. Coordination: Contractor shall coordinate the Work as stated in the General Conditions of the Contract. Work of the Contract includes coordination of the entire work of the Project, from beginning of construction activity through Project closeout and warranty periods. Contractor shall also coordinate Work under the Contract with work under separate contracts by University. Contractor shall cooperate with University and others as directed by University's Representative in scheduling and sequencing the incorporation into the Work of University Furnished/ Contractor Installed (UFCI) products identified in the Contract Documents.
1. Coordinate completion and cleanup of work of the separate trades, subcontractors, vendors, etc., in preparation for University occupancy
 2. After University occupancy, coordinate access to site by various trades, subcontractors, vendors, etc., for correction of defective work and/or work not in accordance with Contract Documents, to minimize University disruption.
 3. Assemble and coordinate closeout submittals specified in Section 017700 – CLOSEOUT PROCEDURES.
- B. Construction Interfacing and Coordination: Layout, scheduling and sequencing of Work shall be solely Contractor's responsibility. Contractor shall bring together the various parts, components, systems and assemblies as required for the correct interfacing and integration of all elements of Work. Contractor shall coordinate Work to correctly and accurately connect abutting, adjoining, overlapping and related elements, including work under separate contracts by University and utility agencies, if any.
- C. Installation of Systems into Project Space: Follow routings shown for pipes, ducts and conduits as closely as practicable, as shown on the Contract Documents with due allowance for available physical space; make runs parallel with line of building. Utilize space efficiently to maximize accessibility for other installations, future maintenance and repairs. In finished areas, except as otherwise shown, conceal pipes, ducts and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.
- D. Utility Work: Work occurring on or in the immediate vicinity of critical utilities must be directly supervised at all times by Contractor's qualified personnel. Requirements stated herein for notification, work plans, dig notification forms and marking locations of existing utilities shall apply. Contractor will be held fully liable for costs and damages due to unplanned interruption of critical utilities, including any personal injury to Hospital patients, visitors, or staff.

1. Provide supervision and coordination necessary to meet requirements of electrical power connection as set forth by the Sacramento Municipal Utility District (SMUD).
2. Provide reasonable and convenient staging and access areas to permit SMUD, its vendors or subcontractors, to install, modify or remove electrical transformers or other components of the electrical power system furnished and installed by SMUD.

1.06 COORDINATION OF SUBCONTRACTORS AND SEPARATE CONTRACTS

- A. Conflicts: Conflicts shall be resolved by the Contractor. Contractor bears primary responsibility for conflict resolution regarding the coordination of all building trades, subcontractors and suppliers.
- B. Superintendence of Work: Contractor shall appoint a field superintendent who shall direct, supervise, and coordinate all Work in the Contract Documents.
- C. Subcontractors, Trades and Materials Suppliers: Contractor shall require all subcontractors, trades, crafts and suppliers to coordinate their portions of Work with the Superintendent to prevent scheduling, sequencing, dimensional and other conflicts and omissions.
- D. Coordination with Work Under Separate Contracts: Contractor shall coordinate and schedule Work under Contract with work being performed for Project under separate contracts by University. Contractor shall make direct contacts with parties responsible for work of the Project under separate contracts, in order to provide timely notifications and to facilitate information exchanges.
- E. Service Connections: Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work; final connection of electrical services to general work is defined as electrical work.

1.07 UNIVERSITY CRITERIA

- A. During the Base Construction time, Contractor shall allow University 14 calendar days [to move University equipment and/or provide furnishings in test locations. Contractor shall notify University's Representative in writing a minimum of fourteen (14) calendar days prior to completion of area described above.
 1. Contractor shall show this time as a distinct activity on the detailed project schedule.
- B. Equipment Coordination: Contractor and University supplied equipment will require complete installation data be exchanged directly between Contractor and vendors and subcontractors involved as progress of Project requires. Individual requesting information shall advise when it is required. Incorrect, incomplete, delayed or improperly identified equipment causing delay or error in installation will require entity causing such action to be liable for modifications or replacements necessary to provide correct and proper installation, including relocations.
- C. Contractor shall provide large scale casework and equipment drawings for casework and equipment service rough-in locations (dimensioned from building features), service

characteristics, and locations of studs or blocking where such locations are critical to mounting or otherwise installing equipment and casework. Furnish sizes and spacing required for mechanical and electrical cutouts, and a complete brochure of fittings, sinks, outlets, or other information to provide a complete assemblage of the items and accessories being furnished.

- D. Interruption of Services: Construction Work shall accommodate University's use of surrounding and adjacent premises during the construction period and shall provide continuous public access and use of surrounding and adjacent facilities. Contractor shall not deny access to public use facilities until an alternate means of public use has been provided. An interruption of service is defined as any event which in any way interrupts, disrupts or otherwise discontinues, even momentarily, the services provided by University to its patients and staff. Adequate notice, as described below, shall be given to University when any interruption of services or interference with the use of existing buildings and roads are anticipated. Any interruption of service will be made only by University upon such notice. Interruptions to University services will not be made without prior notification and approval by University. Contractor shall never interrupt any University service without direct University participation.
1. Dig Notification: Contractor shall complete and submit for review to University's Representative, a Dig Notification Form, included at the end of this section, and obtain written authorization from University prior to the commencement of any digging activities. Digging activities include exploratory demolition, soils excavation, concrete core drilling, and saw cutting. Contractor shall include all pertinent information with the Dig Notification Form and submit with detailed work plan fourteen (14) calendar days prior to desired digging activity.
 2. The Contractor shall contact USA North 811 prior to starting underground Work to locate existing underground utilities.
 3. Contractor shall mark locations of all known utilities on ground of dig area with marker paint.
 4. Prior to commencement of digging activities, Contractor shall verify project inspector has inspected the dig site and confirmed the site marking as accurate, complete and in conformance with site utility plans.
 5. Contractor shall verify with University's Representative that all interested hospital departments have been notified of intent to begin digging operation.
 6. Record documents are required for dig activities. Contractor shall provide As-Built drawings.
- E. Shutdown Procedures: Contractor shall complete and submit for review and approval to University a Request for Shutdown form, included at the end of this section. Contractor shall include all pertinent information to assist University in coordination of shutdown activities. The Shutdown Request Form shall be submitted with a detailed work plan addressing the proposed shutdown not less than fourteen (14) calendar days prior to desired shutdown.
- F. The University does not normally charge for its shutdown support services. However, if poor planning and/or poor execution of a shutdown by the Contractor causes excessive time and effort for University personnel, the University reserves the right to back charge the Contractor for this effort required to support such shutdown.

1. Contractor shall verify with University's Fire Marshal that all appropriate Interim Life Safety Measures (ILSM) are in place.
 2. Contractor shall determine that proper and appropriate coordination and notification has been completed, including written authorization from University's Representative, prior to shut down.
 3. Service shutdowns shall require specific work plans to be submitted to and coordinated with University's Representative. Work Plan should reflect various work trades, activities or entities requiring active participation with University teams to coordinating hospital functions with construction activities.
 - a. Contractor shall request, schedule, and conduct a General Work Plan Meeting prior to any work activity occurrence. During this meeting Contractor and University shall produce and agree to a list of work activities, which will require digging and/or shutdown coordination and procedures.
 - b. University's Representative, upon receiving the agreed submission for coordination, shall schedule the actual digging and/or shutdown at the earliest possible date not later than fourteen (14) calendar days from receipt of the submission. Operation of valves, switches, etc. to affect shutdowns shall be operated by University personnel only.
 - c. A shutdown is defined as any interruption of services provided by University to its patients and staff.
 4. Planned service shutdowns shall be accomplished during periods of minimum usage. Contractor shall plan work to restore service in minimum possible time and shall cooperate with the University to reduce number of shutdowns.
 - a. Notwithstanding the provisions of Article 14.6 of the General Conditions of the Contract, Contractor may be required to perform certain types of work outside normal time periods.
 - 1) Non-normal times shall include, but not be limited to, periods of time before 7:00 a.m. and after 5:00 p.m. in the evening, weekend days, or legal holidays, or such periods of time which constitute split shifts or split working periods.
 - 2) Contractor shall include allocation of the cost of this work as part of the base bid and shall not be entitled to additional compensation as a result of such work during non-normal time periods.
 - 3) Contractor shall include the non-normal periods as distinct activities on the detailed project schedule.
 - 4) Contractor is advised and shall be prepared, at University written request, to perform certain shutdown and asbestos related work during non-normal time periods.
- G. Utility locations: Refer to Section 017600. General location of utility lines and services may be shown on the drawings or described elsewhere, University does not warrant the accuracy of the locations shown or described. Determination of the actual on-site

locations of utility lines and services prior to the commencement of work shall be the responsibility of the Contractor. Contractor shall complete layout/research for Points of Connection (P.O.C.) and clean/prep piping at P.O.C. All capping, relocation or removal of such lines and services shall be performed by Contractor as a part of the Contract. New/continued piping and services installation shall be prefabricated and in place prior to the shutdown. All materials and tools required to complete the work must be at the shutdown location(s). Contractor shall not assume existing valves will hold 100%. Contractor is required to have at least one (1) alternate method (including parts and equipment) to complete installation once shutdown has started. Note: only wheel type cutters shall be used on copper pipe to reduce contamination to existing systems/valves.

- H. Detailed Work Plans: Contractor shall develop and submit for review and approval to University's Representative detailed work plans for specific work activities, both inside and outside the work area, associated with impact to, or interruption of services and operation, and dig activities. Work Plans shall be submitted as a PDF electronic file with Table of Contents indexed. Work Plans shall include written description of work activity, detailed schedule with proposed sequence of operation and activity duration, type of equipment to be used, a copy of site plan highlighted to indicate sequencing and location of work and equipment, completed Request for Shutdown and/or Dig Notification forms as applicable, conformance to ILSM, and control methods for noise, vibration and airborne contaminants.
1. Work Plan submittal will not be accepted unless all required information is provided at time of submittal.
 2. Submit Work Plan at least fourteen (14) calendar days prior to the commencement of any associated work activities.
 3. Coordination/Engineering Drawings: Contractor shall provide a complete set of Coordination/ Engineering Drawings that indicates the architectural and structural building components; and combines all piping, conduits, fire sprinkler system, equipment, hangers, braces and other building components into one composite drawing for each floor, wing or area of work. Submit the Coordination/ Engineering Drawings as a bookmarked PDF electronic file. These drawings are for the Contractor's and University's use during construction and shall not be construed as replacing any shop drawings, "As-Builts", or record drawings required elsewhere in the Contract Documents. University's review of these drawings is for design intent only and shall not relieve the Contractor of the responsibility for coordination of all work performed per the requirements of the Contract.
 - a. Contractor shall prepare and submit complete $\frac{1}{4}'' = 1' - 0''$ coordination drawings, including plans, sections, details as are appropriate indicating the area layout, complete with debris removal area and materials access points, and all mechanical and electrical equipment in all areas and within above and below ceiling spaces for new and existing conditions, including bottom of all ducts, plenum, pipe and conduit elevations. Drawings shall show all structural and architectural components, restraints and other obstructions that may affect the work. Electronic or photo reproduction of University's Architectural Drawings is not acceptable.
 - b. Contractor and each Subcontractor shall ensure all relevant mechanical and electrical equipment, piping, conduit, fire sprinkler system, ceiling

hangers, braces etc., are shown and will fit, together with necessary items such as lights, ducts, fans, pumps, piping, conduit and the like.

- c. Contractor shall indicate all locations of expansion/ seismic joints and indicate how expansion for piping, conduit and other components is provided.
- d. Contractor shall indicate all locations for access doors or other means of access at conditions above and below for items requiring access or service including but not limited to valves, mechanical equipment, electrical equipment valves and other components. The Contractor is responsible that piping, conduit, braces and other obstructions do not block access to items indicated above.
- e. Submit completed and fully coordinated PDF electronic indexed file drawings with bookmarked Sheet Index together with Contractor's comments indicating possible areas of conflict for review to University's Representative prior to start of work.
- f. Penetrations: Contractor shall prepare a sleeving layout (1/4" scale) indicating size and locations of sleeves. Trades shall indicate to Contractor their requirements and locations. PDF electronic files to applicable trades and University's Representative.
- g. Completion of work: All coordination drawings shall be submitted together with record (as built) drawings of all trades involved in accordance with Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 Refer to the following attachments

- A. Request for Shutdown (RFS) Info/Impact Report
- B. Dig Notification Form

END OF SECTION 01 31 00

REQUEST FOR SHUTDOWN (RFS) INFO/IMPACT REPORT

Refer to updated RFS Template

DIG NOTIFICATION FORM

PROJECT #: _____ HCAI#: _____ DATE: _____

TO: UC DAVIS HEALTH Facilities Design & Construction 4800 2 nd Avenue, Suite 3010 Sacramento, CA 95817 P: 916-734-7024	FROM: _____ _____ _____ _____ _____
<u>Project Manager's email address:</u> _____	_____

1. Has USA been notified? YES ___ NO ___
When? _____
2. Are all known utilities marked? YES ___ NO ___
3. Location of dig shown on attached site plan? YES ___ NO ___
Purpose _____
4. Dates digging will take place _____
Place _____

Signed: _____

<u>UNIVERSITY USE ONLY</u>		
Date received: _____		
1. Utilities verified by IOR?	YES ___	NO ___
2. Dig activities coordinated with all parties?	YES ___	NO ___
3. Comments: _____		
Date Authorized: _____	Signed: _____	
Date Returned: _____	Signed: _____	
Comments: (Utilities encountered, disruptions, successes, weather, etc.) _____ _____ _____ _____		
Copies: University _____	Consultants _____	File _____

SECTION 01 32 00

CONTRACT SCHEDULES

PART I - GENERAL

1.01 SCOPE

- A. Preliminary Contract Schedule, Contract Schedule, updated Contract Schedules, Short Interval Schedules (SIS), Recovery Schedules and As Built Schedule.
- B. Sub-networks of activities (Fragnets) supporting Time Extension Requests.

1.02 DEFINITIONS

- A. Construction Schedule/CPM Schedule/Schedule: The most recent; Baseline Schedule, Updated Schedule or Revised Schedule.
- B. Final Baseline Schedule: A final and ongoing Schedule for the project that has been reviewed and accredited by the University's Representative
- C. Critical Work activities are defined as Work activities that, if delayed or extended, will cause a critical delay as defined in General Conditions Article 8. All other Work activities are defined as non-critical Work activities and are considered to have float.
- D. Float is defined as the time that a non-critical Work activity can be delayed or extended without causing a critical delay as defined in General Conditions Article 8. Neither the Contractor nor the University shall have an exclusive right to the use of float. Float is a shared resource available to each party to the contract. The Contractor shall document the effect of the use of float on the updated Contract Schedule.
- E. Recovery Schedule: Schedule required when any Revised Schedule or Update Schedule shows the work to be more than 14 calendar days behind the latest University-accepted contract end date
- F. Short Interval Schedule (SIS): Schedule prepared on a weekly basis demonstrating the work accomplished the prior week and work planned for the upcoming three weeks.

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00 Shop Drawings, Product Data, Samples:
 - 1. Proposed Scheduling Software and qualifications of individual preparing schedules.
 - 2. Preliminary Contract Schedule
 - 3. Contract Schedule including graphical and tabular reports.

4. Monthly Updates to Contract Schedule, including Narrative Report.
 5. Short Interval Schedules
 6. Final As-Built Schedule
- B. Include an electronic version of all submittals required by this specification, including Narrative prepared in MS Word or .pdf format, CPM schedule in .xer file (P6 backup) or other schedule native file format if accepted under 1.3. A.1 above, .pdf of full schedule, and .pdf of critical path. The following fields shall be included:
1. Activity identification
 2. Activity description
 3. Duration, start, and finish dates.
 4. Percentage of completion
 5. Total float
 6. Responsible party
 7. Predecessors and successors

PART II - PRODUCTS

2.01 SOFTWARE

- A. The Contractor shall use Primavera P6 by Oracle Corporation, or equal to produce the schedule and all required graphical and tabular reports.

PART III - EXECUTION

3.01 PRELIMINARY CONTRACT SCHEDULE

- A. Within 10 calendar days after the Notice of Selection as the Apparent Lowest Responsible Bidder, Contractor shall submit the Preliminary Contract Schedule in both native and .pdf format to the University's Representative for acceptance. The Preliminary Contract Schedule shall represent the Contractor's plan for accomplishing the work within the Contract time showing all significant milestones for the Contract period as well as a detailed work plan for the first 90 calendar days following the Notice to Proceed. This detailed work plan shall identify in detail the following activities for the first 90 calendar days:
1. Preparation of equipment and material submittals for review. List Project submittals within Schedule per each specification section including Division 1 requirements. Indicate dates for submission of required submittals. Note: schedule shall include 18 calendar days for the University's review of the Preliminary Contract Schedule.
 2. Make submissions within the following number of days after the Notice to Proceed:

- a. Items needed in initial stages of Work or requiring long lead-time for ordering: 30 calendar days.
 - b. Deferred approval submittals, for review and approval by agencies such as University's when required: 60 calendar days.
 - c. Electrical, mechanical and equipment items other than those covered by item "a" above: 60 calendar days.
 - d. All other items: 90 calendar days.
3. Procurement schedule.
 4. Critical Path for the first 90 calendar days.
- B. The Preliminary Contract Schedule shall acknowledge significant known constraints and include all anticipated activities prior to the Notice to Proceed.
 - C. The Preliminary Contract Schedule shall not include any actual dates or progress measured against any activities.
 - D. Acceptance of the Preliminary Contract Schedule is a condition for approval of the first progress payment application.
 - E. The Contractor's progress shall be measured against the Preliminary Contract Schedule until such time as the University accepts the Contractor's first Contract Schedule. The Preliminary Contract Schedule shall be incorporated into the Contractor's proposed Contract Schedule.
 - F. Unless approved by the University's Representative, there shall be no activities shown with durations greater than 14 calendar days (excluding submittals, submittal reviews, and procurement activities).

3.02 CONTRACT SCHEDULE (BASELINE)

- A. The Contract Schedule shall represent a practical plan to fully complete the Contract within the Contract Time. The Contract Schedule shall include a complete sequence of construction, in adequate detail for coordination of the Work and shall be coordinated with the preparation of the Schedule of Values per 01 29 00 Measurement and Payment.
- B. Form
 1. The proposed first contract schedule shall be produced using CPM (Critical Path Method) techniques, in the PDM (Precedence Diagram Method) method of scheduling. The Contract Schedule shall be calculated using the Retained Logic method. Progress override calculations shall not be acceptable. The schedule shall not use negative float or constraints on work activities.
 2. The Contract Schedule shall identify all holidays and non-working days.

3. Identity of the party responsible for the activity (i.e., University, General Contractor, specific subcontractor, etc.)
4. The Contract Schedule activities shall be coded with the following information applicable to each activity:
 - a. Area of the project
 - b. Identity of the party responsible for the activity (i.e., University, General Contractor, specific subcontractor...)
 - c. Specification section applicable to activity
 - d. Phase
 - e. Sequence – The following sequences shall be identified:
 - 1) Administrative
 - 2) Submittal and Review
 - 3) Fabrication
 - 4) Construction: including phasing and sequencing as identified in 011400 Work Restrictions
 - 5) Inspection, Commissioning, and Close-out

C. Content

1. The Contract Schedule shall identify all Work activities in correct sequence for the completion of the Work within the Contract Time. Work activities shall include the following:
 - a. Major Contractor-furnished equipment, materials, and building elements, and scheduled activities requiring submittals or University's Representative's prior acceptance.
 - 1) Show dates for the submission, review, and approval of each such submittal. Dates shall be shown for the procurement, fabrication, delivery, and installation of major equipment, materials, and building elements, and for scheduled activities designated by the University.
 - 2) The schedule shall allow submittal review time in accordance with Section 01 33 00 Shop Drawings, Product Data, Samples.
 - b. System test dates.
 - c. Scheduled overtime Work to the extent permitted by Contract Documents.
 - d. Dates Contractor requests designated workspaces, storage area, access,

and other facilities to be provided by the University.

- e. Dates Contractor requests orders and decisions from the University on designated items.
 - f. Dates Contractor requests University-furnished equipment.
 - g. Dates Contractor requests University-furnished utilities.
 - h. Planned dates for shutdown, connection and relocation of existing utilities.
 - i. Planned dates for connecting to or penetrating existing structures.
 - j. Planned dates for scheduled inspections as required by Codes, or as otherwise specified.
 - k. Commissioning Sequence and activities for all Building Systems.
- 2. Unless approved by the University's Representative, there shall be no activities shown with durations in excess of 7 calendar days (excluding submittals, submittal reviews, and procurement activities). Milestones should be listed for the completion of wings, floors, and other similar areas.
 - 3. The allowable monthly rain days per the Supplemental Conditions shall be incorporated into the Schedule.
 - 4. Identify types of calendars used and the logic of their application.

D. Submission

- 1. The first Contract Schedule shall be submitted to the University not later than 30 calendar days after Notice to Proceed. The period covered by Contract Schedule shall be the Contract Time as specified in the Notice to Proceed. The Contract Schedule shall incorporate the logic of the Preliminary Contract Schedule covering the first 90 calendar days following the Notice to Proceed. Items to be included with first submission:
 - a. Contract Schedule (Baseline)
 - b. Critical Path Schedule excluding all non-critical Work activities.
 - c. Narrative
- 2. Tabular Computer Reports
 - a. As requested by the University, the Contractor shall submit various computer-generated tabular reports.
 - b. As requested by the University's Representative, the Contractor will be required to submit additional Schedule Reports.

E. Acceptance

1. Upon receipt, the University's Representative shall review the proposed first Contract Schedule. Within 21 calendar Days of the University's receipt of the proposed first Contract Schedule, the University's Representative shall schedule a review meeting with the Contractor for the purpose of jointly reviewing the proposed first Contract Schedule.
2. If the proposed first Contract Schedule is accepted by the University's Representative, it shall become the Contract Schedule (or Baseline Schedule). Such acceptance shall not relieve Contractor from its responsibility to fully complete the Contract within the Contract Time, nor shall it relieve Contractor from sole responsibility for any errors in the Contract Schedule.
3. If the Contractor or the University's Representative determines the proposed first Contract Schedule to need revision, the Contractor shall revise and resubmit the proposed first contract schedule to the University's Representative within 14 calendar days for acceptance. If accepted, it shall become the Contract Schedule. Such acceptance shall not relieve Contractor from its responsibility to fully complete the Contract within the Contract Time, nor shall it relieve Contractor from sole responsibility for any errors in the Contract Schedule. If not accepted the Contractor will resubmit within 10 calendar days for a new review period to start.
 - a. No progress payment beyond the second progress payment will be paid to the Contractor until such time as the University's Representative has approved the Contractor's first proposed Contract Schedule.

F. Schedule Logic

1. Activity schedule logic should normally be of Finish-to-Start relationship type and assembled to show order in which Contractor proposes to carry out the Work. The logic should indicate restrictions of access, availability of Work areas, and availability and use of manpower, materials, and equipment. Form basis for assembly of schedule logic on the following criteria:
 - a. Indicate which activities must be completed before subsequent activities can be started.
 - b. Indicate which activities can be performed concurrently.
 - c. Indicate which activities must be started immediately following completed activities.
 - d. Indicate resource sequencing due to availability or space restrictions.
 - e. Lags shall not be used if can be represented with additional schedule detail. Finish-to-start logic ties with positive lags are not permitted. All positive time consumption should be represented by a schedule activity. Start-to-start, or finish-to-finish logic ties with negative lags are not permitted.
 - f. Lags in Start-to-Start or Finish-to-Finish relationships must not exceed the duration of the predecessor or successor activity, respectively.

G. Non-Sequestering of Float

1. Contractor shall not sequester float through scheduling techniques, including, but not limited to, constrained dates, extending Work Activity duration estimates, using preferential logic, such as lag or negative lag (lead), unless specifically requested in writing and approved by University's Representative. It is acknowledged that University-caused or Contractor-caused time savings to Activities on, or near, the critical path will increase float, such increase in float shall not be for the exclusive use or benefit of either University or Contractor.

H. Out of Sequence Logic:

1. Resolution of conflict between actual work progress and schedule logic: When out of sequence activities develop in Schedule because of actual construction progress, Contractor shall submit revision to schedule logic to conform to current status and direction and include reasons in schedule update Narrative.

I. Preferential Logic:

1. The intended purpose of scheduling on a construction project is to help ensure that Contractor's work on the project is adequately planned, tracked and managed. A construction schedule can be as simple as a list of activities, organized in a logical sequence, and time scaled. The concept of construction scheduling is to see that all activities necessary to complete the work, in accordance with the contract documents requirements, are properly planned, coordinated and managed. When Contractor's schedule activities are not sequenced in the most logical manner, but rather, in a manner as to create the maximum possible opportunity for University interference to claim delay or interruption, the University will reject the schedule with a request of different sequence of activities.

3.03 EXPERIENCE REQUIREMENTS

- A. Contractor shall designate an individual from Contractor's staff or a consultant who shall be responsible throughout the duration of the project for preparation of all schedules and reports as required by this specification. This individual shall also be required to attend all meetings with the University's Representative as required by this specification. The Contractor shall demonstrate to the satisfaction of the University that the individual or consultant has at least 3 years of experience preparing, maintaining, and administering detailed project schedules on projects of the same or similar size and complexity as this project. The Contractor shall also demonstrate to the satisfaction of the University that the individual or consultant is proficient in the use of the scheduling software proposed for use by the Contractor on this project.
- B. Within 14 calendar days after the Notice of Selection as the Apparent Lowest Responsible Bidder, Contractor shall provide the University with the identification, qualifications, and experience of and references for the proposed individual or consultant.

3.04 MONTHLY UPDATES

- A. After acceptance of the first proposed Contract Schedule, Contractor shall update the Contract Schedule monthly. The update shall reflect progress as of the end of each month. Contractor shall submit monthly schedule update to the University's Representative for

acceptance with the draft payment application and no later than the tenth day of the following month. The updates shall be made as follows:

1. The Monthly updates shall report progress based upon percent complete of each activity or remaining duration. Actual start dates shall be recorded for those activities that have started. Actual finish dates shall be recorded for those activities that are completed. Activities that are in progress shall reflect an actual start date and the percentage completion for the activity. Actual dates shall be clearly distinguishable from projected dates.
 2. The updated Contract Schedule shall reflect an up-to-date status of the contract work as completed, and materials furnished and in permanent place that qualify for payment.
 3. The updated Contract Schedule shall reflect Contract Time changes included in all processed change orders for the progress month and each preceding month.
- B. Within 5 calendar days after receipt of the updated Contract Schedule in conjunction with the Application for Payment, the University's Representative shall review both and determine which work and material pay items qualify for payment; the approved data will then be returned to the Contractor for input. Within 14 calendar days, the Contractor and the University's Representative shall meet to review the Construction CPM Schedule and discuss any changes required.
- C. The Contractor shall then revise and resubmit (if required) the Updated Contract Schedule and Application for Payment to the University's Representative for payment approval.
- D. The monthly update shall be calculated using retained logic with a required finish date specified as the current contract completion date. Progress Override calculations shall not be acceptable.
- E. No Applications for Payment will be processed, nor shall any progress payments become due until updated Contract Schedules are accepted by University's Representative. The accepted, updated Contract Schedule shall be the Contract Schedule of record for the period it is current and shall be the basis for payment during that period. Acceptance of any updated Contract Schedules shall not relieve Contractor from its responsibility to fully complete the Contract within the Contract Time, nor shall it relieve Contractor from sole responsibility for any errors in the updated Contract Schedules.
- F. Contractor shall perform the Work in accordance with the updated Contract Schedule. Contractor may change the Contract Schedule to modify the order or method of accomplishing the Work only with prior agreement by the University.
- G. With each monthly updated Contract Schedule, the Contractor shall provide an accompanying narrative describing the progress anticipated during the upcoming month, critical activities, delays encountered during the prior month, delays anticipated during the upcoming month, and an audit of the Contract Time. The audit shall show current days allowed by contract, days used through the end of the month, days remaining, percent of time used to date, and percent complete as measured by cost loaded schedule, and days ahead of or behind schedule. In the event that the Contractor was delayed by any occurrence during the prior month, the narrative report shall include a listing of all delays

that affected the critical path and shall clearly explain the impact the claimed delay(s) had on the critical path and shall include an accounting of days lost or gained.

- H. In the event the monthly update shows the Contractor to be behind schedule (negative float), the narrative shall include a description of actions needed to bring the project back on schedule.

3.05 LOOK AHEAD SCHEDULES

- A. Look Ahead Schedule is a schedule derived from the Contract Schedule (or the most current monthly update of the Contract Schedule) which indicates in detail all activities scheduled or worked on for the 1 prior weeks, and all activities scheduled to occur during the next 3 weeks.
- B. Provide detailed Look Ahead Schedules every week.
- C. Submit in 11-inch by 17-inch Gantt chart format.
- D. Look Ahead Schedule shall be generated from the then current Preliminary Contract Schedule, Contract Schedule, or updated Contract Schedule. Activities listed in the Look Ahead Schedule shall reference the activity identification or other such coding for correlation to the activities listed in the Contract Schedule.

3.06 TIME EXTENSION REQUEST DOCUMENTATION

- A. In the event the Contractor shall request an extension of Contract Time, Contractor shall comply with the requirements of the General Conditions, including without limitation, General Conditions Article 8. In addition to the requirements of the General Conditions, as a condition to obtaining an extension of the Contract Time, Contractor shall timely submit a sub-network of the events of the delay that demonstrates the impact to the activities in the Contractor's then current schedule, as well as the impact to the overall completion date of the project.
- B. If the University's Representative approves the extension of time, the next monthly updated Contract Schedule shall incorporate the subnetwork with the extension of time. In addition, the monthly updated Contract Schedule shall contain all changes mutually agreed upon by the Contractor and the University during preceding periodic reviews and all changes resulting from Change Orders and Field Orders.

3.07 AS BUILT SCHEDULE

- A. As a condition precedent to the release of retention, the last update of the Contract Schedule submitted shall be identified by the Contractor as the "As Built Schedule". The "As Built Schedule" shall be submitted when all activities are 100 percent complete. The "As Built Schedule" shall reflect the exact manner in which the project was actually constructed (including start and completion dates, activities, sequences, and logic) and shall include a statement signed by the Contractor's scheduler that the "As Built Schedule" accurately reflects the actual sequence and timing of the construction of the project.

3.08 WEATHER DAYS ALLOWANCE

- A. Should inclement weather conditions, or the conditions resulting from weather, prevent the Contractor from proceeding with seventy-five (75) percent of the normal labor and equipment force engaged in the current critical activity item(s), (as shown on the latest

CPM Progress Schedule accepted by the University's Representative), for a period of at least five (5) hours per day toward completion of such operation or operations, and the crew is dismissed as a result thereof, it shall be a weather delay day.

- B. The expected loss of days specified in the Supplementary Conditions, item 3 "Modification of General Conditions, Article 8 – Contract Time", shall be included in a separate identifiable critical activity labeled "Weather Days Allowance" to be included as the last critical activity of the project schedule prior to substantial or final completion (whichever is contractual). The weather allowance activity shall be on, and remain on, the critical path of the project throughout the life of the project until it has been absorbed. Typically, all activity's leading to completion shall go through the weather allowance activity first. When weather days are experienced, and are approved as such by the University's Representative, the Contractor shall either:
1. Increase the duration of the current critical activity(ies) by the number of weather days experienced, or
 2. Add a critical activity to the schedule to reflect the occurrence of the weather day(s).
- C. The duration of the weather day allowance activity shall be reduced as weather days are experienced and included in the schedule. Any remaining weather days in the weather day allowance activity at the completion of the project shall be considered as float and shall not be for the exclusive use or benefit of either the University or Contractor.
- D. The Contractor shall not receive any additional compensation for unavoidable delays due to inclement or unsuitable weather. If all the weather allowance has been used, any additional weather delay experienced by the Contractor may result in a non-compensable time extension upon submission of acceptable supporting documentation to the University's Representative.

END OF SECTION 01 32 00

SECTION 01 32 20

CONSTRUCTION PROGRESS REPORTING

PART I - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements and procedures for documentation of construction progress using still photographs, videos, webcam.
2. Requirements and procedures for As-built Documentation

B. Related sections include the following:

1. Division 01, Section "Closeout Procedures" for general closeout procedures.
2. Division 01, Section "Closeout Submittals."

1.02 PROGRESS PHOTOS/VIDEOS

A. Maintain a [**daily, weekly, monthly**] photographic record of the progress of the Work as outlined in Part III of this Section.

1. Photographs to accompany Superintendent Daily Reports will be done on a daily basis.

1.03 AS-BUILT DOCUMENTATION

A. The Contractor shall be responsible for the maintenance and completion of As-Built Documents the following procedure shall be strictly adhered to:

1. Contractor shall download and save all of the construction documents. This set of Drawings along with the Specifications, shall be kept on file available to University's Representative's until the completion of the Project.
2. As the Work progresses, a complete and accurate notation of all documented changes or deviations from the Drawings and Specifications shall be recorded thereon in the As-built Documents by the Contractor. Such indications shall be neatly made and kept current.
3. Do not complete Work or request inspections if such Work has been installed in locations contrary to the Drawings.
4. At the completion of the Project, Refer to Section 017800 CLOSE OUT SUBMITTALS.

PART II - PRODUCTS – Not applicable to this section.

PART III - EXECUTION

- 3.01 Contractor is required to maintain a [**daily, weekly, monthly**] digital photographic record of the progress of the Work and is to submit the photographs and video coverage as required to the University Representative. Daily Photographs are required for Superintendent Daily Reports.
- 3.02 Contractor is required to maintain the As-Built Documents on a [**daily, weekly, monthly**] basis.

END OF SECTION 01 32 20

SECTION 01 33 00

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Administrative requirements for shop drawings, product data and samples submittals
- B. University's and University's Consultant's review of submittals
- C. Contractor's review of submittals
- D. Shop Drawing Submittals
- E. Product Data submittals
- F. Sample submittals
- G. Field Samples and mock-ups
- H. Submittal Schedule requirements

1.02 RELATED SECTIONS

- A. Section 011100 – SUMMARY OF THE WORK: Subcontractor and materials suppliers list.
- B. Section 013200 – CONTRACT SCHEDULES: Submission and review of schedules and submittals.
- C. Section 014500 – QUALITY CONTROL: Test and Inspection Reports.
- D. Section 016100 - PRODUCT REQUIREMENTS
- E. Section 017700 – CLOSEOUT PROCEDURES: Occupancy/Acceptance /Final Payment Submittals.
- F. Section 017800 – CLOSEOUT SUBMITTALS: Preparation of Maintenance and Operating Data.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. General Submittals Review: Submittals shall be made in accordance with requirements specified herein and in individual Sections.
 - 1. Submittals shall be a communication aid between Contractor, University's Representative, and University's Consultant(s) by which interpretation of Contract Documents requirements may be confirmed in advance of construction.

2. Submit on all products to be used on the Project. Make all submittals through the University unless otherwise directed.
 - a. The University's Representative shall provide timely review of submittals and re-submittals.
 - 1) University's Representative shall have twenty-one (21) days from receipt to review all submittals twenty-one (21) days from receipt to review re-submittals.
 - 2) The Fire Marshal shall have twenty-eight (28) days from receipt to review all submittals twenty-eight (28) days from receipt to review re-submittals.
 - 3) University's Representative will prepare and keep a log of review time of all submittals.
 3. Substitutions shall be submitted in accordance with Section 016100 – PRODUCT REQUIREMENTS.
 4. Make submittals sufficiently in advance of construction activities to allow shipping, handling and review by the University's Representative and their consultants.
- B. University's and University's Consultants Review: University's Consultant's review will be only for general conformance with the design intent of the Contract Documents. Review of submittals is not conducted for purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. Review actions of the University's Consultant or University shall not relieve Contractor from compliance with requirements of the Contract Documents. Changes shall only be authorized by separate written Change Order in accordance with the General Conditions of the Contract.
- C. Contractors Review: Contractor shall review, mark-up as appropriate and stamp Shop Drawings, Product Data, and Samples prior to submission. Submittal shall clearly show it has been reviewed by Contractor for conformance with the Contract Documents and for coordination with requirements of the Work. Notify University's Representative in writing, at time of submission, of any changes in the submittals from requirements of Contract Documents.

1.04 SUBMITTAL REQUIREMENTS

- A. Prompt Submission: Submittals shall be submitted promptly in accordance with Submittal Schedule and in such sequence as to cause no delay in the Work or in the work of any separate contractor. Present information in a clear and thorough manner to aid orderly review.
- B. Preparation: Title each submittal with the University's Project Name and the University's Project number, submittal date and dates of any previous submissions. Clearly mark each copy to identify product or model.
 1. Identify each item on submittal by reference to Drawing sheet number, detail, schedule, room number, assembly or equipment number, Specification number

Reference Standard (such as ASTM or Fed Spec Number) and other pertinent information to clearly correlate submittal with Contract Documents.

2. Include the names of the Contractor, Subcontractor, Supplier and Manufacturer.
3. Include field dimensions, clearly identified as such to establish relationship to adjacent or critical features of the Work or materials.
4. Include pertinent information such as performance characteristics and capacities, wiring or piping diagrams and controls, catalog numbers and similar data.
5. Modify manufacturer's standard schematic drawings and diagrams and other diagrams to delete information not applicable to the Work. Supplement standard information to provide information specifically applicable to the Work.
6. Identify changes from requirements of the Contract Documents.
7. Include 8" x 3" blank space on face of submittal for review stamps.
8. Include Contractor's review stamp, initialed or signed, and dated, certifying to the review of the submittal, verification of materials, field measurements, conditions, and compliance of the information within the submittal with the requirements of the Work and of the Contract Documents.

C. Number of submittals required:

1. Product Data Submittals: Submit PDF electronic file with booked marked table of contents and/or sheet index. Submittals for the Fire Department require an electronic file and two (2) hard copies.
2. Initial/Re-submitted Shop Drawing Review(s): Submit PDF electronic file with booked marked table of contents and/or sheet index. Submittals for the Fire Department require an electronic file and two (2) hard copies.
3. Final Shop Drawing Review and Approval: After obtaining University's Representative approval of initial/re-submitted shop drawing submittals, as described in Section 1.04.C.2 above, Contractor shall submit PDF electronic file with booked marked table of contents and/or sheet index. Submittals for the Fire Department require an electronic file and two (2) hard copies. Contractor is responsible for providing all approved shop drawings for its use and use by subcontractors and/or suppliers.
4. Samples: Submit number specified. Samples shall be of sufficient size and quality to clearly illustrate the functional characteristics of the products, with integrally related parts and attachment devices, including full range of colors, textures and patterns.

D. Identifying Submittals: Identify each submittal by Specification section number followed by a number indicating sequential submittal for that Section. Re-submittals shall use the same number as the original submittal, followed by a letter indicating sequential re-submittal. Examples:

1. 092500 – 1 First submittal for Section 092500 – Gypsum Board
2. 092500 – 2 Second submittal for Section 092500 – Gypsum Board

3. 092500 – 2A Re-submittal of second submittal for Section 092500 – Gypsum Board
 4. 092500 – 2B Second re-submittal of second submittal for Section 092500 – Gypsum Board
- E. Resubmission Requirements: Revise and resubmit as specified for initial submittal. Identify any Changes other than those requested. Note any departures from Contract Documents or changes in previously reviewed submittals.
- F. Grouping of Submittals: Unless otherwise specifically permitted by University's Representative, make all submittals in groups containing all associated items as described in each Specification Section. The University's Representative will reject partial submittals as incomplete.
- G. Unsolicited Submittals: Unsolicited submittals will be returned NOT REVIEWED.

1.05 DISTRIBUTION

- A. Reproduce and distribute finalized copies of Shop Drawings and Product Data, to the following:
1. Contractor's Project site file.
 2. As-built Documents file maintained by Contractor.
 3. Pertinent Separate Contractors.
 4. Pertinent Subcontractors.
 5. Pertinent Supplier or Manufacturer.

1.06 FIELD SAMPLES AND MOCK-~~NOT USED~~

- A. Erect at the project site, at a location directed by University's Representative, mock-ups to a size as specified.
1. The following mock-ups are required for this project:
 2. None.
- B. Fabricate each Sample and mock-up to be complete and fully furnished. Unless otherwise agreed, full-size complete samples will be returned and may be incorporated into field mock-ups and Work.
- C. Mock-ups shall be removed by the Contractor at conclusion of the Work at no additional cost to the University.

1.07 SUBMITTAL SCHEDULE

- A. Submittals Schedule: refer to Section 013200 – CONTRACT SCHEDULES.

1. The Submittal Schedule is a schedule for submission of Shop Drawings, Product Data and Samples by Contractor, and the processing and return of same by University.
2. Contractor shall prepare the Submittal Schedule as described herein and coordinate it with the Contract Schedule. No submittals will be processed before the Submittal Schedule has been submitted to and accepted by University.
3. Submittal Schedule shall be adjusted to meet needs of construction process and the Contract Schedule. Submit PDF electronic file with booked marked table of contents and/or sheet index of the Submittal Schedule after it is completed and each time it is update by Contractor.
4. Contractor shall NOT begin fabrication or Work which requires submittals until the return of final reviewed and approved submittals have been received by the Contractor.

1.08 ENVIRONMENTAL PRODUCT DECLARATIONS

- A. Contractor must comply with Buy Clean California Act requirements per California Public Contract Code, Sections 3500-3505.
- B. Contractor shall submit to Project Manager/Construction Manager current facility-specific Environmental Product Declaration for each eligible material proposed to be used on the Project.
- C. Environmental Product Declaration (EPD): Type III environmental impact label, as defined by the International Organization for Standardization (ISO) standard 14025, or similarly robust life cycle assessment methods that have uniform standards in data collection consistent with ISO standard 14025, industry acceptance, and integrity.
- D. Eligible Materials: Any of the following:
 1. Carbon steel rebar.
 2. Flat glass.
 3. Mineral wool board insulation.
 4. Structural steel.
- E. Eligible Materials installed on the Project by Contractor must comply with any standards to the extent established in the BCCA or by University, whichever is more stringent. The facility-specific global warming potential for any Eligible Materials must not exceed any existing maximum acceptable global warming potential for that material pursuant to the BCCA or by University, whichever is more stringent ("EM Standards"). The standards are published on the Department of General Services (DGS) website and updated information can be found on this link: <https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act>
- F. Contractor shall not install any eligible materials on the project before submitting a facility-specific Environmental Product Declaration for that material.
- G. This section shall not apply to an eligible material for a particular contract if the University determines, upon written justification published on its Internet website, that requiring those eligible materials to comply would be technically infeasible, would result in a significant increase in the project cost or a significant delay in completion, or would result

in only one source or manufacturer being able to provide the type of material needed by the state.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not Applicable to this Section

END OF SECTION 01 33 00

SECTION 01 34 00

CONTRACTOR(S) EMERGENCY PROCEDURES

PART I - GENERAL

- 1.01 The purpose of this specification is to outline, to the Contractor, the University's policy and procedures for effective project site management of an emergency during the construction of projects at UC Davis Health.
- 1.02 This procedure applies to all Contractors and their subcontractors who have contractual agreements with UC Davis Health.

PART II - DEFINITIONS

- 2.01 Disaster – any natural or human-made event that causes major disruption such as damage to the organization's buildings or grounds from severe weather conditions, earthquakes, other natural phenomena or loss of utilities (power, water and telephones), acts of civil disobedience, accidents or emergencies within the organization or in the surrounding community.
- 2.02 Code Green – a code notifying all employees that an emergency event has occurred, and University operations will be opening the Hospital Command Center and shifting to emergency operations.
- 2.03 Code Red – Fire
- 2.04 Code White – Hazardous Material / Chemical Spill
- 2.05 Control Facility – the County of Sacramento has designated UC Davis Health as the Control Facility for Sacramento County. The Control Facility coordinates medical control of patients and victim's dispersal to hospitals in the community/region.
- 2.06 Other emergency situations include the following systems failures as outlined in the UC Davis Emergency Response Plan.
 - A. Water system failure
 - B. Telephone system failure
 - C. Fire
 - D. Electrical system failure
 - E. Security
 - F. Chemical spill
 - G. Evacuation

PART III - PROCEDURES

3.01 The Contractor will be issued a UC Davis Health Emergency Response Plan at the project

- A. Pre-construction meeting. This plan must be posted at the project site at all times in a visible location known to all project contractors.
- B. Contractor is directed to contact appropriate emergency personnel as outlined in the Emergency Response Plan information during an emergency.
- C. If the emergency involves an outside utility company, Contractor is to contact utility company directly. Known outside utilities located at the Sacramento campus are as follows.

1. Emergency Telephone Numbers

- a. Police Dispatch: 916-734-2555
- b. PO&M Dispatch (Electrical) 916-734-2763
- c. PG&E (Gas) 800-743-5000
- d. City of Sacramento Water 3-1-1
- e. HazMat Spill 916-734-2740

END OF SECTION 01 34 00

SECTION 01 39 00**GREEN BUILDING POLICY IMPLEMENTATION****PART I – GENERAL**

1.01 SECTION INCLUDES

- A. Fundamental Building Systems Commissioning
- B. Construction Waste Management: Divert 80% from Landfill
- C. Construction Indoor Air Quality (IAQ) Management Plan: During Construction

1.02 RELATED DOCUMENTS AND SECTIONS

- A. Section 015600 – TEMPORARY BARRIERS, ENCLOSURES and CONTROLS
- B. Section 015610 – AIRBORNE CONTAMINANTS CONTROL
- C. Section 016100 – PRODUCT REQUIREMENTS
- D. Section 017400 – CLEANING
- E. Section 017500 – STARTING and ADJUSTING SYSTEMS
- F. Section 017600 – PROTECTING INSTALLED CONSTRUCTION
- G. Section 017700 – CLOSEOUT PROCEDURES
- H. Section 017800 – CLOSEOUT SUBMITTALS
- I. Section 018100 – PLUMBING/HVAC TESTING PROCEDURES
- J. Section 018200 – DEMONSTRATION and TRAINING
- K. Section 027250 – STORM DRAINAGE WATER QUALITY
- L. Section 142400 – HYDRAULIC ELEVATORS
- M. Section 145800 – PNEUMATIC TUBE SYSTEMS
- N. Division 21 – WET SPRINKLER SYSTEMS
- O. Division 22 – PLUMBING WORK
- P. Division 23 – MECHANICAL WORK (All)
- Q. Division 26 – ELECTRICAL WORK (All)

R. Division 33 – SITE UTILITES

1.03 FUNDAMENTAL BUILDING SYSTEMS COMMISSIONING

A. Commissioning is a systematic process of ensuring that all building systems and assemblies perform interactively according to University objectives and requirements and the design according to the contract documents. The commissioning process encompasses and coordinates the traditionally separate functions of system documentation, equipment start-up, control system calibration, systems testing, testing and balancing, and training. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product. Commissioning during construction is intended to achieve the following specific objectives:

1. Ensure that applicable equipment, systems, and assemblies are installed according to the manufacturer's recommendations and to accepted industry standards, and that they receive adequate operational checkout by the Contractor.
2. Ensure and document that equipment, systems, and assemblies' function and perform according to University objectives and requirements and the Contract Documents.
3. Ensure that operations and maintenance (O&M) manuals are complete.
4. Ensure that University operating and maintenance personnel for all systems are adequately trained.

B. Commissioning will be performed under the authority and management of the University Plant Operations & Maintenance Department (PO&M), as an independent organization whose individuals are not directly responsible for project design or construction management.

C. Contractor Commissioning Responsibilities

1. Designate a Commissioning Coordinator to organize, schedule, and coordinate the execution of Contractor and subcontractor commissioning responsibilities.
2. Ensure that commissioning activities and durations including predecessors' activities completed prior to the start of commissioning activities, are represented in the contract schedule.
3. Notify the University when system testing for mechanical and electrical items, installations, and equipment per mechanical and electrical specifications will be conducted.
4. Provide all labor, materials, and subcontractor support required for system testing and commissioning to the University.
5. Attend and participate in commissioning planning and other associated meetings to facilitate the commissioning process.
6. Provide additional documentation prior to normal O&M manual submittals to the University for development of installation, start-up, and testing procedures.

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7. Assist in clarifying the operation and control of commissioned equipment or assemblies in areas where the specifications, control drawings, or equipment documentation is not sufficient preparing testing procedures.
8. Review test procedures developed by the University to ensure feasibility, safety, and equipment protection.
9. Verify that all equipment to be tested or commissioned is installed correctly, anchored correctly, electrical, wiring & breakers are the correct size for the equipment and all other utilities required are installed.
10. Execute testing for selected systems and assemblies under the direction of the University.
11. For work that did not pass testing or commissioning evaluate, identify, make repairs or corrections so not to delay the testing or commissioning process. Update the schedules with the revised commission activities.
12. Ensure that the local authorities having jurisdiction are present to witness any acceptance testing of systems that are a condition of building occupancy (fire alarm, fire damper, sprinkler system, etc.).
13. Train University personnel and prepare O&M manuals in accordance with the Contract Documents.

1.04 CONSTRUCTION WASTE MANAGEMENT: DIVERT 80% FROM LANDFILL

- A. Landfill Diversion Requirement: Divert 80% minimum of total project waste from landfill.
- B. Storage bins
- C. Submittals
 1. Waste Management Plan (WMP): Provide the following information:
 - a. Waste Material Estimating Sheet (Appendix A at the end of this Section): Project title, name of company which will implement the plan, and date.
 - b. Estimated job site waste to be generated, including types and quantities.
 - c. Proposed Alternatives to Landfilling: List each material planned to be salvaged or recycled, including quantities and proposed destination.

2. Waste Management Progress Reports: Submit the following information to the University's Sustainability Administrator on a monthly basis (for example: information for June is due by July 20):
 - a. Waste Management Log (Appendix B at the end of this Section):
 - b. Project title, name of company completing report and dates of period covered by the report.
 - c. Date, destination, and quantity of each type of material landfilled, salvaged or recycled.
 - d. Weighmaster tickets can be substituted for items a and c (except for salvaged items). In all instances, weighmaster tickets must be provided with this submittal.
 - e. Alternative report formats may be acceptable but must be reviewed and approved by the University's Sustainability Administrator before being used in lieu of the requirements above.
 3. Legible copies of manifests, weight tickets, and receipts. Manifests shall be from recycling and/or disposal site operators that can legally accept the materials for the purpose of reuse, recycling or disposal.
 4. Maintain at the Project site Waste Management Logs for each load of materials removed from site.
- D. PROJECT MEETINGS
1. Discuss Waste management plans and implementation at the following meetings:
 - a. Pre-construction meeting.
 - b. Regular job-site meetings.
- E. PROJECT CONDITIONS
1. Hazardous materials are excluded from the work of this Section. If hazardous materials are encountered or suspected, stop work in the suspect area. Refer to Section 013500 Special Procedures.
- F. CONSTRUCTION WASTE RECYCLING SERVICES
1. Construction waste recycling services for materials shall be those proposed by the Contractor and approved by the University.
- G. The following may be suitable for diversion from landfill, though the Contractor and Contractor recyclers are responsible for final determination of suitable materials.
1. Concrete: Clean concrete, concrete with rebar, asphalt concrete.
 2. Metals: Steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass or bronze, including banding, ductwork, framing, roofing and siding, flashing, piping and rebar.

1. EAST WING TOWER & RADIOLOGY SPC 4D COMPLIANCE

3. Aggregate.
4. Wood: Clean dimensional wood, wood pallets, engineered wood products including plywood, particleboard, I joists.
5. Vegetation.
6. Cardboard, paper, packaging.
7. Masonry: Brick, ceramic tile, CMU.
8. Gypsum board.
9. Acoustic ceiling panels.
10. Carpet and pad.
11. Paint.
12. Insulation.
13. Plastics: ABS, PVC
14. Beverage containers

H. WASTE MANAGEMENT PLAN IMPLEMENTATION

1. Coordinate waste materials handling and separation for all trades.
2. Document results of the implementation of the Waste Management Plan.
3. Provide separation bins for temporary onsite storage, handling, transportation, recycling, salvage, and landfilling for all demolition and waste materials.
4. Keep recycling and waste bins areas neat, clean and clearly marked in order to avoid contamination or mixing materials.
5. Maintain logs onsite for each load of materials removed from site.

1.05 CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN: DURING CONSTRUCTION

- A. Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building including:
 1. Meet or exceed the recommended design guidelines of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines, 1995, Chapter 3. Compliance with SMACNA Guidelines shall start no later than the scheduled HVAC startup date. SMACNA Guidelines for HVAC protection and for protection of absorptive materials may need to start at an earlier stage, in accordance with the construction schedule.
 2. Protect stored on-site or installed absorptive materials from moisture damage.
 3. Comply with requirements in Division 23 for Ductwork.

- B. Develop and implement an Indoor Air Quality Management Plan for the pre-occupancy phase.
 - 1. Comply with requirements of in Division 23 for Ductwork.
- C. Submittals
 - 1. Construction Indoor Air Quality Management Plan.
 - a. Submit documentation demonstrating that an Indoor Air Quality Management Plan was developed and implemented, including:
 - 2. SMACNA IAQ Guidelines Chapter 3 implementation.
 - 3. Stored on-site or installed abortive materials were successfully protected from moisture damage.
 - 4. Maintaining ductwork internal cleanliness.
 - 5. Documentation including product data, that if any air handling systems were used during construction, that any return and exhaust grilles were protected with filtration media with a Minimum Efficiency Reporting Value (MERV) of at least 13 (per ASHRAE 52.2) including filtration media manufacturer's name, model number, and MERV value.
 - 6. Documentation, including product data, that all filtration media was replaced prior to occupancy with filtration media with a Minimum Efficiency Reporting Value (MERV) of at least 13 (per ASHRAE 52.2) including filtration media manufacture's name, model number, and MERV Value.
 - 7. Provide photographs verifying plan compliance at different phases of construction.
 - 8. Submit documentation that a minimum two weeks building 100% outside air flush-out was completed, including dates when the flush-out was begun and completed and what steps were taken to guarantee 100% outside air usage.
 - 9. Submit documentation for the filtration media used during the flush-out period, including filtration media manufacturer's name, model number, and MERV value.
- D. Implementation
 - 1. HVAC Protection
 - a. Comply with Section in Division 23 for Ductwork

1. EAST WING TOWER & RADIOLOGY SPC 4D COMPLIANCE

2. Source Control

- a. Prefabricated insulated ductwork and insulating materials should be protected against moisture. Ductwork materials shall be stored in a dry and clean environment pending installation.
- b. Containers of wet products shall be kept closed when not used. Waste materials that can release odor or dust shall be covered or sealed.

3. Housekeeping

- a. Minimize accumulation of dust fumes, vapors, or gases upon HVAC start up.
- b. Do not run the HVAC system until after dust generating finishes, such as spray applied fireproofing and gypsum board, have been installed.
- c. Suppress dust with wetting agents or sweeping compounds. Efficient and effective dust collecting methods such as damp cloths, wet mops, and vacuum with particulate filters, or wet scrubbers shall be used.
- d. Increase the cleaning frequency when dust build-up is noticed.
- e. Remove spills or excess applications of solvent-containing products as soon as possible.
- f. Also refer to Division 23 - Ductwork for requirements.
- g. Water accumulated inside the building shall be removed promptly. Porous materials such as insulation, ceiling tiles, gypsum wall board, carpet and fabric furnishings shall be protected from exposure to moisture.
- h. Store volatile liquids, including fuels and solvents in closed containers and outside of the building when not in use.

4. Scheduling

- a. When possible, install carpets, furnishings and highly absorbent materials after all VOC-emitting products have been installed and fully cured.
- b. Provide sufficient ventilation and air circulation after VOC-emitting materials are installed.
- c. New MERV 13 filters shall be installed immediately following the flush and prior to building occupation. Refer to Division 23 – Ductwork for additional requirements. Monitoring of IAQ Plan

- d. A minimum of 18 photographs, documenting the progress of the IAQ management Plan implementation, shall be taken at the following stages:
 - 1) Site delivery and storage processes
 - 2) Installation, protection, and housekeeping activities
 - 3) Commissioning, flushing, and re-filtering of HVAC systems

Enclose with each photograph a narrative identifying the date and location where the photograph was taken, and the SMACNA strategy applied.

- e. Subcontractor site coordination meetings shall be held monthly. The purpose of these meetings shall be to review the appropriate components of the IAQ Plan and to document the progress of the plan implementation. SMACNA IAQ Guidelines Appendix C shall be used as the Planning Checklist and Appendix D shall be used as the Inspection Checklist by the subcontractor.

5. Building Flush-Out

- a. Building flush-out and report: The subcontractor shall conduct a building flush-out and prepare a flush-out report. The flush-out report should include:
 - 1) Total days required, and actual days conducted.
 - 2) Hours per day required actual hours conducted.
 - 3) Outside air percentage recommended and actual used.

PART II – PRODUCTS – Not Applicable to this section

PART III – EXECUTION

3.01 Refer to the following attachments

- A. Appendix A: Waste Materials Estimating
- B. Appendix B: Waste Management Log"

END OF SECTION 01 39 00

1. EAST WING TOWER & RADIOLOGY SPC 4D COMPLIANCE

APPENDIX A
WASTE MATERIALS ESTIMATING SHEET
(Use as many sheets as needed)

PROJECT TITLE: _____

COMPANY: _____

DATE: _____

		TOTAL AMOUNT GENERATED	AMOUNT RECYCLED	AMOUNT SALVAGED	AMOUNT LANDFILLED
MATERIAL	DESTINATION	TONS	TONS	TONS	TONS
TOTALS					

**APPENDIX B
 WASTE MANAGEMENT LOG**
(Use as many sheets as needed)

PROJECT TITLE: _____

COMPANY: _____

LOG DATES: _____ through _____

Date	Material	Destination	Tons			
			Salvaged	Recycled	Landfilled	Total
Totals						

Note: provide weighmaster tickets with specific information on type of material recycled and weight.

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Relationship between Code, Ordinances, Standards and Contract Documents
- B. Applicable Codes, Laws and Ordinances
- C. Project Inspections
- D. California State Fire Marshal Requirements
- E. Department of Health Care Access and Information Projects

1.02 RELATED SECTIONS

- A. Section 013500 – SPECIAL PROCEDURES
- B. Section 014200 – REFERENCES
- C. Section 014500 – QUALITY CONTROL

1.03 RELATIONSHIP BETWEEN CODES, ORDINANCES, STANDARDS AND THE CONTRACT DOCUMENTS

- A. Authority: All codes, ordinances and standards referenced in Contract Documents shall have full force and effect as though printed in their entirety in the Contract Specifications.
- B. Precedence:
 - 1. Where specified requirements differ from requirements of applicable codes, ordinances and standards, the more stringent requirements shall take precedence.
 - 2. Where Contract Drawings or Contract Specifications require or describe products or execution of better quality, higher standard or greater size than required by applicable codes, ordinances and standards, the Contract Drawings and Contract Specifications shall take precedence so long as such increase is legal.
 - 3. Where no requirements are identified in Contract Documents, comply with all requirements of applicable codes, ordinances and standards of governing authorities having jurisdiction.

1.04 APPLICABLE CODES, LAWS AND ORDINANCES

A. Building Codes, Laws, and Regulations:

1. Work shall meet or exceed the requirements of and be performed in accordance with applicable, adopted code requirements, laws and requirements of all other regulatory agencies, including, but not limited to the following:

a. California Code Series - 2019 Edition

- 1) California Administrative Code, California Code of Regulations – Title 24, Part 1
- 2) California Building Code, California Code of Regulations – Title 24, Part 2, Volume 1& 2
- 3) California Electrical Code, California Code of Regulations – Title 24, Part 3
- 4) California Mechanical Code, California Code of Regulations – Title 24, Part 4
- 5) California Plumbing Code, California Code of Regulations – Title 24, Part 5
- 6) California Energy Code, California Code of Regulations – Title 24, Part 6
- 7) Elevator Safety Construction Code, California Code of Regulations – Title 24, Part 7
- 8) California Historical Building Code, California Code of Regulations – Title 24, Part 8
- 9) California Fire Code, California Code of Regulations – Title 24, Part 9
- 10) California Existing Building Code, California Code of Regulations – Title 24, Part 10
- 11) California Referenced Standards Code, California Code of Regulations – Title 24, Part 12

b. NFPA Code Series. National Fire Protection Association (NFPA) (as adopted by State agencies)

- 1) NFPA 13 – Standard for the Installation of Sprinkler Systems.
- 2) NFPA 14 – Standard for the Installation of Standpipe and Hose System
- 3) NFPA 72 – National Fire Alarm and Signaling Code

- 4) NFPA 80 – Standard for Fire Doors and Other Opening Protectives
 - 5) NFPA 99 – Health Care Facilities Code
 - 6) NFPA 101 – Life Safety Code
 - 7) NFPA 252 – Standard Methods of Fire Tests of Door Assemblies
 - 8) NFPA 701 – Standard Methods of Fire Tests of Flame Propagation of Textiles and Films
- c. California Code of Regulation Series (embodied in California model codes as noted above)
- 1) Title 8, Industrial Relations
 - 2) Title 17, Public Health (Chapter 7)
 - 3) Title 19, Public Safety
 - 4) Title 21, Public Works
 - 5) Title 22, Social Security
 - 6) Title 24, Parts 1, 2, 3, 4, 5, 9 and 12
 - 7) Title 25, Energy Insulation Standards
- d. Americans with Disabilities Act (ADA) 2010 (Federal Law)
- e. Rules and regulations of private and public utilities
- f. American National Standards Institute (ANSI)
- g. American Society of Testing Materials (ASTM)
- h. Federal Specifications (Fed. Spec.)
- i. Underwriters Laboratories
- j. Traffic controls per California MUTCD requirements
2. All dates to comply with editions adopted and accepted by University and California State Fire Marshal (CSFM).
3. Unless otherwise specified, specific references to codes, regulations, standards, manufacturers' instructions, or requirements of regulatory agencies, when used to specify requirements for materials or design elements, shall mean the latest edition of each in effect at the date of submission of bids, or the date of the Change Order, as applicable.

4. References on Drawings or in Specifications to "code" or "building code" not otherwise identified shall mean the codes specified above, together with all additions, amendments, changes, and interpretations adopted by code authorities of the jurisdiction having authority over the project.

B. Other Applicable Laws, Ordinances and Regulations:

1. Work shall be accomplished in conformance with all applicable laws, ordinances, rules and regulations of Federal, State and local governmental agencies and jurisdictions having authority over the Project.
2. Work shall be accomplished in conformance with all regulations of Public Utilities and utility districts.
3. Where such laws, ordinances, rules and regulations require more care or greater time to accomplish Work, or require better quality, higher standards or greater size of products, Work shall be accomplished in conformance to such requirements with no change to Contract Time or Contract Sum, except where changes in laws, ordinances, rules and regulations occur subsequent to execution date of the Agreement.
4. General Contractor shall not self-perform specialty contracting work defined in sections 7055 – 7059.1 of the California Business and Professions Code unless the General Contractor has the specialty contractor's license appropriate for the work performed. Otherwise, specialty contractors shall be retained by the Contractor contractor to perform specialty work identified in the project scope.

1.05 PROJECT INSPECTIONS

- A. Provision of inspectors by University, if any, or by Department of Health Care Access and Information pursuant to this Section and Section 1.04 above shall be subject to the following:
1. Contractor shall allow inspectors full access to Project at all times.
 2. Contractor shall not take any direction, approvals or disapprovals from inspectors.
 3. Contractor shall not rely on inspectors to ensure Work is completed in accordance with Contract Documents.
 4. Acts of omissions of any inspector (including without limitation inspector's failure to observe or report deficiencies in Contractor's Work) shall not relieve Contractor for responsibility to complete Work in accordance with Contract Documents.

1.06 DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION PROJECTS - **NOT USED**

- A. Department of Health Care Access and Information (HCAI) is the agency having jurisdiction over all acute care medical project design and construction unless a Memorandum of Understanding (MOU) has been established assigning University staff to perform regulatory duties.
- B. HCAI will approve an inspector for the Project who shall have full access to the Project at all times.
- C. HCAI will require Verified Report forms to be filed per testing, inspection and observation form during construction and a final verified report at completion of the project. Separate verified reports are required from Consultants, Project Inspector, and Contractor.
- D. HCAI will require a Building Permit for project submitted by University's Representative. No HCAI Building Permit fees are required to be paid by the Contractor.
- E. HCAI will require Change Order Approval submitted by University's Representative.
- F. HCAI will require a Licensed Contractor's Declaration from the Contractor.
- G. HCAI projects shall comply with the 2016 California Administration Code.

1.07 DEFERRED APPROVAL

- A. Where noted in the Contract Documents, certain items of materials and/or systems may require **HCAI** deferred approval pending submittals of shop drawings. For these items, Contractor shall submit details and structural calculations for anchorage, to comply with State of California Code of Regulations Title 24, table T17-23-J. Calculations shall be made by a licensed Structural Engineer registered in the State of California.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not Applicable to this Section

END OF SECTION 01 41 00

SECTION 01 42 00

REFERENCES

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Definitions and terms used in Contract Documents
- B. Reference Standards used in Contract Documents
- C. Common abbreviations and acronyms which may be used in Contract Documents

1.02 RELATED SECTIONS

- A. Section 014100 – Regulatory Requirements

1.03 DEFINITIONS OF TERMS

- A. Basic Contract Definitions: Words and terms governing the Work are defined in the General Conditions of the Contract, provided in the Contract Documents.
- B. Additional words and terms are used in the Drawings and Specifications and are defined as follows:
 - 1. Applicable: As appropriate for the particular condition, circumstance or situation.
 - 2. Approve (d): Used in conjunction with action on submittals, applications, and requests, is limited to duties and responsibilities stated in the General Conditions. Approvals shall only be valid if obtained in writing and shall not apply to matters regarding the means, methods, techniques, sequences and procedures of construction. Approval shall not release Contractor from responsibility to fulfill Contract requirements.
 - 3. And/or: If used, shall mean that either or both items so joined are required.
 - 4. By others: Work on the project that is outside the scope of Work to be performed under the Contract, but that will be performed by University, separate contractors or other means.
 - 5. Contractor-Furnished/University-Installed (CFUI): Items, systems or equipment purchased by the Contractor as part of the project and handed over to the University for installation.
 - 6. Construction Site: Same as site.

7. Directed: As instructed by University or University's Representative, in writing, regarding matters other than the means, methods, techniques, sequences and procedures of construction. Terms such as "directed", "requested", "authorized", "selected", approved", "required", and "permitted" mean "directed by University's Representative", requested by University's Consultant" or University's Representative and similar phrases. No implied meaning shall be interpreted to extend the University's Representative responsibility into Contractor's supervision of construction.
8. Equal or Equivalent: As determined by the University's Consultant as being of the same quality, appearance, utility, durability, finish, function, suitability, and performance.
9. Furnish: Means "supply and deliver, ready for unloading, unpacking, assembly, installation, and similar operations".
10. Indicated: Refers to graphic representations, notes or schedules on Drawings, or Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used, it is to help locate the reference.
11. Install: Describes operations at the site including unloading, unpacking, assembly, erection, anchoring, applying, working to dimension, protecting, cleaning, and similar operations.
12. Installer: "Installer" is the Contractor or an entity engaged by the Contractor, as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
 - a. Experienced Installer: The term "experienced", when used with "installer" means having a minimum of five (5) previous Projects similar in size to this Project, and familiar with the precautions required, and with requirements of the authority having jurisdiction.
13. Jobsite: Same as site.
14. Necessary: as determined in the professional judgement of the University Representative through the University's Consultant as being necessary for the Work, in conformance with the requirements of the Contract Documents, and excluding matters regarding the means, methods, techniques, sequences and procedures of construction.
15. Noted: Same as indicated.
16. Owner-Furnished/ Contractor-Installed (UFCI): Item, system or equipment furnished by University at its cost and installed by the Contractor as part of the Work.
17. Per: In accordance with or in compliance with.
18. Products: Materials, systems or equipment.
19. Project site: Same as site.

20. Proper: As determined by the University's Representative as being proper for the Work, excluding matters regarding the means, methods, techniques, sequences and procedures of construction, which are solely the Contractor's responsibility to determine.
21. Provide: Means "furnish and install, complete and ready for use".
22. Regulation: Includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.
23. Required:
 - a. As required by regulatory requirements of governing authorities.
 - b. As required by referenced standards.
 - c. As required by existing job conditions.
 - d. As generally provided by accepted construction practices of the locale.
 - e. As indicated on the Drawings and in the Specifications.
 - f. As otherwise required by the Contract Documents.
24. Scheduled: Same as indicated.
25. Selected: As selected by University's Representative or University's Consultant from the full national product selection of the manufacturer, unless otherwise specifically limited in the Contract Documents to a particular quality, color, texture or price range.
26. Shown: Same as indicated.
27. Site: Same as Site of the Work or Project Site; the area or areas or spaces occupied by the Project and including adjacent areas and other related areas occupied or used by the Contractor for construction activities, either exclusively or with others performing other construction on the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land upon which the Project is to be built.
28. Testing Laboratories: Same as Testing and Inspection Agency.
29. Testing and Inspection Agency: An independent entity engaged to perform specific inspections or tests, at the Project Site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.
30. University-Furnished/Contractor-Installed (UFCI): Same as Owner-Furnished/Contractor-Installed.

1.04 REFERENCE STANDARDS

- A. References: The Drawings and Specifications contain references to various standards, standard specifications, codes, practices and requirements for products, execution, tests, and inspections. These reference standards are published and issued by the agencies, associations, organizations and societies listed in this Section or identified in individual Sections of the Specifications.
- B. Relationship to Drawings and Specifications: Such references are incorporated into and made a part of the Drawings and Specifications to the extent applicable.
- C. Referenced grades, Classes and Types: Where an alternative or optional grade, class or type of product or execution is included in a reference but is not identified in the Drawings or Specifications, provide the highest, best and greatest of the alternatives or options for the intended use and prevailing conditions.
- D. Copies of Reference Standards:
 - 1. Reference standards are not furnished with the Drawings and Specifications. It is the responsibility of the Contractor, subcontractors, manufacturers, suppliers, trades and crafts to be familiar with these generally recognized standards of the construction industry.
- E. Jobsite Copies:
 - 1. Contractor shall obtain and maintain at the Project site copies of reference standards identified on the Drawings and in the Specifications in order to properly execute the Work.
- F. Edition Date of References:
 - 1. When an edition or effective date of a reference is not given, it shall be understood to be the current edition or latest revision published as of the date of the Contract.
 - 2. All amendments, changes, errata, and supplements as of the effective date shall be included.
- G. ASTM and ANSI References: Specifications and Standards of the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI) are identified in the Drawings and Specifications by abbreviation and number only and may not be further identified by title, date, revision or amendment. It is the responsibility of the Contractor to be familiar with and have access to these nationally, and industry recognized specifications and standards.

1.05 ABBREVIATIONS & ACRONYMS

- A. Abbreviations and Names: Where acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable.
- B. Refer also to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.

C. The following are commonly used abbreviations which may be found on Contract Drawings and in Contract Specifications:

AA	Aluminum Association
AAA	American Arbitration Association
AAC	Architectural Anodizers Council
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
ACPA	American Concrete Pumping Association
ADA	Americans with Disabilities Act
ADC	Air Diffusion Council
AFSA	American Fire Sprinkler Association
AGA	American Galvanizers Association (formerly AHDGA)
AGA	American Gas Association
AGC	Associated General Contractors of American
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulation Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association International
ANSI	American National Standards Institute
APA	Engineered Wood Association (formerly American Plywood Association)
APWA	American Public Works Association
ARMA	Asphalt Roofing Manufacturers Association
ASAC	American Subcontractors Association of America
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BOC	Board of Corrections
CABO	Council of American Building Officials
CAC	California Administrative Code (see California Code of Regulations (CCR))
CAL/OSHA	State of California Construction Safety Orders
CBC	California Building Code
CCR	California Code of Regulations
CEC	California Electrical Code
CFC	California Fire Code
CFR	Code of Federal Regulations
CIMA	Construction Industry Manufacturers Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers' Institute
CMC	California Mechanical Code
CPC	California Plumbing Code
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
CTIOA	Ceramic Tile Institute of America, Inc.
DHI	Door and Hardware Institute
DSA	Division of the State Architect
EJMA	Expansion Joint Manufacturers Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual Research Organization
FS	Federal Specification (from GSA)
GA	Gypsum Association
GSA	General Services Administration
HCAI	Department of Health Care Access and Information (State of California)
IAPMO	International Association of Plumbing and Mechanical Officials
IEEE	Institute of Electrical and Electronics Engineers, Inc.

ISO	International Organization for Standardization
MIA	Masonry Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MM	State of California, Business and Transportation Agency, Department of Transportation, "Materials Manual"
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NAAMM	National Association of Architectural Metal Manufacturers
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NFC	National Fire Code
NFPA	National Fire Protection Association
NFSA	National Fire Sprinkler Association
NGA	National Glass Association
NIBS	National Institute of Building Sciences
NIST	National Institute of Standards and Technology
NPCA	National Precast Concrete Association
NRCA	National Roofing Contractors Association
NSC	National Safety Council
NSF	National Sanitation Foundation
NSPE	National Society of Professional Engineers
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting and Decorating Contractors of America
PDI	Plumbing and Drainage Institute
PS	Product Standard (U.S. Department of Commerce)
RIS	Redwood Inspection Service
SDI	Steel Deck Institute
SFM	State Fire Marshal (California)
SFPE	Society of Fire Protection Engineers
SGCC	Safety Glazing Certification Council
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Society for Protective Coatings (Steel Structure Painting Council)
SSPWC	Standard Specifications for Public Works Construction
SWRI	Sealant, Waterproofing and Restoration Institute
TCA	Tile Council of America
TJC	The Joint Commission
UBC	Uniform Building Code
UFC	Uniform Fire Code
UL	Underwriters Laboratories, Inc.
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
USS	United States Standard
WCLIB	West Coast Lumber Inspection Bureau
WIC	Woodwork Institute of California
WWPA	Western Wood Products Association

- D. Words and terms not otherwise specifically defined in this Section or in the Contract Documents, shall be as customarily defined by trade or industry practice, by reference standard and by specialty dictionaries such as Dictionary of Architecture and Construction (Cyril M. Harris, McGraw-Hill Educational; 4th Edition, September 5, 2005).
- E. Additional abbreviations, used on the Drawings, are listed thereon.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not Applicable to this Section

END OF SECTION 01 42 00

SECTION 01 45 00
QUALITY CONTROL

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Contractor's Quality Control
- B. Quality of the Work
- C. Inspections and tests by governing authorities
- D. Inspections and tests by serving utilities
- E. Inspections and tests by manufacturer's representatives
- F. Inspections and Independent testing and Inspection Laboratories/Agencies
- G. Contractor's responsibilities in inspections and tests
- H. Contractor's responsibilities regarding the University's testing laboratory
- I. Test reports
- J. Geotechnical engineer

1.02 RELATED SECTIONS

- A. Section 013100 – COORDINATION
- B. Section 014100 – REGULATORY REQUIREMENTS: Compliance with applicable codes, ordinances and standards.
- C. Section 014550 – INSPECTION and TESTING of WORK
- D. Section 016100 – PRODUCT REQUIREMENTS: Product Options, substitutions, transportation and handling requirements, storage and protection requirements, and system completeness requirements.

1.03 CONTRACTOR'S QUALITY CONTROL

- A. Contractor's Quality Control: Contractor shall ensure that products, services, workmanship and site conditions comply with requirements of the Contract Documents by coordinating, supervising, testing and inspecting the Work and by utilizing only suitably qualified personnel.
- B. Quality Requirements: Work shall be accomplished in accordance with quality requirements of the Contract Documents, including, by reference, all Codes, laws, regulations and standards. When no quality basis is prescribed, the quality shall be in accordance with the best-accepted practices of the construction industry for the locale of the Project, for projects of this type.

- C. Quality Control Personnel: Contractor shall employ and assign knowledgeable and skilled personnel as required by contract or necessary if not prescribed to perform quality control functions to ensure the Work is provided as required.

1.04 QUALITY OF THE WORK

- A. Quality of Products: Unless otherwise indicated or specified, all products shall be new, free of defects and fit for the intended use.
- B. Quality of Installation: All Work shall be produced plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements and adjacent construction.
- C. Protection of Completed Work: Take all measures necessary to preserve completed Work free from damage, deterioration, soiling and staining, until Acceptance by University.
- D. Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Unless more stringent requirements are indicated or specified, comply with manufacturer's instructions and recommendations, reference standards and building code research report (ICC) requirements in preparing, fabricating, erecting, installing, applying, connecting and finishing Work.
- E. Deviations from Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Document and explain all deviations from reference standards and building code research report requirements and manufacturer's product installation instructions and recommendations, including acknowledgement by the manufacturer that such deviation is acceptable and appropriate for the Project.
- F. Verification of Quality: Work shall be subject to verification of quality by University's Representative and University's Consultant in accordance with provisions of the General Conditions of the Contract.
 - 1. Contractor shall cooperate by making Work available for inspection by University's Representative, University's Consultant or their designated representatives.
 - 2. Such verification may include mill, plant, shop, or field inspection as required.
 - 3. Provide access to all parts of the Work, including plants where materials or equipment are manufactured, fabricated or stored.
 - 4. Provide all information and assistance as required, including that by and from subcontractors, fabricators, materials suppliers and manufacturers, for verification of quality by University's Representative or University's Consultant.
 - 5. Contract modifications, if any, resulting from such verification activities shall be governed by applicable provisions in the General Conditions of the Contract.
- G. Observations by University's Consultants: Periodic and occasional observations of the Work in progress will be made by University's Consultant and their consultants as deemed necessary to review progress of Work and general conformance with design intent.

- H. Limitations on Inspections, Tests and Observations: Neither employment of independent testing and inspection agencies nor observations by University's Consultant and their consultants shall relieve Contractor of obligation to perform Work in full conformance to all requirements of Contract Documents.
- I. Acceptance and Rejection of Work: University's Representative reserves the right to reject all Work not in conformance to the requirements of the Contract Documents.
 - 1. If initial tests or inspections made by University's Testing Laboratory or Geotechnical Engineer reveal any portion of the Work fails to comply with Contract Documents, or if it is determined that any portion of Work requires additional testing or inspection, additional tests and inspections shall be made as directed by University's Representative.
 - 2. If such additional tests or inspections establish such portions of the Work comply with Contract Documents, all costs of such additional testing or inspection will be paid by University.
 - 3. If such additional tests or inspections establish such portions of the Work fail to comply with Contract Documents, all costs of such additional tests and inspection shall be deducted from the Contract sum.
- J. Correction of Non-conforming Work: Non-conforming Work shall be modified, replaced, repaired or redone by Contractor at no change in the Contract Sum or Contract time.
- K. Acceptance of Non-Conforming Work: Acceptance of non-conforming Work, without specific written acknowledgement and approval of University shall not relieve Contractor of the obligation to correct such Work.
- L. Contract Adjustment for Non-conforming Work: Should University or University's Consultants determine it is not feasible or in University's interest to require non-conforming Work to be repaired or replaced, an equitable reduction in Contract Sum shall be made by agreement between University and Contractor. If equitable reduction in Contract Sum cannot be agreed upon, a Directed Change Order will be issued and the amount in dispute resolved in accordance with applicable provisions of the General Conditions of the Contract.

1.05 INSPECTIONS AND TESTS BY GOVERNING AUTHORITIES

- A. Regulatory Requirements for Testing and Inspection: Comply with California Building Code (CBC) requirements and all other requirements of governing authorities having jurisdiction.
- B. Inspections and tests by governing Authorities: Contractor shall cause all tests and inspections required by governing authorities having jurisdiction to be made for Work under this Contract.
 - 1. Such authorities include University's Building Inspection (code compliance), University's Fire Marshal's office and similar agencies.

1.06 INSPECTIONS AND TESTS BY SERVING UTILITIES

- A. Inspections and Tests by Serving Utilities: Contractor shall cause all tests and inspections required by serving utilities to be made for Work under this Contract. Scheduling, conducting and paying for such inspections shall be solely the Contractor's responsibility.

1.07 INSPECTIONS AND TEST BY MANUFACTURER'S REPRESENTATIVES

- A. Inspections and Tests by Manufacturer's Representatives: Contractor shall cause all tests and inspections specified to be conducted by materials or systems manufacturers, to be made. Additionally, all tests and inspections required by materials or systems manufacturers as condition of warranty or certification of Work shall be made, the cost of which shall be included in the Contract Sum. Manufacturer's Representatives shall provide a PDF electronic report indicating but not limited to work or materials that are missing, not installed correctly, damaged or need correction. Manufacturer's Representatives shall issue a final PDF electronic report once all work and materials are installed correctly, functioning and in compliance with the Manufacturer's Warranty.

1.08 INSPECTION BY INDEPENDENT TESTING AND INSPECTION LABORATORIES

- A. Definitions:
 - 1. The term "University's Testing Laboratory" means a testing laboratory retained and paid for by University for the purpose of reviewing material and product reports, performing material and product testing and inspection, and other services as determined by University.
- B. University will select an independent testing and inspection laboratory or agency to conduct tests and inspections as called for in the Contract Documents and as required by governing authorities having jurisdiction.
 - 1. Responsibility for payment for tests and inspection shall be as indicated in the schedule below. All time and costs for Contractor's services related to such tests and inspections shall be included in Contract Time and Contract Sum.
- C. Contractor shall notify University, and if directed by University's Representative testing and inspection laboratory, when Work is ready for specified tests and inspections.
- D. Contractor shall pay for all additional charges by testing and inspection agencies and governing authorities having jurisdiction due to the following:
 - 1. Contractor's failure to properly schedule or notify testing and inspection agency or authority having jurisdiction.
 - 2. Changes in sources, lots or suppliers of products after original tests or inspections.
 - 3. Changes in means, methods, techniques, sequences and procedures of construction that necessitate additional testing, inspection and related services.

- E. Changes in mix designs for concrete and mortar after review and acceptance of submitted mix design. Test and inspections shall include, but not be limited to, the following:

List the applicable services required, for example:

Material Inspections and Tests		Paid by:
Concrete Reinforcement	Reinforcement Inspection	University
	Reinforcement Strength	University
Cast in Place	Slump Tests	University
	Compressive Strength Tests	University
Structural Steel	Welding Inspection	University
	High Strength Bolting Inspection	University

- F. Test and Inspection Reports: After each inspection and test, one (1) PDF electronic report shall be promptly submitted to University's Representative, Contractor and to agency having jurisdiction (if required by code).

1. Reports shall clearly identify the following:
 - a. Date issued
 - b. Project name and Project number
 - c. Identification of product and Specification Section in which Work is specified
 - d. Name of inspector
 - e. Date and time of sampling or inspection was conducted
 - f. Location in Project where sampling or inspection was conducted
 - g. Type of inspection or test
 - h. Date of tests
 - i. Results of tests
 - j. Comments concerning conformance with Contract Documents and other requirements
2. Test reports shall indicate specified or required values and shall include statement whether test results indicate satisfactory performance of products.
3. Samples taken but not tested shall be reported.
4. Test reports shall confirm that methods used for sampling and testing conform to specified test procedures.
5. When requested, testing and inspection agency shall provide interpretations of test results.

6. Verification reports shall be prepared and submitted, stating tests and inspections specified or otherwise required for Project, have been completed and material and workmanship comply with the Contract Documents. Verification reports shall be submitted at intervals not exceeding six (6) months, at Substantial Completion of the Project, and at all times when Work of Project is suspended.

1.09 CONTRACTOR RESPONSIBILITIES IN INSPECTIONS AND TESTS

- A. Tests, inspections and acceptances of portions of the Work required by the Contract Documents or by Applicable Code Requirements shall be made at the appropriate times. Except as otherwise provided, Contractor shall notify University's Representative to make arrangements for such tests, inspections and acceptances. Contractor shall give University's Representative timely notice of all required inspections as outlined in Specification Section 014550 – INSPECTION and TESTING of WORK, Item 1.05, Scheduling Inspections – Notification Requirements.
- B. If such procedures for testing, inspection or acceptance reveal failure of any portion of the Work to comply with requirements of the Contract Documents, Contractor shall bear all costs made necessary by such failure including those of repeated procedures, including compensation for University's Consultant's services and expenses.
- C. If University and/or University's Consultants are to observe tests, inspections or make acceptances required by the Contract Documents, University and/or University's Consultant will do so promptly and, where practicable, at the normal place of testing.
- D. Cooperate with testing and inspection agency personnel, University, University's Consultant's and their consultants. Provide access to Work areas and off-site fabrication and assembly locations, including during weekends and after normal work hours.
- E. Provide incidental labor and facilities to provide safe access to Work to be tested and inspected, to obtain and handle samples at the Project site or at source of products to be tested, and to store and cure test samples.

1.10 CONTRACTOR RESPONSIBILITIES REGARDING UNIVERSITY TESTING LABORATORY

- A. Secure and deliver to University's Testing Laboratory adequate quantities of representative samples of materials proposed for use as specified.
- B. Submit to University's Representative the preliminary design mixes proposed for concrete and other materials, which require review, by University's Consultants and/or University's Testing Laboratory.
- C. Submit copies of product test reports as specified.

1.11 TEST REPORTS

- A. University's Testing Laboratory shall submit one (1) PDF electronic copy of all reports to the University's Representative, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

- B. University will distribute one (1) PDF electronic copy of the reports to University's Consultants and Contractor.

1.12 GEOTECHNICAL ENGINEER (If applicable or NOT USED)

- A. University will retain and pay the expense of a Geotechnical Engineer to perform inspection, testing and observation functions specified by University. Geotechnical Engineer will communicate only with University. University's Representative shall then give notice to Contractor, of any action required of Contractor.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not Applicable to this Section

END OF SECTION 01 45 00

SECTION 01 45 10
SEISMIC CONTROL – HCAI

PART I - GENERAL

1.01 DESCRIPTION

- A. Provide all required seismic restraints and calculations to ensure that the installation of all architectural, mechanical, and electrical equipment/components are in compliance with all applicable seismic codes, standards, and specific information listed herein.

1.02 QUALITY ASSURANCE

- A. ASTM standards
- B. 2019 California Building Code, Title 24 (CBC)

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of material listed in this Section including shop drawing and other documentation to comply to the requirement of this Section.
- B. Submit special seismic certification (OSP) for mechanical and electrical equipment/components as noted on CBC 1705A.13.3.1. Contractor shall bear all costs associated with all tests, engineering calculations and documentation required to obtain Department of Health Care Access and Information (HCAI) approval in accordance with this section in a timely manner if the Contractor chooses to select equipment that does not already have special seismic certification as noted on the design documents.
- C. Submit HCAI Pre-approved Manufacturer's Certification (OPM) as noted on the design drawings with only one applicable OPM per application.

PART II - PRODUCTS

2.01 SEISMIC RESTRAINT REQUIREMENTS

A. SUMMARY

- 1. This section covers the seismic restraint requirements for suspended distribution systems, vibration and non-vibration isolated items, systems and/or related suspended equipment.
- 2. The designers of record (DOR) as referenced in this specification shall be the project architect, structural engineer, and the appropriate system engineer (e.g., electrical, etc.).

3. An HCAI OPM determined by the DOR shall be considered as the specified seismic design for this project. Other non-OPM designs may be submitted as an alternate if they meet or exceed all the requirements contained within these specifications, HCAI pre-approved service loads, installation applications, and engineering services.
4. Channel framing materials, fittings and related accessories shall be as indicated on the OPM and on the drawings. All channel members (trapezes and braces) shall be solid strut. Field drill bolt holes at 1/16" larger than bolt size as required for connections. Back-to-back struts shall be stitch groove welded or button welded.
5. To facilitate plan review and construction, all construction documents should include an equipment schedule identifying all applicable equipment, its classification (fixed, movable, mobile, other, countertop, interim or temporary) and reference to support and attachment per Pin 68-Table 1.

B. SEISMIC RESTRAINT DESIGN

1. The attachment supports and seismic restraints of suspended non-structural components and distribution systems listed below shall be designed to resist the total design seismic forces prescribed in the CBC.
 - a. All equipment/components including but not limited to: electrical, mechanical, plumbing, fire sprinkler and architectural.
 - b. Without referencing OPM or HCAI pre-approved seismic attachment and supports shown on the design document, seismic support and attachment shall be engineered and built by the applicable system contractor. Engineering shall be performed (signed & sealed) by a licensed California Structural Engineer and submitted to the DOR and HCAI for acceptance prior to installation. Cost to be borne by the contractor.
 - c. Design and installation shall consider seismic relative displacement in accordance with ASCE 7-16-13.3.2.
 - d. Pipes with hazardous contents including but not limited to medical gas, fuel oil, natural gas piping, etc., regardless of size and weight shall be seismically braced per the OPM or HCAI pre-approved design.
 - e. Support and attachment requirements for fixed, interim, mobile, movable, other, and temporary equipment shall be in accordance with HCAI PIN 68.
2. Seismic restraint transverse and/or longitudinal spacing shall be in accordance with CBC and OPM and limited to the following:
 - a. Seismic design forces equal to or less than the capacity of the building structure.
 - b. 40' feet transversely and/or 80' feet longitudinally where pipes, conduits, and their connections are constructed of ductile materials (copper, ductile iron, steel, or aluminum and brazed, welded, or screwed connections).

- c. 20' feet transversely and/or 40' feet longitudinally where pipes, conduits, and their connections are constructed of nonductile materials (e.g., cast iron, no-hub pipe, and plastic).
 - d. 20' feet transversely and/or 40' feet longitudinally for bus ducts and cable trays, baskets, channels.
3. Contractor shall not adopt, use, or otherwise implement the omission of any seismic restraints without prior review and acceptance by the designers of record. All submittals for omission of seismic restraints must include the following and must be performed (signed & sealed) by a licensed California Structural Engineer and approved by HCAI.
 - a. Project specific cover letter clearly indicating that said engineer has completely reviewed the project documents, and that the items/systems were designed individually and in coordination with all other trades and references the code section(s) where the omission of seismic restraints is allowed.
 - b. Lateral motion of the supported items/systems shall not directly or indirectly impact adjacent life safety, emergency services and/or hazardous items/systems or their supports.
4. Seismic hardware brackets shall provide a (Captive) 360-degree connection that completely encloses or encircles the rod, anchor, bolt, fastener, etc. Open hook and/or open slot seismic hardware brackets shall not be allowed.
5. Seismic restraint assembly connections shall not incorporate the use of break-off bolts or nuts and pneumatic fasteners unless referenced in the OPM document.
6. Ceiling system shall not be used as a seismic restraint, sway brace and/or safety restraint material.
7. Non-seismic and/or safety restraints sway bracing shall meet or exceed that required for the attachment of seismic restraints to the building structure.
8. Seismic restraints shall be installed to provide a minimum of (2) two transverse and (1) one set of (2) two longitudinal braces per run and per the OPM document.
9. The accumulated load of multiple items at any given support (with or without seismic restraints) shall not overload the building structure and the support assembly.
10. Pipes, conduits, and other items attached to trapeze hangers shall be located uniformly along each individual trapeze hanger so that the accumulated load is evenly distributed.
11. Trapeze systems installed in a multi-layer configuration shall have seismic restraints designed and installed for each individual trapeze layer.
12. Design of supports, seismic restraints and anchorage to the structure shall consider all conditions that involve thermal, structural separation, relative displacement, building expansion and contraction.

13. SMACNA details shall not be used without prior approval by Structural Engineer of Record (SEOR).

C. ACCEPTABLE MANUFACTURERS

1. HCAI Pre-approved Certified Manufacturer (OPM)

D. ANCHORS, INSERTS AND FASTENERS

1. All anchors, inserts, fasteners, or connections to the structure shall be submitted to the structural engineer of record for review and acceptance prior to installation.
2. Do not use any anchor or insert in concrete or metal decking with concrete fill, which does not have one of the following:
 - a. ICC evaluation report
 - b. HCAI pre-approval
3. Cast-in-place inserts that contain internal threads shall include the installation of a jam or lock nut to secure the connection of the vertical support rod to the cast-in-place insert.
4. Cast-in-place inserts that allow for horizontal adjustment shall not be allowed unless an engineered solution is provided to assure positive captured positioning and secured attachment.
5. Do not use powder driven and power driven (Shoot-In) fasteners, expansion nails or internally threaded anchors in concrete or metal decking with concrete fill without prior scanning of the slab and wall for clearances, and to prevent damages to embedded electrical conduits and/or mechanical piping and reinforcing steel.
6. All beam clamps shall be constructed of malleable iron or steel. All single flange mounted beam clamps shall include a retaining strap or J-hook and must be submitted to the project structural engineer of record of review and acceptance prior to installation. Beam clamps shall not be used to resist seismic loads.

E. FIELD QUALITY CONTROL

1. Inspection of seismic restraints by the Inspector of Record (IOR), and/or Authority Having Jurisdiction (AHJ).
2. Special inspection for special seismic certification per CBC 1705A.12.4.

PART III - EXECUTION

3.01 SEISMIC ANCHORING AND RESTRAINTS

A. Equipment anchors:

1. All equipment shall be anchored. Anchor equipment per details shown on the drawings where provided.
2. Anchor installation shall be in accordance with the current ICC report.

3. Anchor details provided are based on specific equipment information. Submit design for approval for anchoring of equipment which varies from design.
- B. Conduit supports:
1. Conduits shall be supported and braced per CBC.
- C. Lighting fixture supports:
1. Provide independent seismic support system per CBC.
- D. Minimum clearance:
1. Diagonal braces and hanger supports shall maintain 6 inches minimum clearance from unbraced ducts and conduits, and 1-inch minimum clearance from braced ducts and conduits.
 2. Except for sprinklers installed using flexible sprinkler hose, installed clearance shall be 3 inches between any sprinkler drop or sprig and permanently attached equipment and other distribution systems, including their structural supports and bracing.
- 3.02 INSTALLATION AND TESTING OF MECHANICAL ANCHORS:

- A. Where permitted in other Sections of this specification, drilled-in expansion-type anchors or other post-installed concrete anchors may be used in hardened concrete.
- B. All post-installed concrete anchors shall be tested. Testing shall be performed in the presence of the Inspector of Record. Number of anchors to be tested shall be as shown on the drawings with a minimum of 50% of anchors installed and at each support. Testing shall be performed by torque or pull test, and to the values noted on the drawings. Test loads, frequency, and acceptance criteria of post-installed anchors in concrete shall be in accordance with CBC 1910A.5.
- C. Internally threaded shell-type anchors and displacement-controlled anchors (e.g., drop-in anchors, screw anchors, adhesive anchors, etc.) shall not be tested using a torque wrench.
- D. Screw anchors shall be installed with a calibrated torque wrench and may be loosened a maximum of one full turn to facilitate the positioning of a tension test collar. Following the tension test, the anchor shall be re-torqued in accordance with the manufacturer's installation instructions.
- E. Tension test of chemical/adhesive anchors and power actuated fasteners shall be in accordance with CBC and as noted on the drawings.
- F. All testing procedures shall be in accordance with CBC 1910A.5, and as noted on the drawings.
- G. Locate existing reinforcing steel and conduits in slabs and walls prior to drilling holes for the mechanical anchors.

END OF SECTION 01 45 10

SECTION 01 45 50

INSPECTION AND TESTING OF WORK

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Project Inspections and Procedures
- B. Scheduling Inspectors – Notification requirements

1.02 RELATED SECTIONS

- A. Section 013100 – COORDINATION
- B. Section 013200 – CONTRACT SCHEDULES
- C. Section 013500 – SPECIAL PROCEDURES
- D. Section 014100 – REGULATORY REQUIREMENTS
- E. Section 014500 – QUALITY CONTROL

1.03 DEFINITIONS

- A. IOR: Inspector-of-Record
- B. ACO: Area Compliance Officer for HCAI
- C. DSE: District Structural Engineer for HCAI
- D. FM: Fire Marshal (may include both HCAI FM and State FM)
- E. TL: Testing Laboratory

1.04 PROJECT INSPECTIONS AND TESTING PROCEDURES

- A. Inspections: This Project (is) (is not) under the jurisdiction of the Department of Health Care Access and Information. The following inspections will be requested on this project, as appropriate. Also see Part 3 for non-HCAI inspection items or Part 3, Item 3.11 for HCAI requirements.
 - 1. Inspections required by the California Building Code
 - 2. Inspections listed on the Testing, Inspection and Observation (TIO) form
 - 3. Final inspections

- B. Procedures: University's Representative shall be the Contractor's contact for all inspection requests. Contractor shall fill out Inspection Request Form for all inspections.
1. Contractor shall properly plan and coordinate inspection requests. Schedule delays caused by Contractor's failure to plan and/or coordinate inspection requests will not be considered for adjustments to Contract Time or Contract Sum.
 2. A complete set of HCAI/SFM stamped and approved Contract Drawings and Contract Specifications, including applicable shop drawings and building permit shall be available on site for review by the Inspector-of-Record. The Contractor, Subcontractors and other responsible parties shall be present during inspection walk-throughs. All areas of project scope shall be ready and accessible for inspection. Contractor shall provide access equipment as applicable for the inspector's needs.
 3. A complete set of codes referred to in the approved plans must be maintained on the job at all times.
 4. Contractor shall submit verified compliance reports as outlined in the California Administrative Code, Section 7-151.

1.05 SCHEDULING INSPECTIONS – NOTIFICATION REQUIREMENTS

- A. Advance Inspection Notification: University's Representative for this project requires the following advance notifications to schedule appropriate inspection agencies at the project site.
1. IOR Inspection Request Notification: Twenty-four (24) hours. Note: Inspection requests received by 2:00 PM will be scheduled for next day inspection. Inspection requests received after 2:00 PM will be scheduled for the following day; (example: Inspection request received at 2:01 PM on a Monday would be scheduled for inspection on Wednesday). Weekend and off-hours inspection requests will be scheduled on a case-by-case basis with a minimum of seventy-two (72) hour inspection request notification.
 2. HCAI Field Compliance Inspectors: Fourteen (14) calendar days.
 3. Testing Laboratory Inspections: Forty-eight (48) hours.
 - a. All testing laboratory and testing procedures must be scheduled by University's Representative. Inspections and/or testing directly scheduled by Contractor will not be accepted.
 - b. Contractor will bear all costs associated with unauthorized inspections and testing.
 4. State Fire Marshal Inspection Request Notification: Seventy-two (72) hours.

B. Methods of Inspection Notification:

1. All inspection notifications shall be in writing using inspection forms located at back of this Section. Incomplete forms will be returned as non-compliant, and no inspection will be scheduled until all required inspection information is provided.
2. Emailed inspection requests will be accepted. University's Representative email address is lfuka@ucdavis.edu Notification time begins from the date and stamp of the email, provided it is sent during normal business hours. Emailed inspection requests sent after normal business hours and/or received on non-normal workdays, as defined in Specification Section 013100 – COORDINATION, paragraph 1.07.F.4.A will begin notification time starting at 7:00 AM the following normal business day.

C. Off-hours Inspection Requests: Contractor shall provide time windows for all off-hour or other than normal work hour inspections. University's Representative shall have final authority in setting times of off-hour inspections.

D. Re-inspections:

1. More than two (2) re-inspections: The cost of re-inspections of the same work, more than twice, shall be deducted from Contract Sum. University will provide itemized invoice for Contractor's records.
2. Work unprepared for inspection: Re-inspections of the same work scheduled by Contractor, but not ready for inspection will be identified as a re-inspection.

PART II - PRODUCTS – Not Applicable to this Section.

PART III - EXECUTION

Note: Part 3 describes typical inspection requirements for each individual inspector's jurisdiction for non-HCAI projects. Part 3 is provided as a reference source for Contractor's use and Scheduling, as applicable. Part 3 is not intended to be all inclusive, and Contractor shall verify actual inspection requirements needed for this project. See Item 3.11 for Testing, Inspection Observation for HCAI.

3.01 FIRE DAMPERS (Title 24, Part 2, Chapter 43)

Note: Manufacturer's installation instructions shall be used for inspections and testing.

- A. 1 Hour: IOR test 100%. State Fire Marshal tests 100% or as needed.
- B. 2 Hour: IOR tests 100%. State Fire Marshal tests 100%.
- C. Smoke: IOR tests 100%. State Fire Marshal tests 100%.

3.02 FIRE SPRINKLERS (Title 24, Part 2, Volume 1, Chapter 9; NFPA Bulletin 13)

- A. Approved drawings shall be on jobsite from start to completion of project.
- B. Underground pressure test @ 200 psi.
- C. State Fire Marshal to witness installation of underground lines.
- D. State Fire Marshal to witness underground flush prior to connection.
- E. Hydro-test above ground piping @ 200 psi for two (2) hours.
- F. Inspection of hangers, bracing, and seismic joint crossing(s).
- G. Flow alarm test, tamper switch test.
- H. Fire pump test.
- I. Certification by installer (Title 24, Part 9, Article 1006.3.4.2).
- J. Final inspection: signs in place, labeling, fire extinguishing system flow alarm test.

3.03 FIRE ALARM SYSTEM (Title 24; Part 9, Article 1006)

Note: Fire Sprinkler and Fire Alarm systems tests shall be performed in presence of State Fire Marshal.

- A. Approved drawings shall be on jobsite from start to completion of project.
- B. Verify Emergency Power source.
- C. Activate all initiating devices.
- D. Certification by installer (Title 24, Part 9, Article 1006.3.4.2).
- E. Complete test of system per Title 24, Part 9, CFC, Article 1003.3.4.1).

3.04 MEANS OF EGRESS (Title 24, Part 2, Volume 1, Chapters 10)

- A. Exit sign/light locations and connected to two (2) sources of power.
- B. Normal Power.
- C. Emergency Electrical System, Life Safety Branch.
- D. Construction - floors, walls, ceilings, penetrations per listings.
- E. Electrical boxes - no back to back, 24 inches horizontal separation (Section 709).
- F. Electrical boxes - 100+ square inches to be wrapped/protected.
- G. Flame Spread, Fuel Contribution and Smoke Density for finishes (Chapter 8).

3.05 EMERGENCY LIGHTING

- A. Generator Test (Title 24, Part 3, Section 700-4; Section 701-5).
- B. Emergency lights - locations (Title 24, Part 2, Volume 1, Chapter 10, Section 1003.2.8.5).

3.06 KITCHEN HOOD FIRE SUPPRESSION SYSTEM (Title 24, Part 9, Article 10, Section 1005; Part 9, Section 10.513)

- A. Approved drawings shall be on jobsite from start to completion of project.
- B. State Fire Marshal to witness system test.

3.07 MECHANICAL CHECKLIST FOR CLOSE-OUT (Title 24, Part 4)

- A. Mechanical Equipment Requirements
 - 1. Access to Equipment (Section 305, 405, 606.5, 815, 2.2.8, 903, 910.8, 1106.3).
 - 2. Labeling of Equipment (Section 307).
 - 3. Identification of Equipment - Area or Space Served (Section 304.5).
- B. Mechanical Testing
 - 1. Air balance completed and reviewed by Mechanical Engineer-of-Record.
 - 2. Hospitals (Chapter 3, Section 314.1, Table 2110-A).
 - 3. Skilled Nursing (Chapter 3, Section 314.2) [test to include humidity controls in required areas - Section 2102(a)].
 - 4. Hydronic balance completed and reviewed by Mechanical Engineer-of-Record.
 - 5. Air and Hydronic reports forwarded to Mechanical Engineer of Record.
 - 6. Fuel Gas line inspection (Part 4, Section 1406 and Appendix B, Chapter 16).
 - 7. Atrium and/or Building Smoke Evacuation System (State Fire Marshal to witness).
- C. Boilers
 - 1. Boiler – Operating Adjustments and Instructions (Section 1022).
 - 2. Boiler – Inspections and Tests (Section 1023).
 - 3. Boiler – Clearances/Permits (Section 1005.0).
- D. Ducts
 - 1. Installation - Bracing (Part 4, Section 604.1.4)
 - 2. Fire Damper test log from IOR (Part 4, Section 606.2).
 - 3. Fire Damper test by State Fire Marshal (Part 4, Chapter 6, Section 606.2).

4. Smoke Damper and Detector test log from IOR (Including Duct Detector tests).
5. Smoke Damper and Detector by State Fire Marshal.

E. HVAC Unit Testing

1. Verify correct filter types and efficiencies.
2. Motor Rotation.
3. Condensate drain tests (Section 310).
4. Equipment shut down by smoke detectors (duct or space).

3.08 PLUMBING CHECKLIST FOR CLOSE-OUT (Title 24; Part 2, Chapter 29; Part 5)

A. Piping Systems (Title 24, Part 5)

1. Domestic Water Line Sterilization Test (Title 24, Part 2, Section 609.9; Title 22, Division 4, Chapter 16, Article 5).
2. Domestic Water System (hot, cold) Pressure test (Title 24, Part 5, 609.4).
3. Natural Gas Pressure Test (Title 24, part 5, Chapter 12, Section 1204).
4. Vent & Waste System Pressure test (Title 24, Part 5, 712.0).
5. Hydronic Water Pressure test (Title 24, Part 4 1201.2.8).

B. Water Heater Testing

1. Water Heater Temperature Test (Domestic/Patient) (105-120°F).
2. Water Heater Temperature Test (Kitchen) (180°F).
3. Water Heater Temperature Test (Laundry) (169°F).
4. Water Heater Temperature Alarm Test (Patient) (125°F).

C. Medical Gas System Testing (NFPA 99, Chapter 4) (Witnessed by SFM).

1. Pressure test - 150 psig - Oxygen, Medical Air & Nitrous Oxide (4-3.4.1.2).
2. Pressure test - 200 psig - Nitrogen (4-5.1.3.4).
3. 24-hour pressure test - 60 psig - Vacuum system (4-10).
4. 24-hour pressure test - 20% over operating pressure [A-4.3.4.1.2 (b)(e)].
5. Alarm test for system [4-3.4.1.3 (d)].
6. Area Valves, location, labeled, alarms tested (4-4.1 & 4-5.1.4).
7. Laboratory testing affidavits - welding/brazing (4-6.2.3.3).

8. Verified Medical Air Quality - Installation and 24 hour later.
9. Certification of system (Purity, Cross Connection, Alarms, Etc.) [4.5].
10. Certification of Bulk System [NFPA 50 (Oxygen) & CGA G-8.1 (Nitrous Oxide)].
11. Approved drawings and documents for submittal to University's Representative for permanent records).

3.09 ELECTRICAL CHECKLIST FOR CLOSE-OUT (Title 24, Part 3, and Part 1, Chapter 7, Section 7-141, 7-149)

A. Main Panel/Service

1. Identification and Labeling of Equipment (110-21, 110-22, 230-70).
2. Grounding test and Certification (250, 250-56).
3. Ground fault interrupt test adjustment and certification [230-95(c); 517-17(c)].
4. Emergency power transfer switch test (700-4).
5. Panel load balance.

B. Emergency Power and Standby Systems (Article 700 & 701) [Test Logs from IOR]

1. Emergency Generator testing and certification (701-5).
2. Identification and Labeling of equipment (110-21, 110-22, 517-22).
3. Lighting and Lighting Levels (517-22).
4. Receptacles (410L, 517-13, 517-18, 517-19).
5. Exiting signs and lights [517-32(b), 517-42(b)].
6. Nurse and Staff Call [517-33(a)].
7. Fire Alarm (760).

C. General Electrical Requirements

1. Working space/Headroom [Table 110-26(a); 110-33; 110-34].
2. Circuits and lights tested (410-45).
3. Receptacle polarity and grounding [200-10(b)].
4. Isolated ground monitor test [517-160(b)].
5. Motor load current adjustment.
6. Identification and Labeling of equipment (110-21; 110-22).
7. Identify circuits (Critical Care Areas) (517-19).

D. Miscellaneous Electrical Requirements

1. Test logs from Contractor and Inspector-of-Record.
2. Electrical Engineer-of-Record acceptance of system.
3. Owner In-Service training on Equipment.
4. Equipment Manuals and Instruction to Owner.
5. Warrantees and Equipment Certification.
6. As-Built documents to Owner.

3.10 FIRE MARSHAL INSPECTION REQUIREMENTS

A. Framing Inspections

1. Structural members in fire-resistive construction.
2. Check fireproofing per approved design tested assembly description.

B. Fire-Rated Partition Locations

1. Check for stud and nailing/screwing spacing per approved design tested assembly description.
2. Check for fire blocking in combustible construction.
3. Check for rated door/window frame installation (manufacturer's installation instructions shall be available for review).
4. Check for electrical installation, for example, number and size of electrical boxes, panels, cabinets, etc.
5. Check hangers, seismic bracing for sprinkler piping installation, if applicable (this would be checked during overload pressure test inspection phase of sprinkler system).

C. Close-In Inspections

1. Check fire-blocking and draft stops in combustible construction.
2. Check gypsum board installation in accordance with approved design assembly description for rated assembly.
3. Check integrity of firewall construction where recessed cabinets, panels, excessive electrical/plumbing are installed.

4. Check fire damper installation (manufacturer's installation instructions shall be available for review). Fire Marshal will witness actuation of minimum 10% fire dampers installed and 100% in 2 hour or greater fire rated wall assemblies.
5. Check for through-penetrations and fire-stop systems in all walls or floor/ceiling assemblies.
 - a. Check top of wall to structure fire stopping.
6. Check above ceiling areas and construction prior to installation of ceilings.
 - b. Check access and serviceability for above ceiling to included but not limited to valves, mechanical equipment, electrical equipment and other components that require adjustment, access or service.
 - c. Contractor shall move any items including but not limited to conduit, piping, braces and other obstructions that block access to equipment and components needing adjustment, access or service.
 - d. Check bracing, anchorage, fasteners and installation.

D. Final Construction Inspections

1. Final project walk-through: Example, Emergency lighting will be tested to verify exit illumination of both interior and exterior, while generator (if applicable) is tested at same time.

3.11 HCAI – Testing, Inspection and Observation (TIO)

Reference approved project TIO for testing requirements.

3.12 Refer to the following attachment

- A. Inspection Request
- B. Non-conforming Work Notice

END OF SECTION 01 45 50

INSPECTION REQUEST

Project #: _____ HCAI #: _____ UCDH IR #: _____ Contractor IR #: _____ Date: _____
Project Name: _____ Spec Section (s): _____

To: UC Davis Health Facilities Design & Construction – Inspection Group 4800 2 nd Avenue, 2 nd Floor Sacramento, CA 95817 Email: lfuka@ucdavis.edu & Project IOR	From: _____ _____ _____ P: _____ E-mail: _____
--	---

Drawing Ref.: _____ Detail: _____ Shop Drawing: _____
Project Schedule Activity ID No.: _____ Date of Inspection: _____ Time Requested: _____
Type of Inspection: _____
Location of Inspection (i.e., Floor, Column Line, etc.): _____

*Re-inspection Requested for Previous UCDH IR #: _____
All work Requested for Inspection has been reviewed for compliance with the contract documents by Contractor's Superintendent prior to notification of Inspection Request.
Signed: _____ Date: _____

UNIVERSITY USE ONLY

Date Received: _____ Time of Inspection: _____
Date of Inspection: _____ Inspector: _____ Inspection Report Attached
Inspector Arrival Time: _____ Inspector Departure Time: _____
Comments: _____

Approved Approved as Noted Not Approved Cancelled

Inspection Request Notes or Description of Items of Deficiency if needed below (Part 1, Chapter 7, Section 7-145, item 6)

Project Field Record of Construction Progress Summary of Work in Progress (Part 1, Chapter 7, Section 7-145, item 6)
<i>Project Phase (Building Foundation, Structural, Wall Framing, Electrical Rough-In, Sprinkler Rough-In, etc.)</i>
Project Phase Percentage Complete (% of the phase completed): _____ Overall Project Percentage Complete: _____

NON-CONFORMING WORK NOTICE

PROJECT #: _____ HCAI #: _____ Notice #: _____ Date: _____

<p>To: <u>[PROJECT MANAGER NAME/EMAIL]</u></p> <p><u>[DESIGN PROFESSIONAL NAME/EMAIL]</u></p> <p><u>[IF HCAI PROJECT, AREA COMPLIANCE OFFICER/EMAIL]</u></p> <p>_____</p> <p>_____</p>	<p>From: UC Davis Health IOR</p> <p>Facilities Design & Construction – Inspection Group</p> <p>4800 2nd Avenue, 2nd Floor</p> <p>Sacramento, CA 95817</p> <p>P: 916-734-5060</p>
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Spec Section Ref.: _____ Paragraph: _____ Drawing Ref.: _____

Detail: _____

In accordance with Article 12 of the General Conditions, the following defective condition(s) has/have become apparent:

Reported by: _____

CORRECTIVE ACTION SHOULD BE TAKEN AS SOON AS POSSIBLE AND COMMENCE NO LATER THAN TEN (10) CALENDAR DAYS AFTER THIS NOTICE. COORDINATE THE VERIFICATION OF THE CORRECTIVE ACTIONS WITH THE INSPECTOR OF RECORD. IF FURTHER INFORMATION IS NEEDED, ADVISE UNIVERSITY'S REPRESENTATIVE IN ACCORDANCE WITH THE GENERAL CONDITIONS.

Description of corrective action taken: _____

Accepted by: _____ Date: _____

CC:

SECTION 01 51 00
TEMPORARY UTILITIES

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Temporary Power and Lighting.
- B. Temporary Heating, Cooling & Ventilation.
- C. Temporary Water.
- D. Temporary Fire Protection.
- E. Temporary Telephone, Data, and WIFI.

1.02 RELATED SECTIONS

- A. Section 011100 – SUMMARY OF THE WORK
- B. Section 013500 – SPECIAL PROCEDURES: General requirements for temporary facilities and controls, to accommodate the University's occupancy and use of the areas and spaces adjacent to construction.
- C. Section 015610 – AIRBORNE CONTAMINANTS CONTROL
- D. Section 017400 – CLEANING
- E. Section 017700 – CLOSEOUT PROCEDURES

1.03 TEMPORARY UTILITIES

- A. Temporary Connections: Temporary power, water, sewer, gas and other utility services necessary for the Work may be made to existing building systems. Connections shall be subject to University's review and written approval. Coordinate with utility companies and University's Plant Operations & Maintenance Department for locations and methods of connections.
- B. Contractor shall provide and pay for installation, operation, maintenance, and removal of all utilities. The services will be provided at the current rates for each utility.

1.04 TEMPORARY POWER AND LIGHTING

- A. Service Requirements:
 - 1. Temporary Electrical Service: Contractor shall provide and pay for installation, operation, maintenance, and removal of temporary electrical service, lighting devices and restoration of existing and permanent equipment in accordance with applicable provisions of the Electrical Safety Orders of the State of California. Use of University's electrical power and lighting system is prohibited without

University's written approval and will be considered only when an alternate electrical power source is unavailable.

- a. Install initial services at time of site mobilization.
 - b. Modify and extend systems as Work requires.
 - c. Maintain electrical system to provide continuous service, including prompt restoration of interruptions to University systems when temporary service is connected.
 - d. Restore existing and permanent lighting used during construction to original condition. Replace defective fixtures, bulbs, and other component parts.
 - e. Clean existing and permanent lighting fixtures used during construction per Section 017400 – CLEANING.
2. Distribution: Contractor shall provide distribution network for temporary electrical power.
 3. Power Source: Arrange for service with University's Plant Operations and Maintenance Department, or local utility company.
 4. Conformance: All temporary wiring and electrical facilities shall be in accordance with applicable provisions of Electrical Safety Orders of the State of California.
 5. Temporary Lighting: Construction lighting shall be supplied and maintained by Contractor at its expense. Sufficient lighting levels shall be provided to allow construction to be properly and safely performed. Contractor shall give special attention to adequate lighting for stairs, ladders, floor openings, basements and similar spaces. Promptly replace burnt out, worn or defective parts.
 6. Lighting fixtures: Locate fixtures in areas of Work: One (1) lamped fixture in rooms, except closets and utility chases; one (1) lamped fixture for every 750 square feet in large areas.
 7. Security Lighting: Contractor shall provide security lighting during hours of low visibility.

B. Distribution requirements:

1. Weatherproof distribution boxes with one (1) - 240-volt, three (3) phase power outlet and four (4) – 120-volt outlets consisting of 100 amperes fused switches with equipment ground, spaced so a 100-foot extension cord will reach all areas of building.
2. Wiring, connections and protection for temporary lighting.
3. Wiring connections and protection for temporary and permanent equipment, for environmental control, for temporary use of electricity operated equipment, and for testing.

C. Use of University System: If alternate electrical power and lighting sources are unavailable, University may permit Contractor to use existing, in-place electrical system. University does not guarantee availability of electrical power or adequate lighting levels through use of existing system. If power and lighting is insufficient or not available Contractor shall provide secondary source (i.e., generator) as approved by University.

1. It is expressly understood and agreed by Contractor that University existing power and lighting system's primary obligation is servicing patient care. The University system is not designed for purposes of construction activities.
2. Contractor should expect power and lighting interruptions during course of Work. Contractor will be required to cease use of University electrical-power and lighting systems, as required by the needs of University.
3. When use of University electrical system is approved in writing, Contractor is required to adhere to University's electrical lockout procedures. See Division 26– Electrical or Campus Design Guidelines.
 - a. Provide and maintain warning labels on energized equipment.
 - b. Replace plates, electrical devices or similar existing items or components damaged as a result of temporary usage.

1.05 TEMPORARY HEATING, COOLING AND VENTILATING

A. Service Requirements:

1. Contractor shall provide temporary heat as necessary for proper installation of all work and to protect all work and materials against injury from dampness and cold and to dry out building. Fuel, equipment and method shall be approved in writing by University's Representative.
2. Install initial services at time of site mobilization. Modify and extend systems as Work requires.
3. Maintain systems to provide continuous service, including prompt restoration of interruptions to University systems when temporary service is connected.
4. Use of permanent heating system is preferred to any other system for maintaining temperature of building during installation of finish materials, but such use will not be permitted before clean-up after plastering and/or drywall work has been completed. Contractor shall make every effort to complete permanent heating

system in time for such use. Permanent fans shall not be used before filters are installed. Filters shall be cleaned and serviced by Contractor just prior to final acceptance.

- a. Vent portable units to building exterior, complete with automatic controls. Direct-fired units are not allowed. Locate units and outlets to provide uniform distribution of heating, cooling and ventilating.
 - b. Operate and maintain existing equipment being used; clean or replace filters and install filters in duct extensions as necessary to maintain occupied areas, work areas and finished areas, in specified condition.
 - c. Prior to operation of permanent equipment, verify controls and safety devices are complete, equipment has been tested, and inspection made and approved for operation.
 - d. Remove temporary materials and equipment when permanent system is operational. Restore existing and permanent systems used for temporary purposes to original condition.
 - e. Install temporary filters in air handling units and ducts, replace as necessary to prevent dust in equipment and ducts, to avoid contaminants in Work or finished areas. After completion, replace temporary filters with new, clean, reusable filters.
5. Maintain temperature, humidity, and ventilation in enclosed areas to provide ambient conditions for storage, preparation and Work; to cure installed materials, to prevent condensation, to dry floor surfaces and to prevent accumulations of dust, fumes and gases.
 6. During non-working hours maintain temperature in enclosed areas occupied solely by Contractor at a minimum of 50°F., or higher as specified in individual Sections and by individual product suppliers and manufacturers. Areas occupied in whole or in part by University are to be maintained at normal temperatures.
 7. Provide high efficiency particulate air (HEPA) filters as specified in SECTION 015610 – AIRBORNE CONTAMINANTS CONTROL, negative pressure ventilation, or special control of existing system as determined by University's Representative.

B. Utility Sources:

1. Electrical: As specified above in Item 1.04.
2. Existing mechanical systems may be used for temporary purposes. Coordinate use with University for conditions to be maintained in adjacent University occupied areas.
3. Contractor shall provide and pay for all installation, operation, maintenance and removal of equipment in accordance with applicable provisions of the Electrical Safety Orders of the State of California.

1.06 TEMPORARY WATER

A. Service Requirements:

1. Maintain systems to provide continuous service, including prompt restoration of interruptions to University's systems when temporary service is connected.
2. Water service, if necessary for construction, can be made available at no expense to the Contractor provided the water is not wasted. Contractor shall be responsible for distribution of water to points of use.
3. Certified reduced pressure type back-flow prevention device as submitted to and approved by University shall be installed before water is obtained from a University campus fire hydrant or interior building connection.

B. Plumbing: Maintain system to provide continuous service with adequate pressure to outlets, including University system when temporary service is connected. See also Division 1 Approvals and ILSM requirements.

1. Size piping to supply construction needs, temporary fire protection, and for University's needs when existing service is connected.
2. Disinfect piping used for drinking water. See Division 33 and 22 for requirements or Campus Design Guidelines
3. Source: University existing service, connect at locations as directed by University.
4. Provide valved outlets to control water pressure adequately for hoses.
5. Fire hydrants used for water supply for construction – Contractor must use only $\frac{7}{8}$ " square hydrant wrench on square operating nut and must use only pentagon wrench on pentagon operating nut. This is to prevent damage to the hydrant operating nut. Any damage caused by the use of an improper wrench or other misuse of the hydrant must be repaired at contractor expense. Contractor must inspect hydrant prior to use and make the University aware of any pre-existing damage.

- C. Use of Existing System: Existing system may be used for temporary water. Monitor usage to prevent interference with University's normal operational requirements.
- D. Use of Permanent System: Contractor shall obtain written agreement from University establishing start of warranty period and conditions of use.
- E. Contractor shall pay for installation, operation maintenance and removal of system and restoration of existing and permanent equipment. University will pay costs of water consumed for normal construction operations. Contractor shall take measures to conserve usage.

1.07 TEMPORARY FIRE PROTECTION

- A. Requirements:
 - 1. Maintain systems to provide continuous service, including prompt restoration of interruptions to University systems when temporary service is connected.
 - 2. Provide and maintain fire protection equipment including extinguishers, fire hoses and other equipment as necessary for proper fire protection during course of the Work.
 - 3. Use fire protection equipment only for fighting fires.
 - 4. Locate fire extinguishers in field offices, storage sheds, tool houses, other temporary buildings and throughout construction site. In area under construction, provide at least one (1) fire extinguisher for each 5,000 square feet of building floor area. Locate fire extinguishers so that a person never has to walk more that seventy-five (75) feet to obtain one.
 - 5. Assign qualified person with authority to maintain fire protection equipment, institute fire prevention measures, and direct prompt removal of combustible and waste material. Submit ILSM requirements per Specification SECTION 013500 – SPECIAL PROCEDURES.

1.08 TEMPORARY TELEPHONE, DATA, INTERNET, and WIFI

- A. Service Requirements:
 - 1. Maintain systems to provide continuous service, including prompt restoration of interruptions to University systems when temporary service is connected.
 - 2. Contractor shall select from the following options:
 - a. University shall provide conduit, cabling and dial tone to Contractor's location(s). Contractor shall pay University for cable, conduit installation and later removal of same and also pay University a monthly fee for use of University telephone, data internet, and WIFI system.

- E. Temporary Internet Service: Provide a high-speed internet connection (Min. 20 Mbps download, 10 Mbps upload) to Contractor's field offices. The Contractor's and University's field offices shall be capable of sending and receiving e-mail and be able access the Internet.
 - 1. **[WIFI coverage at the above internet speeds will be provided throughout the jobsite]**

PART II - PRODUCTS

2.01 MATERIALS

- A. May be new or used, adequate to the purpose.
- B. Devices and Equipment: Standard devices, meeting UL requirements.
- C. Telephones: may be product of local service company or specialty devices compatible with service company requirements.
- D. Modems compatible with internet service.

PART III - EXECUTION

3.01 INTERRUPTION OF EXISTING SERVICES

- A. No existing utility services shall be interrupted at any time without prior written approval from the University. Required shutdowns shall be scheduled a minimum of fourteen calendar days prior to actual shutdown. The operation of valves, switches, etc. will be performed and paid for by University.
 - 1. Prior to the outage, all possible Work shall have been completed which will minimize the length of the required outage. During the outage, the Work will be prosecuted with diligence by an adequate number of skilled personnel.
 - 2. Provide and pay for all personnel required by the University to maintain safe conditions during the outage including but not limited to fire watch, safety monitors and/or traffic control. Coordinate Work with University's Representative.

3.02 REMOVAL OF TEMPORARY CONSTRUCTION

- A. At the completion of the Work, the Contractor shall remove from the Project site all temporary utilities and services construction. Leave the Project site clean and free from debris, materials, or equipment.

END OF SECTION 01 51 00

SECTION 01 52 00
CONSTRUCTION FACILITIES

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Field Offices and Sheds
- B. Temporary Facilities
- C. Temporary Sanitary Facilities

1.02 RELATED SECTIONS

- A. Section 011100 – SUMMARY OF THE WORK
- B. Section 013500 – SPECIAL PROCEDURES: General requirements for temporary facilities and temporary controls to accommodate University continued occupancy and use of the areas and spaces adjacent to construction.
- C. Section 017400 – CLEANING
- D. Section 017700 – CLOSEOUT PROCEDURES

- E. Contract Documents: Complete set of Contract Drawings and Contract Specifications shall be kept continuously at the site. Copies of all Change Orders, letters, Shop Drawings, etc., shall be kept on the jobsite at all times and shall be available for inspector's use.
- F. Contact numbers: Contractor shall provide telephone numbers where Contractor may be reached at all times during normal working hours and after normal working hours, if emergency problems develop that require Contractor 's assistance.
- G. Removal: Upon completion of the work, and before the final payment, Contractor shall remove all temporary work and facilities and return site to condition required by the General Conditions of the Contract and at no change to the Contract Sum or the Contract Time.

1.03 TEMPORARY FACILITIES

- A. Contractor shall provide and maintain the following temporary facilities as required for execution of the Work:
 - 1. Scaffolding, staging, runways and similar equipment.
 - 2. Hoists or construction elevators, complete with operators, power and signals required.
 - 3. Temporary rigging, rubbish chutes, barricades around openings, ladders between floors, and similar equipment.
 - 4. Barricades, fencing, lights and similar safety precautions.
 - 5. Security cameras for remote video surveillance of the project site and 24/7 monitoring services that records and reports incidents and alarms. Security cameras to provide full coverage of the construction and storage site area.
- B. Maintenance: Use all means necessary to maintain temporary construction facilities and controls in proper and safe condition throughout progress of the Work.
- C. Replacement: In event of loss or damage, promptly restore temporary construction facilities and controls by repair or replacement at no change to the Contract Sum or the Contract Time.
- D. Conformance: All materials and equipment required to safely accomplish work under this Section shall be in conformance with requirements of CAL OSHA and other State and Federal Codes and regulations where applicable.
- E. Codes: All temporary work and facilities shall conform to the above requirements that pertain to operation, safety and fire hazard.
- F. Construction Site Security: Temporary barriers, doors and gates shall be keyed to University's master lock system. Security hardware to be provided by Contractor. Keying to University master lock system will be provided by University.

1.04 TEMPORARY SANITARY FACILITIES

- A. Use of existing facilities: Designated toilet facilities may be used by Contractor.
 - 1. Assigned facilities: Location of assigned toilet facilities and maintenance of same are responsibility of University. Contractor shall not have exclusive use to these

facilities and shall abide by health and safety criteria regarding their use and sanitary upkeep.

2. Unassigned facilities: Unassigned toilet facilities shall not be used without written authorization of University's Representative.
 3. Contractor may use existing toilet facilities that are within the limits of the Work.
- B. Contractor shall pay service charges for connection and use of sewage utilities.
- C. Portable units: Enclosed, portable, self-contained units or temporary water closets and urinals, secluded from public view may be used. Self-contained units shall be approved by University's Representative prior to use.
1. Contractor shall pay costs of installation, maintenance and removal of temporary sanitary facilities.
 2. Provide facilities at time of site mobilization.
 3. Modify and extend services as work progress requires.
 4. When utility services are available, provide water, sewer service, and temporary water closets; remove portable facilities. Remove temporary fixtures when permanent facilities are operational.
 5. Clean areas of facilities daily, maintain in sanitary condition. Disinfect fixtures, repair or replace damaged fixtures, accessories and surfaces.
 6. Provide toilet paper, paper towels, and soap in suitable dispensers.
 7. Restore existing and permanent areas and facilities used to original condition. Remove all temporary construction facilities above and below grade. Leave the project site clean and free of debris, materials and equipment.

PART II - PRODUCTS

2.01 MATERIALS

- A. Serviceable, new or used, adequate for required purpose.

PART III - EXECUTION – Not Applicable to this Section

END OF SECTION 01 52 00

SECTION 01 55 00

VEHICULAR ACCESS AND PARKING

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Construction Parking and Access Roads
- B. Traffic Regulation
- C. Project Informational Signs

1.02 RELATED SECTIONS

- A. Section 011100 – SUMMARY OF THE WORK
- B. Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- C. Section 013500 – SPECIAL PROCEDURES: General requirements for temporary facilities and temporary controls to accommodate University's continued occupancy and use of the areas and spaces adjacent to construction.
- D. Section 017400 – CLEANING
- E. Section 017700 – CLOSEOUT PROCEDURES: Project Closeout.

1.03 PARKING AREAS AND ACCESS ROADS

- A. Access Roads: Existing roads shall be used for construction access within limits defined herein. Temporary construction access roads shall not be permitted.
- B. Parking: Parking is controlled and limited by University.
 - 1. Parking of personal vehicles belonging to Contractor employees may be arranged with University's Parking Services, at 916-734-2687. Parking will be allowed in employee permit areas, at the current permit rates depending on space availability.
 - 2. Delivery of materials may be made to the job-site as required. Contractor shall coordinate with University's Representative.
 - 3. Dumpsters shall be located in approved location as arranged by University's Representative.
- C. Existing Pavements and Parking Areas: Designated existing on-site streets and driveways may be used for construction traffic. Vehicles with metal tracks will not be allowed.
 - 1. Designated areas of existing parking facilities may be used by construction personnel. Do not allow heavy vehicles or construction equipment in parking areas.
 - 2. Maintain traffic and parking areas in a sound condition, free of excavating material, construction equipment, products, mud, snow and ice.

3. Maintain existing and permanent paved areas used for construction. Repair existing facilities damaged by usage to original condition: promptly repair breaks, potholes, low areas, standing water and other deficiencies, to maintain paving and drainage in original or specified condition.
4. Remove temporary materials and construction when permanent paving is usable.

1.04 TRAFFIC REGULATION

- A. Schedule of Access Closing: Contractor shall adopt all practical means to minimize interference to traffic. Access to other facilities in the area shall be maintained at all times. Contractor shall provide schedule of planned closing of any street for approval by University and shall give minimum of fourteen (14) calendar days' notice before closing any street or access.
- B. Use of Fire Lanes: Contractor shall notify University of all major pickups and deliveries that require use of controlled access fire lanes. Keys to gates or other barriers will be provided, as needed, to allow use of fire lanes. Vehicles parked in fire lanes for delivery of materials shall be continuously manned for immediate removal if required by the University.
 1. Fire Lanes to remain open at all times and shall not be blocked without a Traffic Control Plan provided prior to work at the Fire Lane and approved by the University's Representative.
- C. All major pick-up and delivery operations shall occur in total before or after normal working hours.
 1. Drawings may indicate haul routes designated by University for use of construction traffic. Confine construction traffic to haul routes.
 2. Provide traffic control at critical areas of haul routes to regulate traffic and minimize interference with public traffic.
- D. Post-mounted and wall-mounted traffic control and informational signs as specified herein.
 1. Traffic Control Signs, Traffic Message Boards, Cones, Drums, Flares, Lights and Flag Control equipment: All as approved by California MUTCD requirements.
 2. Contractor shall furnish at all barricades: Lights and flag control required to control traffic, and shall also provide and maintain suitable temporary barricades, fences, directional signs, or other structures as required for protection of the public; and maintain from the beginning of twilight throughout the whole of every night on or near the obstructions, sufficient lights and barricades to protect the public and/or the Work.
- E. Construction Vehicle Parking: Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and University's operations. Prevent parking on or adjacent to roads or in non-designated areas.

- F. Flag Control: Provide properly trained and equipped flagmen to regulate vehicular traffic when construction operations or traffic encroach on public traffic ways.
 - 1. Provide properly trained and equipped personnel to regulate pedestrian traffic at all interior locations where construction traffic interfaces with University traffic.
 - 2. Flag control personnel shall wear appropriate identifying clothing such as bright colored vests, clearly visible and identifiable as having responsibility for traffic control.
- G. Lights: Use lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- H. Traffic Signs and Signals: At approaches to site and on site, install traffic signs and signals at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
 - 1. Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor 's control, and areas affected by Contractor's operations.
 - 2. Relocate traffic signs and signals as Work progresses, to maintain effective traffic control.
 - 3. Remove equipment and devices when no longer required. Repair damage caused by installation.

1.05 PROJECT INFORMATIONAL

- A. Not used.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION – Not Applicable to this Section

END OF SECTION 01 55 00

SECTION 01 56 00

TEMPORARY BARRIERS, ENCLOSURES and CONTROLS

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Barriers and Enclosures
- B. Protected Walkways and Weather Closures
- C. Tree and Plant Protection
- D. Temporary Controls

1.02 RELATED SECTIONS

- A. Section 011100 – SUMMARY OF THE WORK
- B. Section 013500 – SPECIAL PROCEDURES
- C. Section 013900 - GREEN BUILDING POLICY IMPLEMENTATION
- D. Section 015610 – AIRBORNE CONTAMINANTS CONTROL
- E. Section 017400 – CLEANING

1.03 BARRIERS AND ENCLOSURES

- A. Barricades: Provide to prevent public entry, to protect existing trees and plants, and to protect existing facilities and adjacent properties from damage during construction period. Relocate and extend as construction progress requires per California MUTCD requirements.
- B. Partitions and Ceiling Enclosures:
 - 1. Fire Enclosures-Rated-Corridors and Rated Assemblies: Provide non-combustible dust-proof barrier framed with 20-gauge metal studs spaced 24" o/c maximum and covered on both sides with 5/8" thick Type-X rated gypsum wallboard fire taped, braced so to be self-supporting without fastening to existing finishes.
 - a. Provide gaskets of closed cell neoprene, or strips of fiberglass insulation between barriers and existing finish.

- b. Finish exposed surfaces with two (2) coats of paint (color as selected by University), maintain in neat, orderly appearance and paint barrier on public side. Temporary emergency exit and or directional signage indicating Emergency Exits will be furnished and installed by **[Contractor]**.
 - c. Provide temporary doors in corridors with twenty (20) minute fire-rated assemblies and locksets to limit use.
 - d. Use of access doors and routes by workmen to be approved by University's Representative.
2. Fire Retardant Enclosures - Non-Rated Assemblies: Provide non-combustible dust-proof barriers framed with metal studs and covered on public side with Fire Retardant plastic laminate sheathing material. Flame spread 10 - smoke development 45 - fuel contribution undeterminable, as manufactured by Reef Industries, Inc., P.O. Box 33248, Houston, TX77033 or equal.
- a. Joints shall be taped and sealed over framing studs.
 - b. Bracing shall be self-supporting without fastening to existing finishes.
 - c. Provide gaskets of closed cell neoprene, or strips of fiberglass insulation between barriers and existing finishes.
 - d. Provide non-staining taped seal to surrounding materials to insure seal.
 - e. Non-Rated Assemblies for Dust Control: Use ½" Type-X or equal gypsum wallboard applied on occupancy side on framing member. Joints over studs shall be taped and sealed. Other detail similar to 1.03-B.2 above.
- C. Removal: Remove temporary materials, equipment and construction at completion; repair damage caused by installation or use of barricades and enclosures. Restore existing facilities used during construction to specified or to original condition.

1.04 DIESEL VEHICLE/EQUIPMENT IDLING PROCEDURES

- A. When drivers of diesel powered on-road vehicles arrive at loading or unloading areas to drop-off or pick-up passengers, supplies, equipment, materials, etc., they shall turn off their vehicle's engine as soon as possible but no later than five minutes after arrival.
- B. Operators of off-road diesel-powered equipment shall turn off their engines when the equipment is not performing its primary function, but no later than five minutes after the equipment has come to a stop.
- C. Idling for "warm-up" prior to diesel vehicle or equipment operations on University property shall be limited to a maximum of five minutes.
- D. At end of work shift, or for the purpose of servicing, all diesel equipment shall be parked on site at furthest location away from Hospital air intake systems.
- E. All diesel-powered equipment shall be maintained in good operating condition. University representative will direct **[Contractor]** to remove any equipment producing high amount of diesel fumes resulting from diesel equipment being old or in poor operating condition.

1.05 PROTECTED WALKWAYS AND WEATHER CLOSURES

- A. Cover walkways to provide access to existing facilities for use by public and University personnel.
- B. Provide temporary roofing and weather-tight insulated closures of openings in exterior wall surfaces, to maintain specified working conditions, to protect products and finished work from inclement weather.
- C. Critical access and protected walkways shall comply with the CBC and CFC.

1.06 TREE AND PLANT PROTECTION

- A. Tree Protection: All trees not marked for removal shall be protected against damage from construction operations. Where necessary, in the opinion of University's Representative, trees surrounding building footprint or in close proximity to construction operation shall be protected with barricades. No trees shall be cut or felled without approval of University's Representative. Trees cut and/or removed without explicit instruction shall be replaced by **[Contractor]** at no cost to the University.
- B. Cutting and Pruning: Cutting and pruning of trees to accommodate construction shall be done only with approval and direction by University's Representative. Soil within the spread of tree branches (within drip line) shall not be disturbed except as directed by excavation or trenching drawings. Advance notice shall be given University if tree roots of 3" diameter or greater must be cut.
- C. Drip line Protection: Cars, trucks, or equipment shall NOT be parked or set within the drip line of any tree; nor shall there be any stockpiling or temporary building erected within the drip line.

1.07 TEMPORARY CONTROLS

- A. Dust Control: **[Contractor]** shall take appropriate steps throughout project to prohibit airborne dust due to work under this contract. Execute work by methods to minimize raising dust from construction operations. Water shall be applied wherever practical to settle and hold dust to minimum, particularly during demolition and moving of materials. No chemical dust prohibitor shall be used without written approval by University's Representative.
- B. Noise Control: Control noise as directed by University's Representative.
- C. Pollution Control: Use of noxious or toxic materials for all applications in alterations or work in buildings occupied by University personnel shall be done after proper notification and approval by University, this includes work performed on weekends or other unoccupied times.
 - 1. Provide methods, means and facilities to prevent contamination of soil, water and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.

- D. Waste Control: All waste materials resulting from process of clearing and construction shall be disposed of as follows:
1. General Refuse: All refuse and debris, combustible and incombustible, resulting from construction process, shall be removed from University property as described in the General Conditions of the Contract. **[Contractor]** shall not use any refuse container belonging to University.
 2. Hazardous Refuse: Solvents, oils and any other hazardous material shall be disposed of in containers and removed from site. At completion of work, any contaminated soil shall be removed and replaced with good soil by **[Contractor]** at no expense to University. Coordinate disposal with UC Davis Health EH&S department.
 3. Building materials containing asbestos that are part of the project shall not be disturbed or removed by the contractor during the construction of temporary barriers, enclosures and controls. The contractor shall request from the University's Representative materials that have been identified on the project to contain asbestos so that these materials are not disturbed. The contractor shall refer to Section 013500 Special Procedures, 1.05 Hazardous Materials Procedures regarding materials impacted by construction of temporary barriers, enclosures and controls.
 4. All material and equipment removed as part of the Project is property of University, unless specifically designated otherwise; such material and equipment shall be delivered to a location at the campus, as directed by University, to be selectively sorted by the University; remaining debris shall be disposed of by **[Contractor]** at no expense to University.
- E. Drainage Control: All portions of Work shall be kept free of standing water at all times during construction. Where required, temporary drainage ditches, berms, or pumping systems shall be constructed to divert drainage water from construction site, and resultant water shall be carried to nearest natural water course and disposed of without erosion to surrounding area. Care shall be taken to prevent silting of existing sinkholes and watercourses. Silt deposited as a result of the Work shall be removed and disposed of by **[Contractor]** at no cost to the University.
1. Rough grade site to prevent standing water and to direct surface drainage away from excavations, trenches, adjoining properties and public rights-of-way/s.
 2. Maintain excavations and trenches free of water. Provide and operate pumping equipment of a capacity to control water flow.
 3. Provide de-watering system and pumping to maintain excavations dry and free of water inflow on a twenty-four (24) hour basis.
 4. Provide piping to handle pumping outflow to discharge in manner to avoid erosion or deposit of silt. Provide settling basins to avoid silting; install erosion control at out-falls of system.
 5. Winterize and stabilize site with Geotextile Fabric and gravel so that the site drains and avoids it becoming a quagmire. Maintain access roads on the site with Geotextile Fabric and gravel and make repairs to avoid furrow, ruts, or potholes.
 6. Remove equipment and installation when no longer needed.

F. Sediment and Erosion Control: **[Contractor]** shall furnish, install and maintain means and methods to reduce excessive erosion, minimize sedimentation discharge, and prevent construction materials discharge from causing off-site and on-site contamination. **[Contractor]** shall coordinate with University.

1. **[Contractor]** shall pay for and maintain required permits.
2. **[Contractor]** shall furnish:
 - a. National Pollutant Discharge Elimination (NPDE) permit.
 - b. **[Contractor]** shall file Notice of Intent to California State Water Resources Control Board (SWRCB) stating date construction will begin. Provide copy to University.
 - c. **[Contractor]** shall prepare, maintain and follow Storm Water prevention Plan. The Plan shall include **[Contractor]** Best Management Practices (BMP) describing means and methods to control sediment, erosion and other pollutants.
 - d. **[Contractor]** shall keep BMP Program at jobsite.

PART II - PRODUCTS

2.01 Polyethylene: Polyethylene used for critical barriers and for sealing walls, floors or ceiling systems shall be a minimum of 6 mil thickness and fire-retardant type listed by Fire Underwriters Laboratories, Griffolyn #T55R with Griffolyn fire retardant tape, or equal.

PART III - EXECUTION

3.01 Infection Control Risk Assessment ICRA Requirements:

- A. ****DELETE SECTION IF NON-PATIENT CARE SPACE*** NON-CLINICAL DUST CONTROL COVERED BY 1.03***
1. Refer to attached Infection Control Risk Assessment (ICRA) and UC Davis Health Construction Dust & Hazardous Materials Inspection Worksheet.
 - a. These documents dictate minimum requirements for Class I and II containments and minimum requirements that must be completed to control dust during construction.
 - 1) Mini containments (pop-up cubes) which are designed to have at most 1-2 people may be used in lieu of custom-built Class II Containments.
 2. The outside of the work containment shall have present: ICRA Permit, Interim Life Safety Measure (ILSM) Permit, Daily ICRA Inspection Forms, entry warning sign, Containment Entry Log (provided by the contractor) that lists all persons who enter the containment regardless of affiliation, including all University employees, and an emergency telephone number of persons to call 24 hours.
 3. Before any demolition or construction begins, all Protection Areas (infection control areas), control measures put in place and work plan by the **[Contractor]** will be

inspected by a designated University representative. Work cannot begin until the work containment has been inspected and approved.

3.02 Refer to the following Attachments:

- A. Appendix A - Construction Dust & Hazardous Materials Inspection Worksheet
- B. Appendix B - Initial Information and Benchmark Containment Inspections
- C. Appendix C - Entry Warning Sign with Project Manager Contact Information

END OF SECTION 01 56 00

UC DAVIS HEALTH CONSTRUCTION DUST & HAZARDOUS MATERIALS INSPECTION WORKSHEET – APPENDIX A

ICRA Permit Number	ICRA Class
Job # and Name	Project Manager
Estimated Start	Estimated Completion

ACKNOWLEDGEMENT OF HAZARDOUS MATERIALS

Does the project contact hazardous materials (e.g., asbestos, lead, mold, PCBs, mercury)?	Yes / No
Verified How: (e.g., hazmat survey, personal knowledge)	
By Whom: (name & department)	

CONTAINMENT STRATEGIES

Enclosure Types [check all that apply]			
<input type="checkbox"/>	Full Containment (poly over all surfaces not in SOW)	<input type="checkbox"/>	Hard Barriers Required
<input type="checkbox"/>	Isolated Room – Critical Openings Only (seal doors, supply and return registers, etc)		
<input type="checkbox"/>	Mini Containment Cube (only large enough for 1-2 people; aka pop up cube)		
<input type="checkbox"/>	Shrouded Tool with HEPA filtered exhaust		
<input type="checkbox"/>	Glove Box Containment with HEPA filtered exhaust		
<input type="checkbox"/>	Other:		
Negative Pressure Requirements [check all that apply]			
<input type="checkbox"/>	-0.020" wc at all times (24/7) as displayed on mounted manometer		
<input type="checkbox"/>	-0.020" wc at setup with some negative pressure throughout project as displayed on manometer		
<input type="checkbox"/>	Visual Verification of some negative room pressure throughout project		
<input type="checkbox"/>	No negative room pressure required		
<input type="checkbox"/>	Negative pressure in localized HEPA exhausted work area (e.g. shrouded tool, glove box)		
<input type="checkbox"/>	Other:		
Negative Pressure Equipment [check all that apply]			
<input type="checkbox"/>	Onsite Challenge Testing (DOP or particle counting) prior to setup		
<input type="checkbox"/>	Challenge Tested within last 6 months; Equipment has remained onsite at University		
<input type="checkbox"/>	Single HEPA Unit; exhausted to: <input type="checkbox"/> Outdoors <input type="checkbox"/> Diffusion Box/Chamber		
<input type="checkbox"/>	Two HEPA Units in Parallel; exhausted to: <input type="checkbox"/> Outdoors <input type="checkbox"/> Diffusion Box/Chamber		
<input type="checkbox"/>	Other:		
Additional Containment Requirements [check all that apply]			
<input type="checkbox"/>	Ante Room	<input type="checkbox"/>	Masonite Floor Protection
<input type="checkbox"/>	Walk off mats	<input type="checkbox"/>	Shoe Covers
<input type="checkbox"/>		<input type="checkbox"/>	Protective Clothing
<input type="checkbox"/>		<input type="checkbox"/>	Air Scrubber
<input type="checkbox"/>	Other:		

VERIFICATION OF WORK

Type(s) of Inspection Required	Responsible Party
HEPA Equipment Verification	<input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> Other:
Pre-Work Approval Inspection	<input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> Other:
Daily Onsite Oversight	<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:
Air Sampling Type: _____ Frequency: _____	<input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> Other:
Demolition Inspection	<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:
ICRA Downgrade	<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:
Final Visual Approval Inspection	<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:

INITIAL INFORMATION AND BENCHMARK CONTAINMENT INSPECTIONS – APPENDIX B

ICRA #	Location	Set Up Date	Electrical Shop Inspection	Pre-Start Inspection (Name, Date, Time)	Post-Demo Inspection (Name, Date, Time)	Downgrade Inspection (Name, Date, Time)	Final Inspection (Name, Date, Time)	Take Down Date

DAILY INSPECTION LOG

(Sheet _____ of _____)

Date & Time	Performed By(Name)	Pressure Reading (+/-)	Acceptable Negative Pressure? (Y/N)	ILSM conditions still met? (Y/N/n/a)	Tack Mat useable? (Y/N)	Interior free of dust/debris? (Y/N)	Containment Integrity Intact (no holes or breaches)? (Y/N)	All ICRA permit conditions met? (Y/N)	Other Issues? (Explain)	Corrective Actions
Example 7/4/16 – 0800	B. Clean	-0.025	Y	Y	Y	Y	Y	Y	N	closed entry door



**Under Construction
Do Not Enter**

**En Construcción
No Entrar**

FP&D Project Number and Name:

Project Contacts:

UCDH Project Manager

Name: _____

Phone: _____

Email: _____

Site Superintendent

Name: _____

Company: _____

Phone: _____

Email: _____

Construction Manager

Name: _____

Company: _____

Phone: _____

Email: _____



Facilities Planning and Development

Please bear with us!



(THIS SIGN MUST BE POSTED IN COLOR)

SECTION 01 56 10

AIRBORNE CONTAMINANTS CONTROL

PART I - GENERAL

1.01 SUMMARY

- A. Section Includes: University airborne contaminants control policy procedures and an Infection Control Risk Assessment (ICRA) and plan.

1.02 POLICY

- A. Airborne contaminants control is critical in all hospital areas, as well as non-hospital areas. Contractor shall limit dissemination of airborne contaminants produced by construction-related activities, including dust, chalk, powders, aerosols, fumes, fibers and other similar materials, in order to provide protection of immuno-compromised and other patients, staff, diagnostic operations, or sensitive procedures or equipment, from possible undesirable effects of exposure to such contaminants.
 - 1. Construction activities causing disturbance of existing dust, or creating new dust, or other airborne contaminants, must be conducted in tight enclosures cutting off any flow of particles into patient areas.
 - 2. Ceilings, walls in Protection Areas and other areas in patient care areas as indicated on drawings must be secure at all times.
- B. An Infection Control Risk Assessment (ICRA) and plan to mitigate dust or other airborne contaminants is required for each project. The risk assessment identifies patient groups at risk for infection due to construction dust. The dust mitigation plan is designed to contain dust within the construction zone.
- C. All work at hospital facilities shall follow the recommended UC Davis Medical Center Construction Dust Infection Prevention Best Practices Standard, Version 4.0 – December 2022 or the most recent version.
- D. Should the scope of work change or the discovery of additional toxic materials such as asbestos, lead and radioactive materials or biological substances such as visible mold growth, STOP WORK and seek additional approval and guidance before proceeding. If the above potential materials newly discovered during construction, renovation, or repairs, any ICRA in-hand is invalid and risk assessment shall be performed to reevaluate ICRA levels and the work plan prior to restart of the work. Upon discovering, seal any openings, stop work and notify the University's Representative immediately. This includes projects that are already considered and operating under a Class IV.
- E. Related Sections:
 - 1. Section 017300 – CUTTING AND PATCHING: Removal of debris may be outside of normal work hours and shall be in tightly covered containers.
 - 2. Section 013500 – SPECIAL PROCEDURES: Perform work in accordance with requirements of this section.

3. Section 013900 - GREEN BUILDING POLICY IMPLEMENTATION
4. Section 015100 – TEMPORARY UTILITIES: Provide high efficiency particulate air (HEPA) filters as specified in Section 015610, negative pressure ventilation, or special control of existing system as determined by University's Representative.
5. Section 015600 – TEMPORARY BARRIERS, ENCLOSURES AND CONTROLS: Extend barriers above ceilings as required to seal off and contain airborne contaminants.
6. Section 015600 – TEMPORARY CONTROLS: Contain waste materials during removal; bagging, wrapping, and transporting.
7. Section 017400 – CLEANING: Use wet cleaning methods and HEPA filtered vacuum cleaners as required to minimize release of airborne contaminants. Contain waste materials, debris and rubbish as noted above and clean work area daily. Excess construction debris shall be cleaned daily by the end of each work shift. Disinfect Containment and Protection Areas as directed by University's Representative

F. Dust Mitigation Requirements

1. An ICRA Daily Inspection Log is attached at the end of this section under UC Davis Health Construction Dust Infection Prevention Best Practice Standard. The Contractor must complete this daily checklist and leave posted for the duration of the project at the outside of the containment. Any areas of non-compliance must be specifically listed and addressed for corrective measures when identified. A copy of the daily ICRA inspections shall be submitted to the University's Representative at an agreed upon time between the Contractor and the Project Manager.

G. UC Davis Health Construction Dust Infection Prevention Best Practice Standard

- a. The UC Davis Health Construction Dust Infection Prevention Best Practice Standard is attached at the end of this Section and augments information & requirements of Section 015610.
- b. Refer to the UC Davis Health Construction Dust Infection Prevention Best Practice Standard per requirements for.
 - 1) Responsibilities
 - 2) Procedures
 - 3) Training And Certifications
 - 4) Containment Design & Construction
 - 5) Materials And Equipment
 - 6) Cleaning Procedures
 - 7) Documentation
 - 8) Containment Verification

- 9) Inspection Criteria
- 10) And other Dust Infection Prevention Measures

1.03 SUBMITTALS

- A. Submit to Project Inspector or Post at Anteroom Daily ICRA Inspection Log.
- B. Schedules: Submit work areas and procedure schedules for containment of airborne contaminants. Include this work in the Project Schedule per 013200.
- C. Detailed Work Plan: Drawings including but not limited to Work Area/ Floor Plan, Path of Travel, Egress and Exiting, Rated Construction and details of construction of necessary temporary barriers, and description of procedures to be used to achieve and maintain control of construction-related airborne contaminants.
 - 1. As applicable, the drawing should include the following: location of ante room(s), location of manometer, location of negative air units exhausting outside the construction area including number of negative air units and sizes (cfm), and location of sealed blocked off areas of corridors. If the exhaust of the negative air unit(s) cannot be exhausted outside of the building, the work plan shall include details, product documents and drawings of the approved fire-rated assemblies that will be used to meet Fire Codes (if applicable), Building Codes and ILSM requirements. Any impacts to corridors will need to be approved via ILSM (see specification section 013500 for details).
 - 2. Identify the areas surrounding the project area, assessing potential impact of construction on the patient care area. Identify the specific uses (e.g., patient rooms, medication room, operating room, etc.)
 - 3. Identify the potential impacts including but not limited to.
 - a. HVAC, Ventilation (outages, air flow directions, clean to dirty, air intakes/exhausts, air balance, disruptions, etc.).
 - b. Plumbing (outages, hand-washing access, work area, flushing/draining systems, charging systems, disinfecting systems, etc.).
 - c. Electricity (outages for critical equipment, special ventilation areas, monitoring).
 - d. Identify Airborne infection isolation rooms and patient rooms with immunocompromised conditions that will require High-efficiency Particulate Air (HEPA) filters.
 - 4. Identify containment measures including but not limited to types of barriers to be used. HEPA filtration to be used. Renovation/construction areas should be isolated from occupied areas during construction and provide clean-to-dirty airflow with respect to surrounding areas.
 - 5. Assess preventive maintenance requirements. Will the service/maintenance frequency and level of service of systems need to be modified during construction (e.g., ventilation filters, air intake system, potable water, plumbing, doors). Work Hours: Can or will the work be done during non-patient care hours?

6. Include provisions for but not limited to traffic flow, entrance, egress, control, debris removal and housekeeping.
 7. Work Hours: Identify areas of work that will be done during non-patient care hours. Refer to Sections 011100 Summary of Work and Section 011400 Work Restrictions
 8. The Detailed Work Plan shall be reviewed and approved by the University's Representative prior to the start of Construction.
- D. Project Experience and Training: In order to be considered qualified to work with negative pressure containments; Contractor's must demonstrate experience by providing either of the following:
1. Previously completed, documented negative pressure containment work in a healthcare facility along with an owner reference. Minimum documentation shall include project descriptions and photographs or containment schematics.
 2. Documentation that the contactors' proposed foreman has successfully obtained one of the following from the American Society for Healthcare Engineering (ASHE):
 - a. Certified Healthcare Constructor (CHC) Certification
 - b. Health Care Construction (HCC) Certificate
 - c. Managing Infection Prevention During the Construction & Operation of Health Care Facilities Course Completion
 - d. Completion of an ICRA training course approved by University
 3. Documentation that all contractor employees and subcontractor's employees have successfully completed an ICRA training class that is approved by University. All personnel working with negative pressure containments shall be trained and knowledgeable in the following:
 - a. ICRA Permit contents and requirements
 - b. Site specific containment plan requirements that follow best management practices
 - c. Infection risks associated with construction
 - d. Methods to control the dissemination of dust and fungal spores
 - e. Proper use of protective clothing
 - f. Proper entry and exit procedures
 - g. Manufacturer's requirements, where manufactured containment systems are used (e.g., portable pop-up cubes)
 - h. How to respond to a loss of negative pressure or too much negative pressure
 - i. Breach in practice response and required notifications

4. Contractors shall be additionally trained in the following:
 - a. Proper containment design, construction, and maintenance techniques
 - b. Proper load out techniques for equipment/wastes
 - c. Containment cleaning regime: daily, final, and terminal cleaning
5. Containment failure emergencies caused by the contractor may require retraining at the discretion of the University's Representative Infection Control, or Environmental Health & Safety. Training is to be provided by University Environmental Health & Safety or a University approved training consultant.

6.

1.04 QUALITY CONTROL

- A. Pre-construction Meeting: Before any construction on site begins, Contractor's Superintendent is required to attend a mandatory pre-construction orientation session held by University's Representative for a review on precautions to be taken as required in their ICRA work plan.
- B. Review by PO&M HVAC staff for possibility to disconnect air supply and return into the project area
- C. Review by University Plant Operation & Maintenance Electrical staff for required electrical needs.
- D. Negative air machines shall be connected to separate electrical circuits.
- E. Notification: A minimum of fourteen (14) calendar days written notification to University's Representative of possible construction activity causing airborne contaminants in Protection Areas.

1.05 DEFINITIONS

- A. Containment Areas: As determined by University's Representative and if shown. Includes all areas of construction activities, adjacent staging and storage areas, and passage areas for workers, supplies and waste. The containment area includes ceiling spaces above and adjacent to construction activities.
- B. Critical Openings – Include all potential paths for air and contaminants to move from the project area to outside of the project area and include: supply registers, return registers, exhaust registers, doors, windows, electrical outlets, gaps at ceilings and other openings within the area where contaminants can escape. Sealing the critical openings can be accomplished with fire-rated tape, fire-rated plastic, fire-rated hard barriers and a combination of these materials to seal airtight the critical opening.
- C. HEPA System DOP Testing – An ANSI / ASTM recognized method to test the integrity of a High Efficiency Particulate filter which filters out 99.97% of particles 0.3 micrometers or larger. DOP testing is performed by specialty contractors. The Health System requires that HEPA systems be tested to the ANSI / ASTM standard as delivered prior to their use onsite as further described in this Standard.

- D. ICRA (ICRA) Infection Control Risk Assessment - An evaluation of patient risk based on a matrix of the patient population health in the work area and the invasiveness of the project. This assessment ultimately generates a permit (ICRA permit) issued by Infection Prevention requiring compliance with one of five precaution levels. The ICRA program is documented in Hospital P&P 2120. ICRA's apply to patient care areas and their adjoining contiguous areas. All ICRA evaluations are the sole responsibility of the Health System Infection Prevention Department based on an application by the Project Manager. ICRA Permits expire and can be extended subject to approval by the Infection Prevention Department.

1.06 PERFORMANCE REQUIREMENTS

A. University's Representative's Responsibilities:

1. Determination of the Containment and Protection Areas, as well as, the standard of limitations of the Contractor's responsibilities, required for the project.
2. Statement of Requirements: Description in graphic and written form as required to communicate the above based on evaluation of the construction area and the impact of the project on patient care.
3. Coordinate any testing and monitoring as necessary with EH&S or a third party.

B. Contractor Responsibilities:

1. Provide specific means and methods of achieving and maintaining control of airborne contaminants during construction.
2. Implement all mitigation measures as listed in the UC Davis Health Construction Dust & Hazardous Materials Inspection Worksheet, which have been reviewed and approved by Infection Prevention and EH&S. The work shall be performed in accordance with the specific ICRA/Dust Mitigation Plan, Class (I, II, III or IV) and approved ICRA Permit.
3. Contractor shall ensure that all workers are trained and adhere to the mitigation requirements including provisions indicated per UC Davis Health Construction Dust Infection Prevention Best Practice Standard attached at the end of this Section.
4. The contractor shall ensure that all site workers, including subcontractors, are knowledgeable of the requirements of plans, specifications and approved ICRA permit precautions and the reasons for controlling construction dust.
5. The contractor is required to stop work at times of excessive noise/vibration, when containment is breached, when this standard is not being complied with and when directed by University Representatives.
6. Contractor shall notify University's Representative in writing, a minimum of fourteen (14) calendar days prior to starting construction activity, which might be expected to produce excess levels of airborne contaminants in containment area so that additional precautions may be taken.
7. If project construction activities will occur beyond the expiration date identified in the ICRA Permit, Contractor shall coordinate with University's Representative to

request extension of the ICRA Permit utilizing the ICRA 2.0 Permit Form attached at the end of this section.

PART II - PRODUCTS

2.01 MATERIALS

- A. Polyethylene: Polyethylene used for critical barriers and for sealing walls, floors or ceiling systems shall be a minimum of 6 mil thickness and fire retardant type listed by Fire Underwriters Laboratories, Griffolyn #T55R with Griffolyn fire retardant tape, or equal.
- B. Approved one-hour fire-rated temporary containment systems that meet ASTM E84, Class A requirements for smoke and fire for fire rated assemblies/enclosures.
- C. Fire-rated tape for sealing critical barriers and attaching plastic to building components.
- D. Approved fire damper systems used to control smoke/fire in a fire-rated containment assembly.

PART III - EXECUTION

3.01 PROJECT SPECIFIC REQUIREMENTS:

- A. The below criteria shall be applied on a case-by-case basis as outlined in the project specific requirements, ICRA Permit(s), and EH&S Worksheet(s)

THE BELOW LISTED CRITERIA ARE POSSIBLE STRATEGIES FOR CLASS 3 AND 4 CONTAINMENTS. NOT ALL OF THE STRATEGIES WILL BE ALLOWED OR REQUIRED. THE ICRA PERMIT AND EH&S WORKSHEET DEFINE WHAT IS ALLOWABLE. THINK OF THE ICRA PERMIT AND EH&S WORKSHEET AS A MENU. THE BELOW IS A DETAILED DESCRIPTION OF EACH ITEM ON THAT MENU.

3.02 CONTAINMENT CRITERIA

- A. The outside of the work containment shall have present: ICRA Permit, Interim Life Safety Measure (ILSM) Permit, Daily ICRA Inspection Forms, manometer, entry warning sign, Containment Entry Log (provided by the Contractor) that lists all persons who enter the containment regardless of affiliation, including all University employees, an emergency telephone number of person to call 24 hours a day in the event of a negative pressure alarm or other issue, and that an Environment of Care Incident Report under the category of "Construction Dust" must be filed by area nursing management in case of constant or annoying alarms.
- B. The interior of the containment area shall be cleaned on a continual basis daily. Hard surface floors in work area, adjacent hallways and passage areas require vacuuming with HEPA-filtered vacuum cleaners and frequent wet-mopping during demolition and construction; protect adjacent carpeted areas with plastic and plywood and vacuum with HEPA-filtered vacuum cleaners. Only an EPA Listed Germicide approved by the UC Davis Health Infection Prevention shall be used on the project site.
- C. Contractor shall inspect the containment daily prior to starting work and immediately repair any breaches, holes, or other issues.
- D. For projects of extended length when work activity is not being performed, including on weekend or holiday periods, and if the work area had a very thorough surface cleaning and

received a passing visual inspection by a third party environmental consultant, the daily inspections are not required. At a minimum, ICRA inspections shall be made weekly for containments on projects of extended non-work activity.

- E. Regardless of containment strategies, execute work by methods to minimize raising dust from construction operations. Water may be used to assist in controlling airborne dust.
- F. Full containment
 1. All surfaces in the containment area except surface where work is to occur must be covered in plastic unless they are non-porous, smooth, and accessible for cleaning.
 2. Sealing of Openings: Use fire-rated tape or other impenetrable sealant to seal barrier wall seams, cracks around window and door frames, exhaust system ductwork, pipes, joints and ducts. Use of spray glue is not acceptable to be used inside of the building.
 3. Contractor must block off existing ventilation supply registers, return registers and exhaust registers in the construction area as critical barriers. Materials used to block off these critical barriers in a temporary construction area not exceeding 30 days may be constructed of 6-mil fire-rated plastic. Materials used to block off these critical barriers in a construction area exceeding 30 days shall be constructed of an approved fire-resistive material other than 6 mil plastic.
 4. All polyethylene (plastic) and other materials used for temporary enclosures shall be at least 6 mil thickness and fire-retardant type. Zip poles or other easily removable supports shall be used for projects extending beyond one work shift. Temporary walls with metal stud framing may be required for long term projects and must be approved by the Project Manager. All doors leading into the containment area shall utilize zippered doors for control of the air flow and closing the plastic doors. Flapped doorways consisting of overlapping plastic are not acceptable in the building.
 5. Creation of the negative pressure enclosure includes the requirement to complete temporary barrier walls in the attic space from the top of the ceiling to the underside of the roof deck in the project area when the ceiling system is opened.
 6. Creation of negative pressure enclosure includes sealing wall cavities that are opened to prevent air transmission between adjacent spaces and the attic space that has air pathway to the attic space.
 7. For temporary construction projects that do not exceed 30 calendar days, temporary work area containments may be constructed of 6-mil fire-rated polyethylene. Approval for this shall be by the Fire Marshal.
 8. For projects that exceed 30 calendar days, all barriers used to construct the temporary containment systems in the project area shall be hard barriers that meet the ASTM E84, Class A requirements for smoke and fire. This will include the use of a hard door integral to the temporary containment system to allow access and egress to and from the construction area.
 9. Smoke detectors that are present inside of the construction work area can be temporarily covered during the work shift with a loose-fitting plastic "shower cap" that is commonly used on projects to prevent smoke alarms from inadvertently

being triggered from dust. If this temporary dust control measure is used, the plastic overs shall be removed at the end of each work shift.

G. Critical seal of areas

1. Use tape or other impenetrable sealant to seal barrier wall seams, cracks around window and door frames, exhaust system ductwork, pipes, joints and ducts. Use of spray glue is not acceptable to be used inside of the building.

H. Double Ante Rooms with Negative Air Unit Attached to One Ante Room

1. In some locations when the negative air exhaust cannot be directed outside the building, and while temporary barriers are being installed, use of two anterooms connected in series to the construction zone may be used temporarily until full negative pressure containment is achieved. The use of double anterooms is a temporary measure and shall not be considered a primary means of negative pressure for control of dust. It must receive approval by Infection Prevention or EH&S before it can be considered. The configuration includes two anterooms connected with the clean anteroom accessible from the corridor, room, or space to access the project area. The second anteroom is connected to the construction work area.
2. If approved, a HEPA filtered negative air unit shall be attached to the anteroom that is connected directly to the construction work area. This anteroom is considered the "dirty" anteroom because air is drawn into this room from the construction area. The first anteroom accessible from the corridor, room or space is considered a "clean" anteroom because air is unidirectional, moving into the second anteroom.

I. Cubes

1. Mini-containments (pop-up cubes) which are designed to have at most 1-2 people are means of control to access attic spaces, wall spaces and subfloor spaces usually at defined entry points such as access hatches or above a drop-in ceiling system. Cubes shall have a HEPA filtered negative air unit attached or integral to the cube to create a negative pressure work environment inside of the cube. Cubes are reviewed and approved by the University's Representative on a case by case basis.

J. Glove Boxes

1. A glove box can be used for some work where a HEPA filtered vacuum is attached to the glove box when a small area of work is to be performed. A glove bag is attached to the box enclosure to allow the worker to make small openings by drilling or cutting within the negative pressure glove box. Glove boxes are reviewed and approved by the University's Representative on a case by case basis.

K. Shrouded tools

1. Shrouded tools can be used for some work. A HEPA (DOP Tested) filtered vacuum is attached to the shroud. Shrouded tools are reviewed and approved by the University's Representative on a case by case basis.

3.03 NEGATIVE AIR CRITERIA

- A. HEPA filtered air shall not be discharged into existing HVAC supply ducts, return ducts, exhaust ducts or building plenum spaces unless there is a dedicated exhaust duct available in the construction project area and is approved for use by the University Plant Operations & Maintenance.
- B. The University's Representative shall determine if there is available a dedicated exhaust duct within the project area that is not connected to other exhaust ducts for exhaust out the building. This option can be considered if there are no other ducts attached to the exhaust duct, since other systems attached to the main exhaust duct might be pressurized, changing designed exhaust volumes, or creating back flushing of air in other connected ducts. Use of this option shall be reviewed and approved by University Plant Operations & Maintenance.
- C. When the air from the HEPA filtered negative air unit exhaust cannot be directed outside of the building due to no windows in the vicinity of the work or if impractical, all HEPA filtered negative air units shall be exhausted to a location agreeable to the PM. Each HEPA unit shall be plugged into a separate electrical circuit to provide temporary redundancy should one unit fail or due loss of electrical power. The PO&M Electrical shop shall inspect and test each circuit connected to the HEPA negative air unit prior to use.
- D. If negative air exhaust is required to be exhausted through a fire-rated assembly, the air shall be directed through approved fire-rated temporary containment systems that meet ASTM E84, Class A requirements for smoke and fire.
- E. When the air from the negative air units is exhausted inside of the building, the exhaust air from negative air unit shall be directed into a "diffusion cube" constructed of pleated filters to disperse the air in a manner that does not raise dust or blow air directly onto patients, staff or visitors. The Contractor shall consider and install charcoal filters in the negative air units to control smells/odors associated with the construction.
- F. Negative air units shall be positioned as far from the entry ante room containment as possible for distribution of air flow throughout the project area. The number of negative air units shall be to provide sufficient negative pressure and for a minimum of at least four (4) air changes per hour of the volume of the entire work containment.
- G. Dual HEPA Units operating in parallel may be required for redundancy in high-risk areas.
- H. DOP testing of HEPA equipment
 - 1. Negative air units and HEPA filtered vacuums are to be challenge tested onsite by the DOP test method by a third party prior to being placed in service, after a HEPA filter change, when dropped or damaged or moved from the project site. Only HEPA systems that pass the challenge DOP testing can be used on the project. All HEPA equipment shall be tested per ANSI/ASME N510 Section 10 to ensure 99.97% efficiency at 0.3 micrometer mean aerodynamic diameter.
 - 2. The entire piece of HEPA equipment shall be challenge tested, not just the filter media. The University's Consultant or EH&S shall witness the HEPA challenge testing procedure in entirety. Once the HEPA system passes the challenge testing and passes, the HEPA equipment may be used at the location tested for a period not to exceed one year. The testing label shall remain on the HEPA equipment and remain legible. Re-testing of the HEPA equipment is required annually, if the piece of equipment is transported out of the building to another building location on the campus, if dropped, or otherwise subjected to forces that might unseat the

HEPA filter, damaged by water or laceration of the filter or if HEPA filter maintenance or adjustments are performed.

3. When utilizing HEPA Filtered Vacuums for glove boxes or shrouded tools these HEPA Vacuums must be DOP tested.

3.04 NEGATIVE AIR MONITORING CRITERIA

A. Fully Monitored Negative Air Maintaining -0.020" Water Column (in-WC)

1. Build containment with negative air machines capable of maintaining a pressure differential of -0.020 in-WC across all critical barriers
2. Demonstrate negative pressure is achieved continuously (24/7) by means of an electronic manometer sensitive to measure down to -0.020" wp. The manometer shall be capable of measuring the water pressure down to at least -0.001" in-WC.
3. An Omniguard IV recording manometer is recommended as the standard instrument for containment pressure monitoring, but other electronic manufactured models with similar sensitivities at low pressures and recording capabilities are acceptable.
4. Inclined manometers using a liquid water solution and non-digital air pressure gauges are not an acceptable manometer since they do not meet the sensitivity of measuring -0.001" WC.
5. Zero pressure or positive pressure is unacceptable and must be responded to immediately. Locate and repair holes or breaches in exterior containment system with tape. Secure zip poles if they have fallen. Close entry door by zipping lower or closing flaps and securing.

B. Hybrid Monitoring and Visual Verification

1. Build containment with negative air machines capable of maintaining a pressure differential of -0.020 in-WC across all critical barriers.
2. During the course of construction, the scope of work may dictate removal of work (e.g. Ceilings or drywall) that would make it difficult to maintain -0.02 in-WC of negative pressure. During working hours Visual Verification of negative pressure may be used in lieu of the -0.02 in-WC requirement with electronic monitoring.
3. At the end of shift all openings must be sealed to bring the containment back to the -0.020 in-WC requirement.

3.05 ADDITIONAL CONTAINMENT CRITERIA

A. Ante Room

1. An ante room is a separate chamber attached to the containment area with zippered doors to allow entry and exit into the containment area. Entry into the containment area shall be only via the ante room. The ante room is commonly constructed of zip poles or equivalent, plastic and tape. The ante room is sized for each project to allow workers and equipment to be moved into and out of the containment area. A sticky mat is required in the ante room for workers and carts on wheels to use when existing the ante room from the containment area. The

zippered doors are to remain closed or adjusted slightly open as necessary to allow negative pressure to be maintained at a minimum of -0.020 in-WC during work periods and during off hours.

2. The ante room shall have a sticky mat present which is intended to remove any debris from the bottom of work shoes before leaving the ante room into the public area. The sticky mat is not intended to clean debris from the bottom of disposable coveralls or from booties. The sticky mat layers shall be replaced many times during a work shift when work involves movement of many workers and supplies out of the containment area.
3. All people who enter and leave the project containment area including the contractor and all subcontractor employees are responsible for removing a dirty sticky mat and replacing it with a clean one when it is necessary. This includes all University Representatives, Consultants, Infection Prevention, Inspector of Record, Environmental Health & Safety, Engineers, Architects, etc.
4. People entering into the containment area will put on a full body disposable coverall with booties inside of the ante room before entering the containment area. Entry into the ante room requires one of the two zippered doors to be opened at one time to maintain the required negative pressure. After entering the ante room, the zipper shall be closed before leaving the ante room into the containment area.

B. Air Scrubbing

1. The Contractor shall place additional HEPA filtered fan units (negative air unit) inside of the project work area and operate them in recirculation mode or "scrub mode" near the final cleaning phase of the project to aide in additional particulate cleaning of the space. These units will circulate air internal to the containment area and scrub the air to reduce the total airborne particle concentrations inside of the containment area.

C. Disposable Coveralls and Booties

1. Disposable coveralls are required in all Class IV containment areas and selected to provide protection of street clothes from particulates generated inside of the containment area. Disposable coveralls shall be changed if they become ripped and are no longer serviceable. Disposable coveralls are required to protect the patients and are considered Patient Protective Apparel (PPA), since they are designed to protect patients who might be susceptible to the dust generating activity of the construction area.
2. Coveralls are not necessarily considered personal protective equipment (PPE), which is designed to protect the worker, unless the work activity involves asbestos, lead or other chemicals involved in the construction area.
3. Proper use of the disposable coveralls, booties and use of the sticky mat shall be followed at all times for all workers and UC Davis Health employees, when it is required by the ICRA Permit. At no time shall workers leave the containment area wearing disposable coveralls and booties. They are to be removed in the ante room or immediately in front of the ante room within the containment area if it is free and clean of debris. The workers shall remove all disposable coveralls and booties and place them in the plastic garbage bag and leave the ante room after walking on the sticky mat.

3.06 CONTAINMENT SET UP

- A. Notify University's Representative forty-eight (48) hours prior to containment set up.
- B. Build containment in compliance with ICRA, drawings and plans.
- C. Notify University's Representative and EH&S for inspection prior to start of work. Before any demolition or construction begins, all Protection Areas (infection control areas), control measures put in place and work plan by the Contractor will be inspected by the University's Environmental Health & Safety Personnel, or by a designated representative of the University. Work cannot begin until the containment area has been inspected and approved, meeting all of the provisions of the ICRA Permit.

3.07 REMOVAL OF CONTAINMENT

- A. Provide thorough cleaning of existing surfaces, which become exposed to dust, before leaving the containment area and before allowing staff and the public access to the project area.
- B. Final cleaning of the containment area requires diligent HEPA vacuuming of all horizontal surfaces and wet wiping all surfaces. Clean towels, sponges, cloth rags or other means shall be used with clean water to effectively clean all surfaces within the containment area. Use of a measured solution of an EPA Listed Germicide is required as part of the final detail cleaning. Use an appropriate attachment to ensure all large dust is removed. Vacuum slowly and pay special attention to cracks and crevices where dust may have accumulated.
- C. Prepare a measured solution of a University approved Environmental Protection Agency listed disinfectant and use according to the instructions on the label. Using clean towels or sponges, wipe all surfaces with the disinfectant. If visible dust accumulates on the applicator, wipe again until no residue is detected. Frequently change to clean applicators. Leave the surface wet and allow to air dry. Do not wipe dry.
- D. Remove the top floor layer, if present and HEPA vacuum and wipe down the bottom floor layer. The inspection will not be performed until the containment is dry.
- E. Additional HEPA filtered negative air units may be installed for scrubbing of particles (see 3.05 B).
- F. Coordinate with the University's Representative to call for a final visual inspection of the containment area. The final visual inspection will be made after the Contractor has thoroughly cleaned the entire containment area. The Contractor will be allowed to remove the containment barriers after the interior has passed the visual inspection for cleanliness.
- G. Particle count assessment may be made inside of the containment area by the University's Representative as part of the final visual inspection process in addition to the final visual inspection. Particle testing will include testing the airborne concentration of various particle sizes compared to the concentration outside of the containment area. If particle counts inside of the containment area are significantly greater than outside of the containment area, the Contractor shall continue to scrub the air inside of the project area with HEPA filtered negative air units and conduct additional surface cleaning until subsequent particle testing has demonstrated particle concentrations inside of the containment area are not

significantly greater than particle concentrations immediately outside of the containment area.

- H. The University's Representative is required to provide a 24-hour notification to University Environmental Services that terminal cleaning will be needed, in addition to notification at the time the containment is being removed. Note that containment removal cannot take place until the Contractor has completed a full cleaning of the containment and the final visual inspection has passed.

3.08 ENTRY/EGRESS

- A. Entry into the project containment area shall be through the ante room. Entry into the ante room requires one of the two zippered doors to be opened at one time to maintain the required negative pressure. After entering the ante room, the zipper shall be closed before leaving the ante room into the containment area. Equipment and supplies brought into the containment area shall be in sealed leak tight containers inside of rolling covered carts. Equipment, tools and supplies brought into the building shall be clean and free of dust, debris, mold and other contaminants. Cardboard products shall not be brought into the containment area if they are water damaged or have suspect mold growth.
- B. All HEPA equipment when transported into and out of the containment area shall be cleaned of all debris on the surfaces and shall have the intake openings sealed with plastic and duct tape.
- C. All workers leaving the containment area shall leave in clean clothes. At no time shall disposable coveralls or booties be worn when leaving the containment area through the anteroom into the public area. The workers shall clean all gross particulate debris from the coveralls using a HEPA filtered vacuum. Disposable coveralls can be taken off after gross debris has been removed from the disposable coveralls. The worker shall remove the disposable coverall inside of the ante room by rolling the disposable coverall inside out and then place it into a garbage container (plastic bag) located inside of the ante room or just inside of the project work area.
- D. All equipment and supplies leaving the containment area shall be cleaned of all dust and debris before leaving the containment area. Removal of supplies, materials and waste debris from the containment area shall be using tightly covered containers/carts that contain the waste material. The wheels of carts shall be cleaned on a frequent schedule to minimize track-out of debris as they are removed from the containment area. All waste material shall be in sealed leak tight containers. If plastic bags are used, they shall be 6 mil thick at a minimum.

3.09 ENFORCEMENT

- A. Failure to maintain required containment will result in issuance of written warning; if situation is not corrected within eight (8) hours of receipt of warning, University will have cause to stop the work as provided in Article 2.1 (if Brief Form) or 2.3 (if Long Form) of the General Conditions. Any egregious violation of safety requirements shall be grounds for Immediate Work Stoppage.

3.10 Refer to the following Attachments

- A. Infection Control Risk Assessment (ICRA) with Matrix of Precautions for Construction & Renovation: 3 Pages.
- B. Infection Control Construction Permit: 1 Page.

- C. UCDH Construction Dust & Hazardous Materials Inspection Worksheet: 2 Pages.
- D. UC Davis Health Construction Dust Infection Prevention Best Practice Standard: 23 Pages including.
 - 1. Appendix A: Inspection Documentation Form and Daily Inspection Log.
 - 2. Appendix B: Entry Warning Sign with Project Manager Contact.
 - 3. Appendix C: Staff Education Poster.

END OF SECTION 01 56 10

ICRA Committee approval of an ICRA Permit is required for all Construction Activity

BASIC PROJECT INFORMATION			
Project Name:	Project Number:	Today's Date	
Impacted Department(s):	Building Number and Name:	Floor:	Suite/Room:
Estimated Construction Start Date:		Estimated Completion Date:	
UCDH Project Manager:	UCDH PM Mobile Phone #:	UCDH PM Email:	
Construction Manager:	CM Mobile Phone:	CM Mobile Email:	
GENERAL PROJECT SCOPE			
ATTACH DESCRIPTIVE PROJECT SCHEMATIC OR IMAGE TO PACKET			
MULTIDISCIPLINARY TEAM			
Identify the multidisciplinary team included in this review and agree with the requirements identified within the package.			
Department	Name	Email	
UCDH Project Manager			
Fire Marshal's Office			
Infection Prevention			
Environmental Health & Safety			
Contractor Representative			
Other Multidisciplinary Team Members			

INFECTION CONTROL RISK ASSESSMENT

Step One: Using the table, identify the Construction Project Activity Type (A-E).

Type A	<p>Inspection and non-invasive activities. Includes but is not limited to:</p> <ul style="list-style-type: none"> • Removal of ceiling tile for visual inspection-limited to 1 tile per 50 square feet with limited exposure time. • Limited building system maintenance (e.g., pneumatic tube station, HVAC system, fire suppression system, electrical and carpentry work to include painting without sanding) that does not create dust or debris. • Clean plumbing activity limited in nature.
Type B	<p>Small-scale, short duration activities that create minimal dust and debris. Includes but is not limited to:</p> <ul style="list-style-type: none"> • Work conducted above the ceiling (e.g., prolonged inspection or repair of firewalls and barriers, installation of conduit and/or cabling, and access to mechanical and/or electrical chase spaces). • Fan shutdown/startup. • Installation of electrical devices or new flooring that produces minimal dust and debris. • The removal of drywall where minimal dust and debris is created. • Controlled sanding activities (e.g., wet, or dry sanding) that produce minimal dust and debris.
Type C	<p>Large-scale, longer duration activities that create a moderate amount of dust and debris. Includes but is not limited to:</p> <ul style="list-style-type: none"> • Removal of preexisting floor covering, walls, casework, or other building components. • New drywall placement. • Renovation work in a single room. • Nonexistent cable pathway or invasive electrical work above ceilings. • The removal of drywall where a moderate amount of dust and debris is created. • Dry sanding where a moderate amount of dust and debris is created. • Work creating significant vibration and/or noise. • Any activity that cannot be completed in a single work shift.
Type D	<p>Major demolition and construction activities. Includes but is not limited to:</p> <ul style="list-style-type: none"> • Removal or replacement of building system component(s). • Removal/installation of drywall partitions. • Invasive large-scale new building construction. • Renovation work in two or more rooms.
Type E	<p>Exterior Construction typical activities. include, but are not limited to:</p> <ul style="list-style-type: none"> • Excavation, Trenching, Grading, Boring, Pile Driving, Demolition • Asphalt, Concrete, Stucco, Scaffolding • Roofing • Window washing, Caulking, Tuckpointing, Cleaning, Painting • Landscaping, Planting
<p>Explain the reasoning for this assessment:</p>	

Step Two: Using the table below, identify the Patient Risk Group(s) that will be affected. If more than one risk group is involved, select the higher-risk group.

Low Risk Non-patient care areas such as:	Medium Risk Patient care support areas such as:	High Risk Patient care areas such as:	Highest Risk Procedural, invasive, sterile support and highly compromised patient care areas such as:
<input type="checkbox"/> Office areas not on clinical units <input type="checkbox"/> Breakrooms not on clinical units <input type="checkbox"/> Bathrooms or locker rooms not on clinical units <input type="checkbox"/> Mechanical rooms not on clinical units <input type="checkbox"/> EVS closets not on clinical units <input type="checkbox"/> Corridors and gathering areas not near clinical units	<input type="checkbox"/> Waiting / Lobby areas <input type="checkbox"/> Clinical engineering <input type="checkbox"/> Materials management <input type="checkbox"/> Sterile processing department - dirty side <input type="checkbox"/> Cafeteria, gift shop, coffee shop, and food kiosks <input type="checkbox"/> Public hallways and gathering areas near clinical units	<input type="checkbox"/> Patient care rooms and areas <input type="checkbox"/> All acute care units <input type="checkbox"/> Emergency department <input type="checkbox"/> Employee health <input type="checkbox"/> Pharmacy: General Work Zone <input type="checkbox"/> Medication rooms and clean utility rooms <input type="checkbox"/> Imaging suites: diagnostic imaging <input type="checkbox"/> Laboratory <input type="checkbox"/> Kitchen	<input type="checkbox"/> All transplant and intensive care units <input type="checkbox"/> All oncology units and other areas with severely immunocompromised patients <input type="checkbox"/> OR theaters and restricted areas <input type="checkbox"/> Procedural suites <input type="checkbox"/> Pharmacy compounding <input type="checkbox"/> Sterile processing department: clean side <input type="checkbox"/> Transfusion services <input type="checkbox"/> Dedicated isolation units and isolation rooms <input type="checkbox"/> Imaging suites: invasive imaging <input type="checkbox"/> Dialysis unit

Describe key patient risks:

Step Three: Match the Patient Risk Group (Low, Medium, High, Highest) from Step Two with the planned Construction Activity Project Type (A, B, C, D, E) from Step One using the table below to find the Class of Precautions (I, II, III, IV or V) or level of infection control activities required. The activities are listed in the table below – Minimum Required Infection Control Precautions by Class.

Patient Risk Group	Construction Project Activity Type				
	TYPE A	TYPE B	TYPE C	TYPE D	TYPE E
LOW Risk	I	II	II	III*	<input type="checkbox"/> Exterior
MEDIUM Risk	I	II	III*	IV	
HIGH Risk	I	III	IV	V	
HIGHEST Risk	III	IV	V	V	

All construction and maintenance activities as defined in Step 1 require a permit and approval unless the work does not expose patients or employees and the ICRA Committee determines there is no appreciable risk to patients for acquired infection due to the project. Such decisions must be documented.

Environmental conditions that could affect human health, such as sewage, Mold, asbestos, gray water, and black water will require Class of Precautions IV for LOW and MEDIUM Risk Groups and Class of Precautions V for HIGH and HIGHEST Risk Groups.

Class III* Precautions - Type C [Medium Risk groups] and Type D [Low Risk Groups] work areas that cannot be sealed and completely isolated from occupied patient care spaces should be elevated to include negative air exhaust requirements as listed in Class IV Precautions.

Surrounding Area Assessment

Step Four: Assess potential risk to areas surrounding the project. Using the table below, identify the surrounding areas that will be affected and the type of impact that will occur. If more than one risk group is impacted, select the higher risk group using Step 2 - Patient Risk Group.

Unit Location:	Below	Above	Lateral	Behind	Front
Unit Name:					
Risk Group:					
Unit Contact:					
Phone:					
Email:					
Additional Controls:	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input type="checkbox"/> Dust control <input type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization
Impact on other systems, such as:	<input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems
Notes:					

Were there discoveries in surrounding areas that would serve as a cause to increase the class of precautions and necessitate additional controls? If so, please summarize.

NOISE AND VIBRATION ASSESSMENT

Type	Suggested Control Measures
<input type="checkbox"/> Drilling <input type="checkbox"/> Heavy Equipment <input type="checkbox"/> Motors <input type="checkbox"/> Pounding <input type="checkbox"/> Grinding <input type="checkbox"/> Other:	<input type="checkbox"/> Required for high-impact activities – Notify PO&M, Building Coordinator and EH&S <input type="checkbox"/> Always consider using Engineering solutions before using Personal Protective Equipment. <input type="checkbox"/> Coordinate disruption plan with PO&M and other stakeholders as necessary <input type="checkbox"/> Deploy noise dampening blankets or other similar equipment <input type="checkbox"/> Use tools or alternative methods designed to minimize noise and vibrations <ul style="list-style-type: none"> <input type="checkbox"/> Use diamond drills instead of powder-actuated fasteners <input type="checkbox"/> Use beam clamps instead of shot <input type="checkbox"/> Prefab where possible <input type="checkbox"/> Use tin snips to cut metal studs instead of using a chop saw <input type="checkbox"/> Install metal decking with vent tabs, then use cellular floor deck hangers <input type="checkbox"/> Consider pro-press instead of soldering, brazing, or welding <input type="checkbox"/> Wet core drill instead of dry core or percussion <input type="checkbox"/> Instead of jackhammering concrete, use wet diamond saws <input type="checkbox"/> Use HEPA vacuums instead of standard wet/dry vacuums <input type="checkbox"/> Use mechanical joining system sprinkler fittings instead of threaded <input type="checkbox"/> Where fumes are tolerated, use chemical adhesive remover instead of mechanical <input type="checkbox"/> To remove flooring, shot blast instead of using a floor scraper <input type="checkbox"/> Use electric sheers instead of reciprocating saw for ductwork cutting. <input type="checkbox"/> Install exterior man/material lifts. <input type="checkbox"/> Provide staff and/or patients with noise-reducing protective equipment (e.g., ear plugs) <input type="checkbox"/> Relocate members/staff to another area of the facility for the duration of the activity <input type="checkbox"/> Notify affected areas before noise or vibration-producing activity <input type="checkbox"/> Schedule activities during hours that minimize patient, visitor, and staff impact. Hours: <input type="checkbox"/> Other:

AIR QUALITY IMPACT

Type	Suggested Control Measures
<input type="checkbox"/> Dust <input type="checkbox"/> Chemical (VOC) <input type="checkbox"/> Fugitive Emissions (Fumes) <input type="checkbox"/> Potential Mold <small>Note: If Mold is encountered, follow work practices outlined in the General Requirements Division 1 Section 01561 Document.</small> <input type="checkbox"/> Asbestos <input type="checkbox"/> Paint Solvent/Cleaner <input type="checkbox"/> Roofing Tar <input type="checkbox"/> Other:	<input type="checkbox"/> Restrict/shut down air handlers for the duration of the activity <input type="checkbox"/> Install temporary partitions <input type="checkbox"/> Install charcoal filters in HVAC or portable units <input type="checkbox"/> Install temporary ductwork and portable units <input type="checkbox"/> Prohibit idling of heavy equipment engines <input type="checkbox"/> Provide local exhaust ventilation <input type="checkbox"/> Substitute material with low VOC product <input type="checkbox"/> Notify area staff and EH&S before construction activity that may impact air quality <input type="checkbox"/> Provide negative pressure/HEPA filtration <input type="checkbox"/> Exhaust HEPA–99.97% to exterior <input type="checkbox"/> Relocate members/staff to another area of the facility for the duration of the activity <input type="checkbox"/> Schedule activities during hours that minimize patient, visitor, and staff impact. Hours: <input type="checkbox"/> Provide Safety Data Sheets to EH&S for other recommended actions <input type="checkbox"/> Other:

HAZARDOUS MATERIALS

A determination regarding the presence of hazardous materials in all UCDH buildings must be made before a project starts. This can be accomplished by existing surveys that identify the presence of hazardous materials or by hiring a consultant to perform a hazardous materials assessment of the areas that the project will impact. All impacted Hazardous Materials must be handled per the appropriate control measures.

Note: A Certified Asbestos Consultant must have conducted an asbestos survey before any demolition or renovation activity. There are no exceptions based on the date of construction or the facility's age.

ACKNOWLEDGEMENT OF HAZARDOUS MATERIALS

Does the project contact hazardous materials (e.g., asbestos, lead, mold, PCBs, mercury)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
How was this verified?	<input type="checkbox"/> Hazmat Survey		<input type="checkbox"/> Personal Knowledge
	<input type="checkbox"/> Other:		
Who verified this information?	<input type="checkbox"/> Company:		
	<input type="checkbox"/> Person and Department:		
	<input type="checkbox"/> Other:		
Hazardous Materials Present in Project Work Area	Required Control Measures		
<input type="checkbox"/> Asbestos <input type="checkbox"/> Lead <input type="checkbox"/> PCBs <input type="checkbox"/> Universal Waste <input type="checkbox"/> Other:	Follow work practices outlined in the General Requirements Division 1 Document.		

CONTAINMENT REQUIREMENTS WORKSHEET

Containment Barrier	Where construction will impact fire-rated assemblies, the contractor is responsible for constructing interim assemblies and barriers that maintain the integrity of the structure's fire-rated system. Note: Interim Life Safety Measures may be required.			
	<input type="checkbox"/> Full Containment (poly over all surfaces within containment)			
	<input type="checkbox"/> The ceiling plenum within the work area shall be isolated and sealed by fire-rated six mil. poly			
	<input type="checkbox"/> Hard Barriers are recommended for work lasting greater than 30 days and in high-traffic areas.			
	<input type="checkbox"/> Fire retardant plastic barriers are recommended for work lasting less than 30 days. Plastic Barriers cannot be used where hot work will be performed.			
	<input type="checkbox"/> Isolated Room – Critical Openings Only (seal doors, supply and return registers, etc.)			
	<input type="checkbox"/> Prefabricated Containment Cube (only large enough for 1-2 people; aka pop-up cube or Mini Cube)			
	<input type="checkbox"/> Shrouded Tool with HEPA-filtered exhaust			
<input type="checkbox"/> Glove Box Containment with HEPA-filtered exhaust				
<input type="checkbox"/> Other:				
Negative Pressure	The contractor is required to maintain and document negative air pressure. DOP Tested HEPA-filtered negative air machines (with a minimum of 99.97% efficiency) and a rating of 200 to 2000 cubic feet per minute (CFM) is required for construction activities.			
	<input type="checkbox"/> -0.020" WC always displayed on a mounted digital manometer			
	<input type="checkbox"/> -0.020" WC at setup with negative pressure throughout the project, as displayed on the manometer			
	<input type="checkbox"/> Visual Verification of some negative room pressure throughout the project			
	<input type="checkbox"/> No negative room pressure is required			
	<input type="checkbox"/> Negative pressure in localized HEPA exhausted work area (e.g., shrouded tool, glove box)			
	<input type="checkbox"/> Additional Ante room under negative pressure			
<input type="checkbox"/> Other:				
Air Exhaust	<input type="checkbox"/> Air exhausted directly outside - Avoid exhausting air near air intakes or operable windows doors, and avoid exhausting air near walkways			
	<input type="checkbox"/> For air exhausted inside, check any of the following conditions that are required:			
	<input type="checkbox"/> Additional Filtration (ex. Charcoal, Diffuser system)			
	<input type="checkbox"/> Exhaust into Ducts/HVAC system – Mechanical engineer must confirm that exhausted air will not negatively impact the air balance of the existing system			
	<input type="checkbox"/> Onsite Challenge Testing (DOP or particle counting) before containment setup			
<input type="checkbox"/> Challenge Tested within last six months; Equipment has remained onsite at UCDH				
Additional Containment Requirements	<input type="checkbox"/> Ante Room	<input type="checkbox"/> Masonite Floor Protection	<input type="checkbox"/> Protective Clothing	<input type="checkbox"/> Air Scrubber
	<input type="checkbox"/> Walk Off Mats	<input type="checkbox"/> Shoe Covers	<input type="checkbox"/> Collect Samples During Work	<input type="checkbox"/> HEPA Vacuum
	<input type="checkbox"/> Other:			
Verification of Work	<input type="checkbox"/> HEPA Equipment Verification		<input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> Other:	
	<input type="checkbox"/> Pre-Work Approval Inspection		<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:	
	<input type="checkbox"/> Daily Onsite Oversight		<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:	
	<input type="checkbox"/> Post Demolition/Abatement Inspection		<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:	
	<input type="checkbox"/> ICRA Downgrade		<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:	
	<input type="checkbox"/> Final Visual Containment Inspection		<input type="checkbox"/> PM <input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> IOR <input type="checkbox"/> Other:	
	<input type="checkbox"/> Air Sampling		<input type="checkbox"/> EH&S <input type="checkbox"/> Consultant <input type="checkbox"/> Other:	
Air Sampling	<input type="checkbox"/> Particle Counting <input type="checkbox"/> Mold <input type="checkbox"/> Asbestos <input type="checkbox"/> Other:			Frequency:
Air Balance in Adjacent Areas:	The contractor is responsible for maintaining air balance in adjacent <u>high and highest-risk areas</u> per design/ASHRAE guidelines. Contact PO&M to verify the air balance requirements of surrounding areas.			
	Adjacent High/Highest Risk Areas		Air Balance Requirements	

ICRA Permit Number	ICRA Class

Project Number:		Project Name:	
Impacted Department:	Building Number and Name:	Floor:	Suite/Room:
UCDH Project Manager:	UCDH PM Mobile Phone #:	UCDH PM Email:	
Construction Manager:	CM Mobile Phone:	CM Mobile Email:	
General Contractor:	General Contractor Mobile Phone:	General Contractor Mobile Email:	
Containment will be set up and maintained by:		Third-Party Containment Consultant:	

ICRA Class:		Project Start Date	Completion Date
Additional Requirements			
Signatures	Project Manager	General Contractor	Infection Control and Prevention
Downgrade Request – ICRA Class		Project Start Date	Completion Date
Additional Requirements			
Signatures	Project Manager	General Contractor	Infection Control and Prevention
Extension Request – ICRA Class		Project Start Date	Completion Date
Additional Requirements			
Signatures	Project Manager	General Contractor	Infection Control and Prevention

Please include the appropriate Infection Prevention Requirement page(s) for the Class indicated in Step 3 of this package.

INFECTION PREVENTION REQUIREMENTS - CLASS I

Prior to and During Construction:	<ul style="list-style-type: none"> Perform non-invasive work activities not to block or interrupt patient care. Perform non-invasive work activities in areas that are not directly occupied by patients. Perform non-invasive work activity in a manner that does not create dust. Immediately replace any displaced ceiling tile before leaving the area and/or at the end of non-invasive work activity.
Upon Completion of Work:	<p>Cleaning</p> <ul style="list-style-type: none"> Clean work areas, including all environmental surfaces, high horizontal surfaces, and flooring materials. Check all supply and return air registers for dust accumulation on upper surfaces and air diffuser surfaces. <p>HVAC Systems</p> <ul style="list-style-type: none"> Remove isolation of the HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational. Verify the HVAC systems meet original airflow and air exchange design specifications.
	Additional Infection Prevention Requirements:

INFECTION PREVENTION REQUIREMENTS - CLASS II

Prior to and During Construction:	<ul style="list-style-type: none"> • Perform only limited dust work and/or activities designed for basic facilities and engineering work. • Perform limited dust and invasive work following standing precautions procedures approved by the organization. • This Class of Precautions must never be used for construction or renovation activities.
Upon Completion of Work:	<p>Cleaning:</p> <ul style="list-style-type: none"> • Clean work areas, including all environmental surfaces, high horizontal surfaces, and flooring materials. • Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces. <p>HVAC Systems:</p> <ul style="list-style-type: none"> • Remove isolation of the HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational. • Verify the HVAC systems meet original airflow and air exchange design specifications.
	<p>Additional Infection Prevention Requirements:</p>

INFECTION PREVENTION REQUIREMENTS - CLASS III

Prior to and During Construction:	<ul style="list-style-type: none"> • Provide active means to prevent airborne dust dispersion into the occupied areas. • Means for controlling minimal dust dispersion may include hand-held HEPA vacuum devices, polyethylene plastic containment, or isolation of work area by closing room door. • Remove or isolate return air diffusers to avoid dust from entering the HVAC system. • Remove or isolate the supply air diffusers to avoid positive pressurization of the space, • If work area is contained, then it must be neutrally to negatively pressurized at all times. *If negative pressure is required, see additional requirements below. • Seal all doors with tape that will not leave residue • Contain all trash and debris in the work area. • Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area. • Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled. • Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces. <p>Additional requirements for Class III containments that require negative pressure:</p> <ul style="list-style-type: none"> • Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows requires the highest degree of filtration feasible. • If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas. • Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable. • Install digital monitoring manometer with one thousandth of inch of water pressure (eg. - 0.024) exterior of work containment to continually monitor negative pressurization. The non-digital manometer monitors are not acceptable.
Upon Completion of Work:	<p>Cleaning:</p> <ul style="list-style-type: none"> • Clean work areas including all environmental surfaces, high horizontal surfaces, and flooring materials. • Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces. <p>HVAC Systems:</p> <ul style="list-style-type: none"> • Remove isolation of the HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational. • Verify the HVAC systems meet original airflow and air exchange design specifications. <p>Class III precautions require inspection and documentation for downgraded ICRA precautions. Construction areas must be inspected by the designee on the containment requirements worksheet for discontinuation or downgrading of ICRA precautions.</p> <p>Work Area Cleaning:</p> <ul style="list-style-type: none"> • Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials.

INFECTION PREVENTION REQUIREMENTS - CLASS III

- Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.

Removal of Critical Barriers:

- Critical barriers must remain in place during all work involving drywall removal, creation of dust and activities beyond simple touch-up work. The barrier may NOT be removed until a work area cleaning has been performed.
- All (plastic or hard) barrier removal activities must be completed in a manner that prevents dust release. Use the following precautions when removing hard barriers:
 - Carefully remove screws and painter tape.
 - If dust will be generated during screw removal, use hand-held HEPA vacuum.
 - Drywall cutting is prohibited during removal process.
 - Clean all stud tracks with HEPA vacuum before removing outer hard barrier.
 - Use a plastic barrier to enclose area if dust could be generated.

Negative Air Requirements:

- The use of negative air must be designed to remove contaminants from the work area.
- Negative air devices must remain operational at all times and in place for a period after completion of dust creating activities to remove contaminants from the work area and before removal of critical barriers.

HVAC systems:

- Upon removal of critical barriers, remove isolation of HVAC system in areas where work is being performed.
- Verify that HVAC systems are clean and operational.
- Verify the HVAC systems meets original airflow and air exchange design specifications.

Additional Infection Prevention Requirements:

INFECTION PREVENTION REQUIREMENTS - CLASS IV

Prior to and During Construction:

- Construct and complete critical barriers meeting NFPA 241 requirements. Barriers must extend to the ceiling or if ceiling tile is removed, to the deck above.
- All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor.
- Seal all penetrations in containment barriers, including floors and ceiling, using approved materials (UL schedule firestop if applicable for barrier type).
- Containment units or environmental containment units (ECUs) approved for Class IV precautions in small areas totally contained by the unit and that has HEPA-filtered exhaust air (MiniCube Mobile Containments).
- Remove or isolate return air diffusers to avoid dust entering the HVAC system.
- Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
- Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized.
- Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows requires the highest degree of filtration feasible.
- If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas.
- Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable.
- Install digital monitoring manometer with one thousandth of inch of water pressure (eg. - 0.024) exterior of work containment to continually monitor negative pressurization. The non-digital manometer monitors are not acceptable.
- Contain all trash and debris in the work area.
- Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
- Worker clothing must be clean and free of visible dust before leaving the work area. HEPA vacuuming of clothing or use of cover suites is acceptable.
- Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed.
- Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled.
- Collection of particulate data during work may be collected to assure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies. Collection of particulate data may be collected by Environmental Health and Safety or approved third party consultant.

INFECTION PREVENTION REQUIREMENTS - CLASS IV

Upon Completion of Work:

Class IV precautions require inspection and documentation for downgraded ICRA precautions.

Construction areas must be inspected by the designee on the containment requirements worksheet for discontinuation or downgrading of ICRA precautions.

Work Area Cleaning:

- Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials.
- Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.

Removal of Critical Barriers:

- Critical barriers must remain in place during all work involving drywall removal, creation of dust and activities beyond simple touch-up work. The barrier may NOT be removed until a work area cleaning has been performed.
- All (plastic or hard) barrier removal activities must be completed in a manner that prevents dust release. Use the following precautions when removing hard barriers:
 - Carefully remove screws and painter tape.
 - If dust will be generated during screw removal, use hand-held HEPA vacuum.
 - Drywall cutting is prohibited during removal process.
 - Clean all stud tracks with HEPA vacuum before removing outer hard barrier.
 - Use a plastic barrier to enclose area if dust could be generated.

Negative Air Requirements:

- The use of negative air must be designed to remove contaminants from the work area.
- Negative air devices must remain operational at all times and in place for a period after completion of dust creating activities to remove contaminants from the work area and before removal of critical barriers.

HVAC systems:

- Upon removal of critical barriers, remove isolation of HVAC system in areas where work is being performed.
- Verify that HVAC systems are clean and operational.
- Verify the HVAC systems meets original airflow and air exchange design specifications.

Additional Infection Prevention Requirements:

INFECTION PREVENTION REQUIREMENTS - CLASS V

Prior to and During Construction:

- Construct and complete critical barriers meeting NFPA 241 requirements. Barriers must extend to the ceiling or if ceiling tile is removed, to the deck above.
- All (plastic or hard) barrier construction activities must be completed in a manner that prevents dust release. Plastic barriers must be effectively affixed to ground and ceiling and secure from movement or damage. Apply tape that will not leave a residue to seal gaps between barriers, ceiling or floor.
- Seal all penetrations in containment barriers, anteroom barriers, including floors and ceiling using approved materials (UL schedule firestop if applicable for barrier type).
- Construct anteroom large enough for equipment staging, cart cleaning, workers. The anteroom must be constructed adjacent to entrance of construction work area.
- Personnel will be required to wear coveralls at all times during Class V work activities. Coveralls must be removed before leaving the anteroom.
- Remove or isolate return air diffusers to avoid dust entering the HVAC system.
- Remove or isolate the supply air diffusers to avoid positive pressurization of the space.
- Negative airflow pattern must be maintained from the entry point to the anteroom and into the construction area. The airflow must cascade from outside to inside the construction area. The entire construction area must remain negatively pressurized.
- Maintain negative pressurization of the entire workspace by use of HEPA exhaust air systems directed outdoors. Exhaust discharged directly to the outdoors that is 25 feet or greater from entrances, air intakes and windows requires the highest degree of filtration feasible
- If exhaust is directed indoors, then the system must be HEPA filtered. Prior to start of work, HEPA filtration must be verified by particulate measurement as no less than 99.97% efficiency and must not alter or change airflow/pressure relationships in other areas.
- Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (bathroom exhaust) is not acceptable.
- Install digital monitoring manometer with one thousandth of inch of water pressure (eg. -0.024) exterior of work containment to continually monitor negative pressurization. The non-digital manometer monitors are not acceptable.
- Contain all trash and debris in the work area.
- Nonporous/smooth and cleanable containers (with a hard lid) must be used to transport trash and debris from the construction areas. These containers must be damp-wiped cleaned and free of visible dust/debris before leaving the contained work area.
- Worker clothing must be clean and free of visible dust before leaving the work area anteroom.
- Workers must wear shoe covers prior to entry into the work area. Shoe covers must be changed prior to exiting the anteroom to the occupied space (non-work area). Damaged shoe covers must be immediately changed.
- Install a sticky (dust collection) mat at entrance of contained work area based on facility policy. Sticky mats must be changed routinely and when visibly soiled.
- Collection of particulate data during work may be collected to assure that contaminants do not enter the occupied spaces. Routine collection of particulate samples may be used to verify HEPA filtration efficiencies. Collection of particulate data may be collected by Environmental Health and Safety or approved third party consultant.

INFECTION PREVENTION REQUIREMENTS - CLASS V

Upon Completion of Work:

Class IV precautions require inspection and documentation for downgraded ICRA precautions.

Construction areas must be inspected by the designee on the containment requirements worksheet for discontinuation or downgrading of ICRA precautions.

Work Area Cleaning:

- Clean work areas including all environmental surfaces, high horizontal surfaces and flooring materials.
- Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.

Removal of Critical Barriers:

- Critical barriers must remain in place during all work involving drywall removal, creation of dust and activities beyond simple touch-up work. The barrier may NOT be removed until a work area cleaning has been performed.
- All (plastic or hard) barrier removal activities must be completed in a manner that prevents dust release. Use the following precautions when removing hard barriers:
 - Carefully remove screws and painter tape.
 - If dust will be generated during screw removal, use hand-held HEPA vacuum.
 - Drywall cutting is prohibited during removal process.
 - Clean all stud tracks with HEPA vacuum before removing outer hard barrier.
 - Use a plastic barrier to enclose area if dust could be generated.

Negative Air Requirements:

- The use of negative air must be designed to remove contaminants from the work area.
- Negative air devices must remain operational at all times and in place for a period after completion of dust creating activities to remove contaminants from the work area and before removal of critical barriers.

HVAC systems:

- Upon removal of critical barriers, remove isolation of HVAC system in areas where work is being performed.
- Verify that HVAC systems are clean and operational.
- Verify the HVAC systems meets original airflow and air exchange design specifications.

Additional Infection Prevention Requirements:

INFECTION PREVENTION REQUIREMENTS – EXTERIOR

Prior to and During Construction:	<ul style="list-style-type: none"> • Identify and confirm fugitive fume and dust control measures are in place prior to work starting i.e., charcoal filters at air intakes, scrubbers on equipment etc. • Contractor must submit an excavation and trenching plan for review and implementation. • Install fencing, physical barriers and interior/exterior signage to re-direct pedestrian and vehicular traffic as necessary. • If locally required, validate soil survey was performed to identify potential contaminants (e.g., valley fever, radon, legionellosis, etc.). • Ensure that fugitive dust control measures are adhered to (e.g., work area is kept wet). • Validate those fumes created by equipment and material is controlled. <ul style="list-style-type: none"> o If required, install charcoal filters on air intake to building. o Maintain equipment exhaust scrubbers if working near sensitive areas or near air-intake o Minimize equipment idling • Validate barriers restricting access and signage into construction work areas are maintained.
Upon Completion of Work:	<ul style="list-style-type: none"> • Ensure all control measures are removed at completion of project.
	Additional Infection Prevention Requirements:

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PURPOSE

This document represents the minimum best practice standards to prevent the acquisition of nosocomial infection in patients due to exposure to potentially infectious or harmful dust created by construction, renovation, or maintenance activities.

Aspergillus fungal spores carried on dust particles are the most common cause of construction-related infection in healthcare settings. Overall mortality from healthcare construction and renovation-related fungal infection is 50%. Infection due to construction in healthcare facilities is estimated to cause 5,000 deaths each year in the United States.

The Project Manager, Infection Prevention, and Environmental Health & Safety will audit performance to this standard, as amended by the needs of specific projects. All users of this standard are authorized to contact EH&S directly with questions or for consultation.

SETTING

All work has been evaluated by IP and EH&S and received an Infection Control Risk Assessment (ICRA) permit for construction, remodeling, maintenance, or repair activities at the University of California, Davis Health (UCDH) facilities. This includes external construction and work at leased facilities where owner-provided contractors are used. Work in non-patient care areas such as the School of Medicine and medical research facilities may be excluded.

This standard does not apply to projects coming in contact with hazardous materials, such as asbestos, lead, chemical, or radioactive materials. Projects involving hazardous materials must undergo additional assessment and approval processes. If hazardous materials are discovered during work, immediately contact UCDH Environmental Health & Safety (EH&S) and Infection Prevention (IP) for additional risk assessment.

DEFINITIONS

Anteroom – a small room connected to the entrance of the negative pressure containment, used for donning/doffing protective clothing and adding a layer of insulation between the containment and hospital environment; required on Class IV and V containments.

Audit – an official review to confirm containment inspections are being completed appropriately and/or assess contractor performance. EH&S or IP conducts audits.

Containment – a system of barriers and/or negative pressure equipment that isolates the construction zone air space from the adjacent hospital environment.

Containment Inspector – may perform any of the inspections listed in the “Inspection Criteria” section listed on Page 15 & 16, except for the initial containment inspection (aka “Pre-start”). Containment inspectors must be trained annually.

Critical Barrier – barrier sealed over critical openings into the work area such as HVAC vents, doorways, electrical outlets, gaps in a drop in ceilings, or other openings.

DOP test – filter challenge test; a standard recognized method to test the integrity of a HEPA filter using dispersed oil particulate (DOP) and particle counting techniques which a specialty contractor performs.

HEPA filter – High-Efficiency Particulate Air (HEPA) filter removes 99.97% of particles 0.3 micrometers and is even more efficient for particles of other sizes.

Immunocompromised – having a weakened immune response due to an infection, disease, or immunosuppressive agents such as medication or irradiation.

Infection Control Risk Assessment (ICRA) – a process that evaluates patient risk due to construction activities focused on reducing the risk of infection; based on a matrix of the affected patient population and the invasiveness of the work. This assessment generates a permit issued by Infection Prevention requiring compliance with one of five precaution levels (classes). See UCDH Hospital Policy and Procedure 2004.

Inspection – examination of the containment to confirm it meets the permit requirements.

In writing – written, hard copy, or electronic communications. Electronic communications must be retained in the same manner as hard-copy documents.

Manometer – electronic pressure measuring instrument sensitive to measuring one-thousandth of an inch of water pressure (e.g., -0.020” wp).

Negative pressure – pressure within a system that is less than the environment that surrounds that system; having atmospheric pressure that is less than the ambient atmospheric pressure—examples: vacuum flask (thermos) interstitial space, airborne infectious agent isolation room.

Nonporous – free from minute spaces or holes (pores) where contamination may be trapped; smooth.

Nosocomial Infection – hospital-acquired infection; infection contracted from the environment, staff, or operations of a healthcare facility.

Particle Counting – method of determining ambient particulate concentrations of various sized airborne particles using a laser diode and photodetector; not specific to the nature of the sampled particle.

Poly – polyethylene sheeting; plastic film sheeting used to contain contamination.

Positive pressure – pressure within a system that is greater than the environment that surrounds that system; having atmospheric pressure that is greater than the ambient atmospheric pressure. Example: inside of an inflated balloon or tire. Patient Care Area – a location where patient care is provided, not limited to direct treatment, and can include waiting rooms, lobbies, food service areas, and other places throughout the facility where patients may be present. Infection risks are elevated in these locations as immuno-compromised patients are concentrated.

RESPONSIBILITIES

All parties to this standard must primarily act in the best interests of patients and patient care, regardless of the impact on project timelines or other constraints.

PROJECT MANAGER

The Project Manager (PM) is the Facilities Planning and Development (FP&D) or Plant Operations and Maintenance (PO&M) representative overseeing project execution. The PM oversees the Contractor or in-house personnel who are performing the work. A third-party construction manager may supplement the PM's duties, but the UCDH PM retains all responsibility under this best practice standard.

The project manager shall ensure the following:

- All work is performed under an approved ICRA
- An Interim Life Safety Measure (ILSM) plan is created, if necessary
- Coordination with work area stakeholders regarding the potential impacts on patient care, including the containment location, project duration, and any changes during construction
- This best practice document is followed throughout the duration of the project
- A qualified consultant is hired for projects (as determined by agreement between FP&D and EH&S) and for projects that take place after hours or on weekends
- Plans and specifications (bidding documents) are developed per this best practice standard
- Containment inspectors and consultants perform to this best practice standard
- Contractor expectations are communicated in writing before the start of work
- The Contractor must comply with plan specifications and approved ICRA permit precautions.
- Routine containment inspections are performed and documented by a trained, qualified containment inspector
- Project documentation is maintained
- Containment failures or severe breaches of practice are communicated to EH&S and IP in writing as soon as possible
- Root causes of failures are determined, and corrective action is taken to prevent future episodes

- Work is stopped for excessive noise/vibration, breach of containment, non-compliance with this best practice standard, or other patient care is compromised by the work
- Environmental Services (EVS) is contacted for a terminal cleaning of the project area after a successful final inspection and containment dismantlement

CONTRACTOR

The Contractor is responsible for complying with all provisions of plans, specifications, and approved ICRA permit precautions to control construction dust at the project site. These provisions include witnessed DOP testing of all HEPA-filtered equipment.

The Contractor shall ensure that all site workers, including subcontractors, are knowledgeable of the requirements of plans, specifications, and approved ICRA permit precautions and the reasons for controlling construction dust. The Contractor is required to stop work at times of excessive noise or vibration when containment is breached when this standard is not being complied with, and when directed by the PM, EH&S, or IP.

CONTAINMENT INSPECTORS

Containment inspectors may perform any of the inspections listed in the “Inspection Criteria” section listed on Page 15 & 16, except for the initial containment inspection (aka “Pre-start”). Containment inspectors must be trained on an annual basis by EH&S, IP, or a qualified consultant and report to the PM.

ENVIRONMENTAL HEALTH AND SAFETY

Environmental Health and Safety (EH&S) is responsible for providing consulting services related to this best practice standard, auditing containment inspector and consultant performance, and updating these best practices document.

EH&S is responsible for ensuring either EH&S or the consultant performs the following:

- Witness and/or confirm DOP testing of HEPA-filtered equipment [or perform particle count challenge testing in rare cases]
- Complete site inspections according to this best practice standard (must perform the pre-start inspection and approve of the containment design)
- Audits of contractor performance, including particle counting
- Training of containment inspectors
- Environmental sampling, as needed
- Investigation of containment failures
- Stop work for excessive noise/vibration, breach of containment, non-compliance with this best practice standard, or other patient care is compromised
- Along with IP, approve any deviations to this best practice standard

INFECTION PREVENTION

The Department of Hospital Epidemiology and Infection Prevention (IP) is involved in many facets of the control and prevention of nosocomial infections at UC Davis Health System, including infections from construction dust. The IP Department reviews and approves Infection Control Risk Assessments (ICRAs) of construction projects; along with EH&S, approves temporary deviations to this best practice standard to support unique scenarios; and approves this best practice standard document. IP may audit compliance with this Standard and have the authority to stop work for: excessive noise/vibration, breach of containment, non-compliance with this standard, or other project issues compromising patient care.

Infection Prevention is responsible for performing:

- Site inspection audits according to this best practice standard
- Audits of contractor performance
- Training of containment inspectors
- Investigation of containment failures
- Stop work for excessive noise/vibration, breach of containment, non-compliance with this best practice standard, or other patient care is compromised

ALONG WITH EH&S, APPROVE ANY DEVIATIONS TO THIS BEST PRACTICE STANDARD ENVIRONMENTAL SERVICES

Environmental services (EVS) personnel perform terminal cleaning of project areas once containments have been removed (per UCDH Hospital Policy and Procedure). The PM must provide a 24-hour notification to EVS that terminal cleaning will be needed, in addition to notification when the containment is removed. Note that containment removal cannot occur until the Contractor has completed a full cleaning of the containment, and the final visual inspection has passed. EVS personnel also occasionally perform final clean inspections for some work.

CONSULTANTS

Consultants retained by FP&D or PO&M provide project scoping, planning, specification, and work plan development, project monitoring compliance with this standard, and inspection services. EH&S shall approve consultants based on education, training, and experience before beginning billable work. Consultants may only use qualified employees trained and experienced with infection prevention and construction dust control in a hospital setting. Consultants shall be directed by the PM and shall communicate with EH&S and the PM.

POLICY

All work that has received an ICRA Class III*, IV, or V permit must be completed using a negative pressure containment system to separate the construction air space from the hospital environment. This system comprises an enclosed work area and HEPA-equipped filtration units providing negative pressure to the work area. The following policies shall apply to all personnel working with negative pressure containments at UCDH facilities.

TRAINING

All personnel working with negative pressure containments shall be trained and knowledgeable in the following:

- ICRA Permit contents and requirements
- Site-Specific Containment plan
- Provisions of this best practice standard
- Requirements in Section 01561 Airborne Contaminant Control Specifications
- Infection risks associated with construction
- Methods to control the dissemination of dust and fungal spores
- Proper use of protective clothing
- Proper entry and exit procedures
- Manufacturer's requirements, where manufactured containment systems are used (e.g., cubes)
- How to respond to a loss of negative pressure or too much negative pressure
- Breach in Practice response and required notifications
- Contractors shall be additionally trained in the following:
 - Proper containment design, construction, and maintenance techniques
 - Proper load-out techniques for equipment/wastes
 - Containment cleaning regime: daily, final, and terminal cleaning

CONTAINMENT FAILURE EMERGENCIES CAUSED BY THE CONTRACTOR MAY REQUIRE RETRAINING AT THE DISCRETION OF THE PM, IP, OR EH&S. TRAINING IS TO BE PROVIDED BY EH&S, OR AN EH&S-APPROVED TRAINING PROVIDER, SUCH AS A CONSULTANT. EXPERIENCE

Contractors, consultants, and containment inspectors shall demonstrate the following experience requirements before performing duties under this standard.

CONTRACTORS

To be considered qualified to work with negative pressure containments, contractors must demonstrate experience by providing either of the following:

- Previously completed, documented negative pressure containment work in a healthcare facility along with an owner reference. Minimum documentation shall include project descriptions and photographs or containment schematics.
- Documentation that the contractors' proposed onsite Foreman and onsite Supervisor has successfully obtained one of the following from the American Society for Healthcare Engineering (ASHE):
 - Certified Healthcare Constructor (CHC) Certification;
 - Health Care Construction (HCC) Certificate; or
 - Managing Infection Prevention During the Construction & Operation of Health Care Facilities Course Completion

CONSULTANTS

To be considered qualified to work with negative pressure containments, consultants must demonstrate all the following:

- Hands-on oversight by a Certified Industrial Hygienist (CIH) in good standing with the American Board of Industrial Hygiene (ABIH)
- Field personnel shall be experienced in Healthcare Construction Infection Prevention and shall possess certification in good standing by Cal/OSHA as a California Certified Asbestos Consultant (CAC) or Certified Site Surveillance Technician (CSST)
- Owner references for previously completed, documented negative pressure containment oversight work in healthcare facilities

CONTAINMENT INSPECTORS

Containment inspectors may be trained in-house UCDH personnel or outside, third-party consultants. Approval shall include ensuring familiarity with the following:

- The operation, maintenance, and inspection of HEPA-filtered equipment
- Methods to achieve and maintain negative pressure in containments
- Methods to monitor negative pressure
- Inspection elements and documentation requirements

In-house containment inspectors may only inspect containments that do not require negative pressure. All negative pressure containments shall be inspected by a third-party consultant.

Requests for exemption: PMs may place a request to use trained-in house personnel, rather than third party consultants, during the weekly ICRA committee meeting.

EQUIPMENT

Equipment used for construction containments must arrive free and clean of any debris or significant dust. Equipment that cannot be thoroughly decontaminated must arrive wrapped in 6 mil (0.006 inches) polyethylene sheeting, be used only within negative pressure containment, be wrapped before transport out of the containment, and be transported offsite in a covered cart.

All polyethylene sheeting shall be flame retardant and at least six mils thick. Waste bags shall be six mils thick.

All HEPA-filtered equipment must be tested before being utilized to ensure the integrity of the filter and housing. The equipment will be tested onsite by standard dispersed oil particulate (DOP) challenge testing using a certified independent testing contractor. In rare cases or emergencies, EH&S or an approved consultant may perform onsite particle challenge testing of HEPA-filtered equipment. A legible label indicating the date tested, testing party, and expiration date must be affixed to the equipment for it to be considered compliant with this best practice standard.

Both DOP and particle tests shall be valid for six months from the date of initial testing, provided the Contractor certifies and can verify that the machines have remained at the same building with the

same filters in place since initial testing and have not been moved, modified, inverted, or roughly handled in that time. Previously tested equipment removed from the building shall be tested before being reutilized onsite.

PROCEDURE

Best practice procedures must be used wherever possible when working with negative pressure containment systems.

WORK PRACTICES

To minimize the creation of airborne dust, capture and control dust as close to the source of generation as possible. Use water mist, HEPA vacuums, vacuum tool attachments, and/or other methods to prevent the spread of dust within the containment.

Clean as you go and clean up promptly. Vacuum up dust as it is generated. Vacuum out exposed cavities as soon as they are made accessible. The Contractor shall perform daily cleaning of the containment interior by HEPA, vacuuming any noticeable dust, and bagging up debris. Do not leave debris in an unoccupied containment.

The Contractor shall inspect the containment before starting work and immediately repair any breaches, holes, or other issues.

Stop work and notify the PM immediately if unforeseen hazardous materials (including mold) are discovered during construction. This condition will warrant a reassessment of the project by IP and EH&S.

Use only tested, HEPA filter-equipped vacuums. Do not use standard shop vacuums; all vacuums without HEPA filters are dust distributors.

Avoid dry sweeping, dry shoveling, or other dry debris cleanups. Use a water mist or sweeping compound before sweeping or shoveling debris. Do not use compressed air on dust or debris. In occupied areas, provide an effective means of diffusing the air exhausted from HEPA-filtered negative air machines.

PROTECTIVE CLOTHING

Class IV and V containments require protective clothing, including shoe covers. The purpose of this clothing is to protect street clothing from becoming contaminated during work and prevent the track out of dust.

Shoe covers may be attached to protective suits or may be worn separately. Head coverings are not required unless dust creation is expected to be extensive, as in the case of abrasive blasting or concrete coring, or head exposure is likely, as in the case of attic crawling. Protective clothing may be disposable (e.g., Tyvek suits) or reusable and regularly laundered.

Note that disposable suits are not typically fire-resistant and, therefore, not intended for hot work environments. If fire-resistive clothing is necessary, it must be brought onsite in a sealed bag, used only within containment, and re-bagged and sealed before offsite transport.

DECONTAMINATION

To avoid tracking construction dust in the hospital environment, workers and equipment must be carefully decontaminated before exiting the containment.

PERSONNEL

For exceptionally dusty work, before removing protective clothing, clean the outside surface using a HEPA equipped vacuum or damp towel/sponge frequently rinsed in clean water. Do not use disinfectants to wipe skin or protective clothing to avoid chemical hazards.

If respiratory protection is used, remove protective clothing before removing the respirator. When removing protective clothing, roll the suit outwards and down the body such that the exterior side is rolled into itself and only the clean side of the suit is exposed. Only touch the inside (clean side) of the suit.

Step out of the suit and discard it into a waste bag for disposal or a plastic bag for laundering. If shoe covers are not attached to the suit, remove them by rolling the dirty side onto itself.

Step onto the tack mat several times to remove fugitive dust before stepping onto the flooring outside the work area. Note: The sticky mat is not intended to clean the bottom of the booties. They are designed to clean the bottom of the work boots/shoes after removing booties or full-body coveralls.

When working in semi-restricted or restricted areas, put on clean protective clothing before entering the semi-restricted or restricted area located outside the negative pressure containment.

Wash face, hands, and any exposed skin surfaces as soon as possible upon exiting containment. A wash station near the work area may be required for dusty work.

EQUIPMENT & WASTES

Decontaminate the exterior surface of all bagged waste, tools, or construction materials before the exit of the containment by wet wiping. Tools or materials that cannot be exposed to water may be thoroughly HEPA vacuumed before removal.

Contaminated construction materials, tools, or other reusable items contaminated with dirt or debris must be wrapped in 6 mil plastic sheeting or bags any time they are outside the containment and before covered cart transport. Insides of transport carts shall be maintained free and clean of dust and debris.

Nonporous/smooth and cleanable containers with a hard lid must be used to transport trash and debris from the construction areas. Before leaving the contained work area, these containers must be damp-wiped, cleaned, and free of visible dust/debris. Open carts or plastic-covered carts are unacceptable.

CONTAINMENT DESIGN & CONSTRUCTION

Containment is the primary engineering control to prevent patient exposure to contamination. Proper containment design and construction are necessary for proper function. The following sections are related to whole, negative pressure containments; alternative containment strategies are presented in the next section.

LOCATION

Nurse management must approve the containment location and configuration in patient care areas. Containment location concerning emergency egress must be reported to UCDH Fire Marshal's Office. An Interim Life Safety Measure (ILSM) plan may be required.

MATERIALS

Temporary containments in non-fire-rated locations lasting less than 30 days may be constructed of fire-rated polyethylene sheeting (at least six mil in thickness) that meets the standards specified by the UCDH Fire Marshal's Office. The polyethylene used for critical barriers and sealing walls, floors, or ceiling systems shall be a minimum of 6 mil thickness and fire-retardant type listed by Fire Underwriters Laboratories, Griffolyn #T55R with Griffolyn fire retardant tape, or equal, (no known equal).

Only approved one-hour fire-rated temporary containment systems that meet ASTM E84, Class A requirements for smoke and fire for fire-rated assemblies/enclosures shall be used. Only approved fire damper systems used to control smoke/fire in a fire-rated containment assembly shall be used.

Containments to remain in place for more than 30 days, those requiring additional security or those designed to control highly dusty environments, as in the case of abrasive blasting or concrete coring, shall be constructed of rigid, airtight materials, such as drywall and metal wall framing. A hard-sided containment with a lockable door shall be used when there are concerns about security or safety from unauthorized entry, especially if the containment will be left unattended for extended amounts of time.

Avoid creating tape damage on existing finish materials.

CONSTRUCTION

Locate the HEPA-filtered negative pressure unit as far away from the containment entrance (or other location of makeup air) as possible and duct the exhaust outdoors whenever feasible. Distancing the negative pressure unit from the source of makeup air helps to ensure complete and effective scrubbing of the contained airspace. Locating the unit too near the entrance can allow pockets of contamination to exist within the contained zone. At least four air changes per hour must be always provided within the negative pressure containment, which can be determined by the number of HEPA-filtered negative air unit scrubbers operating cubic feet per minute and the volume of the containment. All sources of air infiltration into the work zone must be sealed off before erecting containment barriers. These critical barriers include those over HVAC supply and return registers, electrical outlets, gaps in the drop-in ceilings, doorways not being used, etc.

All existing surfaces within the containment which are not to be disturbed during construction must be covered with polyethylene sheeting unless they are nonporous, smooth, and accessible for cleaning. Where floors are likely to be damaged by the construction activities, durable flooring (e.g., Plywood, Masonite) shall be installed over two layers of plastic sheeting.

Locate tack mats outside of the containment exit when possible. Otherwise, locate tack mats on the floor, just inside the containment exit. An additional tack mat may be useful for incredibly dusty projects. Expose a new tack sheet when tack mats are no longer sticky and again at the end of each shift. The use of wetted carpet mats is not acceptable.

When required, a manometer displaying the current containment pressure must be installed in an accessible location near the containment entrance.

NEGATIVE PRESSURE REQUIREMENTS

Negative pressure containments shall be a minimum of -0.020 inches of water column or less (-0.021, -0.022, -0.023....) relative to the adjacent, uncontained space. Exceptions to this requirement may be allowed by IP and will be listed on the ICRA permit. Demonstrate negative pressure is achieved continuously (24/7) through an electronic manometer sensitive to measure down to -0.020” wp. The manometer shall be capable of measuring the water pressure down to at least -0.001” in-WC. Inclined manometers using a liquid water solution and non-digital air pressure gauges are unacceptable since they do not meet the sensitivity of measuring -0.001” WC.

Zero pressure or positive pressure is unacceptable and must be responded to immediately. Locate and repair holes or breaches in the exterior containment system with tape. Secure zip poles if they have fallen. Close the entry door by zipping lower or closing the flaps and securing it. A pressure too negative (-0.060 inches of water column or less) can cause the containment to collapse inwards. To relieve too negative pressure, turn down the negative air machines, if possible, and increase the size of the containment door openings.

Manometer Reading	Why it’s a problem	Response Options
Positive Pressure (+0.001 and greater)	Active contaminant ejection	This is an emergency. Call Project Manager ASAP!
No pressure (0.000)	Possible contaminant migration	Close zipper doors, Check and repair breaches, Ensure correct operation of negative air machines, and Call Project Manager.
Too Negative (-0.060 and less)	Could collapse containment	Lift the zipper on the containment and anteroom door

ALTERNATIVE CONTAINMENT STRATEGIES

A full negative pressure enclosure is not always possible or warranted. Work may be completed using alternative containment strategies such as those listed below. IP may approve other alternative containment strategies on a case-by-case basis.

MOBILE CONTAINMENTS, AKA “CUBES”

Cubes are manufactured containment systems that are erected on a mobile platform. Examples are pictured on the following page. If they are used for Class III or IV work, they must conform to all Class III or IV ICRA permit requirements, including negative pressure, cleaning, inspection, required postings, etc.

Cubes are not typically inspected at the same frequency as fixed containments as the work is often of short duration and may occur in several locations throughout a single day.

The containment inspector shall conduct periodic, unannounced audits of cube work to ensure compliance with the ICRA and this best practice standard. Inspect cube operations two times or more for each ICRA permit issued. Projects longer than two weeks shall be audited at least twice per month. Where failures are located, corrective action must be taken immediately.



“GLOVE” BAGS OR BOXES & HEPA SHROUDS

Small projects may be accomplished by containing the work only - and not the workers. Glove bags, boxes, and HEPA shrouds can be used to complete work that disturbs small areas. Some examples of these systems are pictured on the following page.



EXAMPLES HEPA SHROUDED SYSTEMS



Projects commonly completed using these systems include drilling small penetrations, cutting in for wire receptacles, and placing backing plates for hanging objects from the wall. Because the containment cannot be posted, display the required postings (including the ICRA permit) in the work area.

Before first use, the design and construction of these types of containments shall be approved by IP and EH&S.

The glove bag or box should be composed of a sturdy frame enclosed in polyethylene or a transparent, sturdy material (e.g., plastic panel). Do not use corrugated materials, as they tend to collect and retain dust. A tested HEPA vacuum is used to maintain negative pressure within the glove bag/box. The bag/box must be cleaned before detachment. The negative pressure may be verified by observing the bowing of the bag/box sides, using visible smoke, tissue paper, or other means approved by EH&S.

Work utilizing these types of containments is typically very short in duration; therefore, inspections differ from those performed in fixed containments. Further, because these types of systems heavily rely on the work practices used, contractors must be strictly monitored, especially at the beginning of a project.

The containment inspector shall conduct periodic, unannounced audits of the work to ensure compliance with the ICRA permit and this best practice standard. Where failures are located, corrective action must be taken immediately, and EH&S must be notified immediately.

DEHUMIDIFICATION

Dry-out efforts using dehumidifiers are allowed if completed within 72 hours of initial wetting and are approved by EH&S and/or IP. If the duration of the wetting is unknown, additional measures must be performed to ensure no mold growth has occurred – consult with EH&S.

Dehumidification may only be used in clean water or steam condensate intrusion cases. Materials wetted by contaminated, black, or grey water require measures beyond dehumidification, ideally removal and replacement.

Dehumidification of voids such as wall or ceiling cavities must be done as a closed loop such that the space does not become positively pressured relative to patient care areas.

POSTINGS

All the following postings must be posted as soon as containment is constructed and thus maintained in the work area of a Class I-V permitted project:

- Copy of ICRA Permit
- Copy of Interim Life Safety Measure (ILSM) Permit
- Containment Inspection Log (See Appendix A)
- Entry Warning Sign with Project Manager Contact (See Appendix B)
- Building Permit (when required)

CLEANING PROCEDURES

Once all work has been completed within containment, use the following procedures to perform a final cleaning. Final cleaning must be verified and signed off by the containment inspector before removing the containment.

- Change into a clean disposable suit or clean clothing.
- Carefully HEPA Vacuum all surfaces. Use an appropriate attachment to ensure all large dust is removed. Vacuum slowly and pay special attention to cracks and crevices where dust may have accumulated.
- Prepare a measured solution of a UCDH-approved EPA-listed disinfectant (see UCDH Hospital Policy and Procedure 2111) and use it according to the instructions on the label.
- Using clean towels or sponges, wipe all surfaces with disinfectants. If visible dust accumulates on the applicator, wipe again until no residue is detected. Frequently change to clean applicators.
- Leave the surface wet and allow it to air dry. Do not wipe the surface dry.
- Remove the top floor layer, if present, and HEPA vacuum and wipe down the bottom floor layer.
- Call for a final visual inspection. The inspection will not be performed until the containment is dry.
- If the containment does not pass inspection, the entire containment must be re-cleaned using the steps outlined above before re-inspection.
- When containment passes inspection, remove the components, retain the documents for the project manager, and contact EVS for terminal cleaning of the project area.

DOCUMENTATION

The project manager shall retain all the following documents related to the containment:

- Copy of ICRA permit
- Containment Inspection Log (see Appendix A) and any Manometer Logs
- Copies of HEPA equipment certification
- Records of sampling conducted, if any
- Findings from project audits

- Documents should be retained until the project is completed and occupancy has been granted.

CONTAINMENT VERIFICATION

Periodic particle counting is recommended and may be required to ensure exhausted air meets the HEPA rating and ambient air near the project is not excessively loaded with particles, compared to baseline measurements collected before construction or measurements collected in areas deemed currently acceptable. Particle counters should be set up to log the collected data, and all sampling records must be provided to the project manager and EH&S.

INSPECTION CRITERIA

Inspections are required: at the initial containment setup to verify proper construction each day to ensure proper operation once all demolition has been completed, whenever an ICRA reclassification is requested, and when all work has been completed, and the containment has been cleaned. The requirements of each of these types of inspections follow.

INITIAL CONTAINMENT INSPECTION (AKA "PRE-START")

To ensure the containment is sufficient before the start of work, EH&S or the consultant shall check for the following and sign off on the posted "inspection documentation form" with their name and the date and time the pre-start inspection passed.

- ILSM permit conditions are met (if applicable)
- All equipment is free and clear of dust/debris or arrives wrapped in poly
- A hard lid-covered cart is available for waste transport
- HEPA-filtered equipment has passed inspection and is not expired
- Protective clothing is available
- HVAC is sealed off in the work area, and other critical barriers are in place
- Containment is complete (no holes/gaps) and structurally sound
- Negative pressure exhaust is located as far from containment entry as possible
- Nonporous, non-cleanable surfaces not in the scope are covered in poly
- Fixtures outside of the scope of work are covered or removed
- Where floor damage may occur, durable floor protection is in place
- Installed manometer displays sufficient negative pressure
- Negative pressure exhaust is diffused/not directing high-velocity air onto occupants
- All required postings are in place

INSPECTIONS WHILE WORKING

Containment inspections shall be performed twice per workday. Once at the beginning of the work shift, prior to work starting. Once at the end of the work shift, before closing up shop for the day. For projects of extended length when work activity is not being performed, including on weekends or holidays, and if the work area had a comprehensive surface cleaning and received a passing visual inspection by a qualified containment inspector or third-party environmental consultant, the daily inspections are not required. At a minimum, ICRA inspections shall be made weekly for containments on projects of extended non-work activity. Containment checks shall include the following. The containment inspector shall note observations on the “Containment Inspection Form” (see Appendix A) attached to the containment.

- ILSM permit conditions are met (if applicable)
- Containment remains complete (no holes/gaps/tears) and structurally sound
- No unauthorized personnel are inside
- All required postings are in place
- No changes to the location of the HEPA exhaust
- The Tack mat is present and usable
- No signs of track out are observed
- Installed manometer displays sufficient negative pressure
- Containment is generally clean
- Covered carts with hard lids are being used to transport equipment and wastes
- All ICRA permit conditions are met

IN-PROGRESS INSPECTIONS (AKA “POST-DEMO”)

To ensure completion of the demolition phase of projects, the containment inspector shall verify the following conditions and sign off on the containment documentation form with their name and the date and time the inspection was completed.

- All wetted or hazardous materials have been removed entirely (May require using infrared cameras and/or moisture meters to verify remaining materials are dry).
- The demolition scope is complete
- No hazardous materials have been discovered
- Containment is clean, and waste has been removed

ICRA CLASS CHANGE (AKA “ICRA DOWNGRADE”)

At times, with the approval of IP, construction work may begin under ICRA Permit Class III, IV, or V and become reclassified to a lower ICRA Class once significant dust-producing activities have ceased. An inspection must take place before the downgrade to ensure that the dust-producing work is complete, the Class III or IV containment is clean, and the IP requirements of the ICRA permit downgrade are met. The containment must meet the criteria for a “final visual inspection” (see next section), except for all construction efforts being complete.

FINAL INSPECTION BEFORE DISMANTLEMENT (AKA “FINAL VISUAL”)

Once the construction is complete, a containment inspector shall verify the following and document a passing final inspection by signing the inspection log form attached to the containment, including the date and time the inspection passed. Before dismantling the containment, the Contractor shall collect all posted paperwork, including any manometer tapes, and deliver it to the Project Manager, who is responsible for contacting EVS for the terminal cleaning.

- All construction efforts are completed
- No tools, equipment, or personal belongings are present (clean ladder excepted)
- No debris or waste present
- The Tack mat is clean
- Containment is “white glove” clean – no visible dust can be wiped from any surface

The table below provides guidance for inspections needed during each phase of work.

*For projects impacting hazardous materials, all inspections except the “daily inspection” need to be completed by a third-party consultant.

	Initial Visual Inspection	Daily Inspection	Post-Demo	ICRA Class Change	Final Visual	Weekly Inspection
Projects with containment – including negative pressure and/or critical barriers	X	X	If demo done	If the ICRA class changes, such as a request for downgrade.	X	
Cube projects	At least once with first use of cube	Ad hoc (at least 2x per permit and 2x per month for longer projects)	If demo done	N/A	At least once, with completion of the use of cube	
Glove box projects	N/A	Ad hoc	N/A	N/A	N/A	
Inactive Projects	N/A	N/A	N/A	N/A		containments on projects of extended non-work activity

REFERENCES

The following sources were used to gather information for this policy.

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APPENDIX A: CONTAINMENT INSPECTION LOG

APPENDIX B: ENTRY WARNING SIGN WITH PROJECT MANAGER CONTACT

CONSTRUCTION NOTICE

**Under Construction
Do Not Enter**

**En Construcción
No Entrar**

FP&D Project Number and Name:

Project Contacts:

UCDH Project Manager

Name: _____

Phone: _____

Email: _____

Site Superintendent

Name: _____

Company: _____

Phone: _____

Email: _____

Construction Manager

Name: _____

Company: _____

Phone: _____

Email: _____



SECTION 01 56 20**REQUIREMENTS FOR CEILING ACCESS TO SPACES CONTAINING ASBESTOS****PART I - GENERAL****1.01 SECTION INCLUDES**

- A. This section outlines policy and procedures for access to ceiling spaces containing or suspected of containing asbestos fireproofing, thermal insulation, or other asbestos containing material.
- B. Work that may disturb asbestos but is not intended to result in intentional asbestos removal shall be controlled in accordance with this section, as well as Cal/OSHA requirements for Class III asbestos work contained in California Code of Regulations, Title 8, Section 1529. Moving ceiling tiles or horizontal hatches to access ceiling spaces with asbestos fire proofing or containing debris from asbestos thermal insulation is Class III asbestos work. The University Representative may approve modifications to these procedures. This section outlines minimum requirements. Controls that exceed these requirements may be used.

PART II - Not applicable to this section**PART III - EXECUTION****3.01 Training**

- A. Personnel performing work in spaces containing or suspected of containing asbestos material shall have training which meets the requirements of Cal/OSHA Class III asbestos work that is specific to the work task to be completed. This training shall adhere to requirements as set forth in 40 CFR 763.92(a)(2).

3.02 Competent Person

- A. During work in asbestos contaminated attic spaces, an asbestos Competent Person, as defined by 8 CCR 1529, shall be present at all times to oversee safe access and control measures. A Competent Person shall inspect the area to assure the controlled work area is properly established, and to determine that appropriate cleanup has occurred at the end of the work task. The Competent Person shall adhere to all requirements within their area of responsibility outlined in 8 CCR 1529.

3.03 Standard Access/Egress Procedures from Mini-Enclosure

- A. Access into an attic space with asbestos shall be completed using a manufactured mini-enclosure, or an equivalent enclosure constructed on site. Use of a small HEPA filtered negative air unit attached or integrated with the mini-enclosure to create negative pressure in the enclosure is required. A HEPA filtered vacuum shall be present and available for use in the mini-enclosure. The mini-enclosure must be posted with the asbestos warning sign in accordance with Cal/OSHA Title 8 CCR 8 1529. Access into the enclosure must be restricted to trained personnel, who are required to wear full body coveralls and a respirator approved for asbestos. A sticky mat shall be present immediately outside of the mini-enclosure. Any debris generated by work activity must be cleaned up using a HEPA vacuum and wet wiping techniques. All mini-enclosures and HEPA vacuums must be re-certified by a third-party using DOP testing every 6 months.

- B. Disposable full body coveralls are required in all ICRA Class III and IV containment areas dealing with asbestos or presumed asbestos and shall be selected to provide protection of street clothes from particulates generated inside of the containment area. All work inside a mini enclosure for asbestos related work is considered ICRA Class III or IV. Disposable coveralls shall be changed if they become ripped and are no longer serviceable.
- C. Proper use of the disposable coveralls and use of the sticky mat shall be followed at all times for all workers and University employees, when it is required by the ICRA Permit. At no time shall workers leave the mini enclosure wearing soiled disposable coveralls and booties. At times, in select areas requiring sterile environments, it may be necessary to change from soiled disposable clothing into clean disposable clothing before exiting containment. Coveralls and booties are to be removed inside the mini-enclosure and placed into a labeled, secured, plastic asbestos waste bag before leaving the mini-enclosure.

3.04 Air Sampling

- A. Air sampling is required per 8 CCR 1529 to assess asbestos exposures when the project requires workers to enter the attic space if there is a reasonable possibility that the permissible exposure limit (PEL) may be exceeded. The air sampling frequency shall be sufficient to assess all work activities in the mini-enclosure and in the attic space and may include both 30-minute Excursion sample periods and longer sampling periods.

3.05 Debris Clean-up

- A. All debris inside of the mini-enclosure shall be cleaned up promptly by HEPA vacuuming and wet wiping techniques and before each time the mini-enclosure is moved. These techniques of minimizing asbestos fiber migration are outlined in 8 CCR 1529 and are to be strictly adhered to.

3.06 Personal Protective Equipment

- A. All personnel entering the attic space with known or presumed asbestos containing materials shall wear full body disposable coveralls (e.g., Tyvek, Kleenguard or equivalent) and at a minimum, a half face, tight fitting, elastomeric respirator with HEPA (P-100) filter cartridges for asbestos protection (or a respirator offering greater protection). The individual wearing this respirator must have been fit tested, trained and had medical clearance, pursuant to 8 CCR 5144.

3.07 Entering ceiling spaces where asbestos fire proofing (contaminated with assumed or visible asbestos debris) is present (e.g., when personnel must enter the space and "crawl" in the attic space, but asbestos will likely not be disturbed).

- A. Control of disturbance of asbestos debris during work inside of an attic space shall be followed in all cases, by using a HEPA vacuum to clean-up visible suspect asbestos containing debris in the immediate area of access and work. If practical, vacuum visible debris for the full path of travel. If this is not practical, use other procedures to ensure safe removal of visible debris in the path of travel that would be disturbed by the crawl. For example, wet paper towels and plastic bags may be used to pick up and contain visible debris. The top surface of the attic access panel shall be cleaned of all dust and debris using a wet paper towel before the access hatch panel is allowed to swing down into the suspended position. Other control methods may be used provided they meet the following criteria:
 - a. dry sweeping is not permitted
 - b. employees must not walk on, crawl on or otherwise crush visible suspect asbestos containing debris
 - c. the control method must not result in a release of airborne fibers.

- B. If the coverall tears or rips during the work activity, repair or replacement is required. Use duct tape to repair tears or rips to the coverall if feasible or exit and replace the coverall. Remove and bag coverall in mini-enclosure as in ceiling access procedure. If coveralls were torn, vacuum any noticeable debris from underlying clothing. Use two disposable coveralls to minimize contamination of street clothes when tearing is likely or when crawling on rough surfaces.

3.08 HEPA Filter Challenge Testing and Certification

- A. All HEPA filtered equipment (including negative air units and vacuums) used must have passed onsite DOP testing within the last 6 months and must be re-certified after filter replacement or if moved offsite, including to another University building.

3.09 Access for Inspection after Ceiling Tile has been Removed

- A. Inspection above the ceiling, after a ceiling tile has been moved using a mini-enclosure containment, may be performed with asbestos awareness training. Access of this type is limited to visual inspection through the ceiling opening. Full entry to the space or ceiling crawl must meet the other requirements of this section. Personnel who perform this work must be notified that asbestos is present in the area and which materials in the area contain asbestos.

3.10 Asbestos Waste Management

- A. Personnel are required to appropriately bag all asbestos debris, disposable personal protective equipment, and other materials potentially contaminated with asbestos. Bags shall be clear, 6 mil, imprinted with the required asbestos warning label. Appropriate packaging includes double-bagging and wetting the materials in the inner bag. Each bag shall be legibly marked with (Site address and Generator Number will change with each project site location) The Generator is UC Davis Health EPA ID No. CAD076124981. The Generator address is 2315 Stockton Blvd., FSSB 2500, Sacramento, CA 95817.
- B. For those projects generating five (5) or fewer bags of asbestos-contaminated materials, University Environmental Health and Safety (EH&S) will manage the disposal of the bags; contact EH&S at 916-734-2740 for disposal with at least one week's notice of the intent to dispose. Materials must be bagged and marked as described above prior to EH&S' acceptance.
- C. Asbestos disposal is the responsibility of the **[Contractor][CM/Contractor][Design-Builder]** on those projects generating more than five (5) bags of asbestos-contaminated material. If a Uniform Hazardous Waste Manifest is required for transportation, such manifest must be signed by a representative of the University EH&S. Contact EH&S with at least one week's notice of the intent to dispose.

END OF SECTION 01 56 20

SECTION 01 61 00

PRODUCT REQUIREMENTS

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Product Options
- B. Product Substitutions
- C. Product Transportation and Handling Requirements
- D. Product Storage and Protection
- E. Product System Completeness

1.02 RELATED SECTIONS

- A. Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- B. Section 013900 - GREEN BUILDING POLICY IMPLEMENTATION
- C. Section 014100 – REGULATORY REQUIREMENTS
- D. Section 014500 – QUALITY CONTROL

1.03 PRODUCTS

- A. Product Selection: Provide products that comply with Contract Documents, are undamaged and unused at installation. Contractor/Design-Builder should consider products included in the attached Vizient supplier list where appropriate. UC Health is a partner member of Vizient, Inc. and has access to discounted prices for University projects. Vizient participates in the design review and submittal review process to advise UC Davis Health on potential savings based on product selection.
- B. Product Completeness: Provide products complete with all accessories, trim, finish, safety guards and other devices needed for complete installation and for intended use and effect.
- C. Products: Items purchased for incorporation in Work, whether purchased for project or taken from previously purchased stock; this includes materials, equipment, assemblies, fabrications and systems.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model designation indicated in the manufacturer's published product data.
 - 2. Materials: Products that are shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed or installed to form part of the Work.
 - 3. Equipment: A product with operating parts, whether motorized or manually operated, requiring connections such as wiring or piping.

- D. Specific Product requirements: Refer to requirements of Section 014500 – QUALITY CONTROL and other Sections in Division 2 through 49 for specific requirements for products.
- E. Code Compliance: All products, other than commodity products prescribed by Code, shall have current listing service report or research report. Minimum Requirements: Specified requirements are minimum requirements.
- F. Interchangeability: To fullest extent possible, provide products of the same kind from single source. Products supplied in quantity shall be same product and interchangeable throughout the Work. When options are specified for selection of any of two (2) or more products, product selected shall be compatible with products previously selected.
- G. Nameplates: Except for required labels and operating data, do not attach manufacturer's name plates or trademarks on surfaces exposed to view in occupied spaces or on the exterior of building.
- H. Equipment Nameplates: Provide permanent nameplate on each item or service-connected or power-operated equipment. Locate on inconspicuous accessible surface. Nameplate shall contain the following information and essential operating data:
 - 1. Name of product and manufacturer
 - 2. Model and serial number
 - 3. Capacity and Speed
 - 4. Ratings and other pertinent information
- I. Listing Service: Products, for which listing service standards have been established and for which their service label is available, shall bear the appropriate listing service label.

1.04 PRODUCT OPTIONS

- A. Products Specified Only by Description: Where the Contract Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the appropriate characteristics and otherwise complies with the requirements.
- B. Performance Specification: Where Contract Specifications require compliance with performance requirements, provide products that comply and are recommended for application. Manufacturer's recommendations may be contained in Product literature, or by certification of performance.
- C. Compliance with Standards: Where Contract Specifications require compliance with a standard, select a product that complies with the standard specified.
 - 1. Wherever catalog numbers and specific brands or trade names followed by the designation "to match existing" are used in conjunction with product(s) required by the Contract Specification, no substitution will be considered.

- D. Products Specified by Naming One (1) or More Manufacturers:
1. Specified manufacturer(s): Provide specified product(s) of the specified manufacturer. Wherever more than one (1) manufacturer's product is specified, the first-named product is the basis for the design used in the Work and the use of alternative-named products or substitutes may require modifications in that design. If such alternatives are proposed by **[Contractor]** and are approved by University, **[Contractor]** shall assume all costs required to make necessary revisions and modifications to the design, including additional costs to University for evaluation of revisions and modifications of the design resulting from the substitutions submitted by **[Contractor]**.
 - a. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or equal" supporting data for second manufacturer's product, if proposed by **[Contractor]**, shall be submitted in accordance with the requirements for substitution.
 2. Quality Standard: Products(s) of the specified manufacturer shall serve as standard by which the product(s) of other named manufacturers are evaluated.
- E. "Or Equal" Provision: Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by Contract Specification to establish standard of quality, utility, and appearance required.
1. "Or Equal" Products: Equivalent products of manufacturers other than the specified manufacturer may be provided if determined by University's Representative to be acceptable in accordance with substitution provisions following:
 - a. **[Contractor]** shall submit to University's Representative, within thirty-five (35) calendar days after the date of commencement of the Work specified in the Notice to Proceed, a list in excel format containing Specification Section number with extension i.e. 088000 2.B.1.a. with descriptions of each product proposed for substitution.
 - b. **[Contractor]** shall provide supporting data as required herein.
 - c. University will evaluate **Contractor's** proposal. The decision of University shall be final.
 - d. University will accept, in writing, proposed substitutions that are in University's opinion equal in quality, utility and appearance to the product specified. Such acceptance does not relieve **[Contractor]** from complying with requirement of the Contract Documents.

- e. **[Contractor]** shall be responsible for all costs of any changes resulting for **Contractor's** proposed substitutions that affect other work, or the Work of Separate **[Contractor]**.
 - f. Failure to place orders for specified products sufficiently in advance of required date for incorporation into the Work will not be considered justification for **[Contractor]** to request a substitution or deviation from requirements of the Contract Documents. The sixty (60) calendar day submittal period does not excuse **[Contractor]** from completing the Work within the Contract Time.
- 2. **Contractor's Determination:** Prior to submitting "or equal" product(s) for consideration, **[Contractor]** shall review and determine product(s) meet or exceed the quality and warranty provisions of the specified product.
 - 3. **Late Substitution Requests:** If a request for substitution occurs after the sixty (60) calendar day period, the substitution may be reviewed at the discretion of University and the costs of such review, as approved by University, shall be deducted from the Contract Sum.
 - a. **Product Availability Waiver:** Substitutions will be considered after the sixty (60) calendar day period only when a product becomes unavailable due to no fault of the **[Contractor]**.
- F. **Visual Matching:** Where Contract Specifications require matching a sample, University's decision on proposed product match is final. If no product matches and complies with other requirements, comply with provisions for "substitutions" for selection of a matching product in another category.
- G. **Visual Selection:** Where requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product that complies with other requirements. University's Representative will select color, pattern and texture from the product line selected.

1.05 SUBSTITUTIONS

- A. **Substitutions:** Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the **[Contractor]** after award of the Contract shall be considered "substitutions". The following are not considered substitutions:
- 1. Revisions to Contract Documents requested by University's Representative or University's Consultant.
 - 2. Specified options of products and construction methods included in Contract Documents.
 - 3. Compliance with governing regulations and orders issued by governing authorities.

- B. Substitution Provisions: Requests for Substitutions will only be considered if **[Contractor]** submits the following data:
1. Furnish complete technical data including drawings, performance specifications, samples, test reports and any additional information required by University's Representative, for each product proposed for substitution.
 - a. Submit ONE (1) PDF file with bookmarks.
 - b. In reviewing supporting data for substitution, University will use, for purpose of comparison, all characteristics of Basis of Design specified product as it appears in manufacturer's published data even though all characteristics may not have been particularly mentioned in the Contract Specifications. If more than two (2) substitutions of supporting data are required, University's costs of reviewing additional supporting data will be deducted from the Contract Sum.
 - c. Submit statement indicating substitution's effect on the Construction Schedule, if any.
 - d. Submit cost information, including proposal of net deduction, if any, from Contract Sum.
 2. Furnish statement by **[Contractor]** that proposed substitution is in full compliance with requirements of Contract Documents and Applicable Codes.
 3. Provide a Comparison Table as part of the substitution request listing the design and performance criteria of the Basis of Design specified product with the proposed substitution product side by side. The design and performance criteria shall include but not limited to; size, thickness, gauge, strength, function, ASTM rating, test report data, manufacturing association standards & data, technical properties & performance data, traffic or weather resistance, quality assurance data, warranty and other design and performance criteria list in Basis of Design manufactures specification and written material.
 4. Furnish list of Subcontractors, if any, that may be affected by the substitution.
 5. If proposed substitution requires portions of the Work to be redesigned or removed in order to accommodate substituted product, submit design and engineering calculations prepared by the licensed design professional of record.
 6. Contract Document Revisions: Should **[Contractor]** proposed or alternate sequence or method of construction require revision of Contract Documents, including revisions for purpose of determining feasibility, scope or cost, or revisions for the purpose of obtaining approval by governing authorities having jurisdiction, revisions will be made by University's Consultant who is the design professional of record.
 - a. Services of University's Consultants, including time spent in researching and reporting on proposed substitutions or alternate sequences and methods of construction, shall be paid by **[Contractor]** when such activities are considered additional services to the design services contracts of University.

- b. Cost of services by University's Consultants shall be paid on a time and material basis, based on current hourly fee schedules, with reproduction, long distance telephone and shipping costs reimbursable. Such fees shall be paid whether or not the proposed substitution or alternate sequence or method of construction is ultimately accepted by University and Change Order executed. Such fees owed shall be deducted from the Contract sum on the next Application for Payment.
7. Submit all proposed substitutions in writing to University using the Request for Substitution form provided at the back of this Section.
- C. University may reject any substitution not proposed as described above and presented within the time prescribed.
 - D. Revisions to submittals: If University's Representative, in reviewing list of substitutions, requires revisions or corrections to previously accepted Shop Drawings and supplemental supporting data, **[Contractor]** shall promptly do so. If any proposed substitution is judged by University's Representative to be unacceptable, the specified product shall be provided at no cost to the University.
 - E. Samples: Samples may be required. Tests required by University's Representative for determination of quality and utility shall be made by **Contractor** 's independent testing Laboratory, at expense of **[Contractor]** with prior University acceptance of test procedure.

1.06 TRANSPORTATION, DELIVERY AND HANDLING

- A. Transport products by methods to avoid product damage.
- B. Schedule delivery to minimize long-term storage and prevent overcrowding construction spaces. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
- C. Deliver products in undamaged condition in manufacturer's original sealed container or packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
- D. Provide equipment and personnel to handle products by methods to prevent soiling, marring or other damage.
- E. Promptly inspect products on delivery to ensure products comply with Contract Documents, quantities are correct, and to ensure products are undamaged and properly protected. Promptly remove damaged or defective products from site and replace at no adjustment to the Contract Sum and/or Contract Time.

1.07 STORAGE AND PROTECTION

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
- B. Store products to facilitate inspection and measurement of quantity or counting of units.
- C. Store heavy materials away from structures in a manner that will not endanger supporting construction.

- D. Store sensitive products in weather-tight enclosures. Store products subject to damage by the elements above ground, under cover in a weather-tight enclosure, with ventilation adequate to prevent condensation.
1. Maintain temperature and humidity within range required by manufacturer's instructions.
 2. Exterior Storage:
 - a. Store products above ground on blocking or skids to prevent soiling, staining and damage.
 - b. Cover products that are subject to damage by the elements with impervious protective sheet coverings. Provide adequate ventilation to prevent condensation.
 - c. Store sand, rock, aggregate or other loose granular material in well-drained area on solid surfaces. Prevent mixing with foreign matter.
 3. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged and maintained under required conditions, free from damage and deterioration.
- E. Protection After Installation: Provide barriers, substantial coverings, notices and other materials or methods as necessary to protect installed work from traffic, subsequent construction operations and weather.
1. Maintain temperature and humidity conditions in interior spaces for Work in accordance with manufacturers' instructions for materials and equipment being protected.
 2. Remove protective measures when no longer required and prior to Acceptance of the Work.

1.08 SYSTEM COMPLETENESS

- A. The Contract Drawings and Contract Specification are not intended to be comprehensive directions on how to produce the Work. Rather, the Drawings and Specifications are instruments of service prepared to describe the design intent for the completed Work.
- B. It is intended that equipment, systems and assemblies be complete and fully functional even though not fully described. Provide all products and operations necessary to achieve the design intent described in the Contract Documents.
- C. **[Contractor]** is urged to report to University's Representative immediately when elements essential to proper execution of the Work are discovered to be missing or misdescribed in the Contract Documents or if the design intent is unclear.

- D. Should an essential element be discovered as missing or misdescribed prior to receipt of bids or establishing a negotiated Contract Sum, an Addendum or Clarification will be issued so that all cost may be accounted in the Contract Sum.
- E. Should an obvious omission or misdescription of a necessary element be discovered and reported after execution of the Agreement, **[Contractor]** shall provide the element as though fully and correctly described.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 INSTALLATION OF PRODUCTS

- A. Comply with manufacturer's instructions and recommendations for installation of products.
- B. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect to ensure freedom from damage and deterioration at time of Substantial Completion.

3.02 Refer to the following Attachment:

- A. Request for Substitution Form.

END OF SECTION 01 61 00

REQUEST FOR SUBSTITUTION

Substitution #: _____ **Submittal #:** _____ **Date:** _____

Project#: _____ **HCAI#:** _____

PROJECT NAME: _____

TO: UC DAVIS HEALTH Facilities Design & Construction 4800 2ND Avenue, Suite 3010 Sacramento, CA95817 P: 916-734-7024 Attn.: (Project Manager's Email Address)	FROM: _____ _____ _____ _____ _____
---	--

Name of Party Submitting Request for Substitution: _____

Reason for Submitting Request for Submission: _____

Specification Section and Paragraph #: _____

Substitution Manufacturer name and address: _____

Proposed substitution (trade name of product, model or catalog #): _____

Fabricators and Suppliers (as appropriate): _____

PRODUCT DATA: ATTACH PRODUCT DATA AS SPECIFIED IN SPECIFICATION SECTION 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Similar projects using product (list dates of installation and names/phone numbers of Owners): _____ _____ _____ Similar comparison of proposed substitution with specified product (indicate variation(s), and reference each variation to appropriate Specification Section paragraphs): -ATTACH COMPARISON SUMMARY-
--

(SUBSTITUTION REQUEST CONTINUES)

Quality and performance comparison between proposed substitution and specified product:

Availability of maintenance services and replacement materials: _____

Effect of proposed substitution on Construction Schedule: _____

Effect of proposed substitution on other work or products: _____

SECTION 01 72 00

PREPARATION

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Surveying and Field Engineering Services

1.02 RELATED SECTIONS

- A. Section 014500 – QUALITY CONTROL
- B. Section 017800- CLOSEOUT SUBMITTALS

1.03 REGISTRATION REQUIREMENT

- A. **Contractor** shall employ civil engineers/land surveyors, which are registered and licensed in the state of California and acceptable to the University.

1.04 LINE AND GRADES

- A. **Contractor** shall provide all construction survey work required for accurate location of the Work. Horizontal and vertical control for the Work shall be from project reference marks as shown on Contract Drawings. University's decision will be final in all questions regarding proper location of work.
- B. **Contractor** shall verify final configuration of project during demolition work. Minor adjustments of work to accommodate existing field conditions shall be responsibility of **Contractor**.
- C. For work that connects to existing structures with new floors or roofs that align with existing conditions; **Contractor** shall verify new and existing elevations prior to constructing the new floor or roof structure. Adjust elevations accordingly so that the new and existing floors are level and lineup.
 - 1. University approval in writing is required for any deviations from the contract documents intent.
- D. Replace control points that may be lost or destroyed, base requirements on original survey control, at no increase in the Contract Sum.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 INSPECTION

- A. Verify locations of survey control points prior to starting work. Promptly notify University's Representative of any discrepancies discovered.

3.02 SURVEY REFERENCE POINTS

- A. Protect survey control points prior to starting site work; preserve permanent reference points during construction. Make no changes without prior written notice to University's Representative.
- B. Promptly report loss or destruction of any reference point or relocation required to University's Representative. Replace dislocated survey points based on original survey control.
- C. All control points established for the project must be clearly shown on the record documents.

3.03 SURVEY REQUIREMENTS

- A. Establish minimum of three (3) permanent benchmarks on site, referenced to establish control points. Record locations, with horizontal and vertical data, on Project Record Documents.
- B. Establish lines and levels, locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements, including pavements, stakes for grading, fill and topsoil placement, utility locations, slopes and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations and ground floor elevations.
 - 4. Controlling lines and levels required for mechanical and electrical work.
 - 5. Verify layouts as Work proceeds to assure compliance with required lines, levels and tolerances.
- C. Periodically certify layouts by same means.

3.04 RECORDS

- A. Maintain complete and accurate log of all control and survey work as it progresses Including but not limited to items indicated in 3.03, B. and 3.04, B.
- B. On completion of foundation walls, underground utilities and major site improvements, prepare certified survey showing all dimensions, locations, angles and elevations of construction. Provide as part of the As-Built Documents per Section 017800.

END OF SECTION 01 72 00

SECTION 01 73 00

CUTTING AND PATCHING

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching Work.
- B. Hazardous Conditions Permit requirements for brazing, welding and other hot work.

1.02 RELATED SECTIONS

- A. Section 011100 – SUMMARY OF THE WORK
- B. Section 013100 – COORDINATION
- C. Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- D. Section 015610 – AIRBORNE CONTAMINANTS CONTROL
- E. Section 016100 – PRODUCT REQUIREMENTS
- F. Individual Specifications Sections.
 - 1. Cutting and patching incidental to Work specified in this Section.
 - 2. Coordination with work in other Sections for openings required to accommodate Work specified in those other Sections.

1.03 SUBMITTALS

- A. **[Contractor]** shall complete and submit for review to University's Representative, a Coring/Sawcutting Form, included at the end of this Section, and obtain written authorization for University prior to the commencement of any dig activities. **[Contractor]** shall include all pertinent information with the Coring/Sawcutting Form and submit with detailed work plan fourteen (14) calendar days prior to desired coring/cutting activity.
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather-exposed or moisture-resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of University.
 - 6. Utility supply, drains, fire alarm, communication.

- B. Include in request:
1. Identification of Project, including University's Project Name and Project Number.
 2. Location and description of affected Work.
 3. Necessity for cutting and patching.
 4. Description of proposed work, and products to be used.
 5. Alternatives to cutting and patching.
 6. Effect on work of University.
 7. Written permission of University.
 8. Date and time work will be executed.

1.04 NOTIFICATIONS

- A. Before starting welding or cutting work involving the use of gas or electric welding equipment, or any brazing work involving gas or electric brazing equipment **[Contractor]** shall complete the online Hazardous Conditions Permit form at <https://health.ucdavis.edu/fire/>. **[Contractor]** shall allow seventy-two (72) Hours for Fire Marshal's approval and issuance of Hazardous Conditions Permit. This permit will be issued without cost to **[Contractor]** and may be applicable to more than one (1) building. **[Contractor]** shall be responsible for reporting to Fire Department either by telephone or in person at beginning and end of each day's work. Provide minimum written notice of fourteen (14) calendar days prior to such activities.
1. Welding and brazing personnel must be certified by a University or HCAI approved laboratory and must maintain this certification during the work of this Contract.
 2. **[Contractor]** is responsible for notifying University of all apparent locations where suspect asbestos containing materials may be present or discovered during the course of the project such as cement pipes or other insulated material, which may be a result of newly excavated materials below grade or after building systems are opened such as within wall, ceiling or subfloor spaces. When any such location is discovered by **[Contractor]** information relating thereto shall be immediately communicated to University's Representative.
 3. Where welding and cutting activity is required and suspect painted surfaces are present that will be impacted by the welding or cutting activity, the contractor shall request from the University's Representative information regarding laboratory analysis for lead or other hazardous metals in the painted metal components before any cutting or welding is performed. The contractor shall refer to Section 013500 Special Procedures, 1.05 Hazardous Materials Procedures regarding materials impacted by welding and cutting activity.
 4. **[Contractor]** shall then follow any and all instructions as indicated by University's Representative.

PART II - PRODUCTS

2.01 MATERIALS

- A. Product substitution: For any proposed change in materials, submit request for substitution under provision of SECTION 016100 – PRODUCT REQUIREMENTS. Use only materials for cutting, fitting, and patching which comply with the applicable Specification Sections, and which match adjacent materials. Use materials whose installed performance will equal or surpass that of existing materials.

PART III - EXECUTION

3.01 EXAMINATION

- A. General: Execute cutting, fitting and patching including excavation and fill, to complete Work and:
 - 1. Fit the several parts together, to integrate with other work.
 - 2. Uncover work to install ill-timed work.
 - 3. Remove and replace defective and non-conforming work.
 - 4. Remove samples of installed work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical work.
- B. Examination, General: Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
 - 1. After uncovering existing Work, inspect conditions affecting proper accomplishment of Work.
 - 2. Beginning of cutting or patching shall be interpreted to mean that existing conditions were found acceptable by [**Contractor**].
- C. Ground Penetrating Radar: Determine by Ground Penetrating Radar all existing reinforcing, conduit and piping located in concrete walls and slabs prior to demolition. Clearly mark all locations and review with University Representative prior to demolition.

3.02 PREPARATION

- A. Temporary Supports: Provide supports to assure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Weather Protection: Provide protection from elements in all areas that may be exposed by uncovering work. Maintain excavations free of water.
- C. Protection. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- D. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas. Do not block required exit ways or stairs.

- E. Protect rated floor, wall and ceiling assemblies. Prior to cutting opening in a rated assemblies review with University's Representative and get written approval form the Fire Marshal.

3.03 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching to properly complete Work.
- B. Coordinate installation or application of products for integrated Work.
- C. Uncover completed Work as necessary to install or apply products out of sequence.
- D. Remove and replace defective or non-conforming Work.
- E. Provide openings in the Work for penetrations of mechanical and electrical Work.
- F. Provide cutting and patching to accommodate all demolition work as part of this contract. Provide level and plumb cuts at locations that will be exposed or to provide smooth and even surface for patching to existing work or surfaces.
- G. Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

3.04 PERFORMANCE

- A. Execute cutting and patching by methods to avoid damage to adjoining Work, and that will provide appropriate surfaces to receive final finishing.
- B. Execute cutting and patching of weather-exposed, moisture-resistant and sight-exposed surfaces by methods to preserve weather, moisture and visual integrity.
- C. Restore work with new Products as specified in individual Sections of Contract Documents.
- D. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not allowed without prior approval from University. Coordinate timing of all sawing and cutting work with the University's Representative. Do not over saw cut corners and intersection unless written authorization is provided from the University Representative and the Structural Engineer of Record.
- E. Fit work neat and tight allowing for expansion and contraction. Butt new finishes to existing exposed structure, pipes, ducts, conduit, and other penetrations through surfaces.
- F. At penetrations of firewalls, partitions, ceiling, or floor construction, completely seal voids with UL approved fire-rated assembly. Provide temporary closures at the end of each workday. Closures shall be approved by the University Fire Marshal.
- G. Refinish surface to match adjacent finish. For continuous surfaces, refinish to nearest intersection, corner or natural break and from floor to ceiling. For an assembly, refinish unit. All patched surfaces from new to existing shall provide a smooth and even transitions aligning with the adjacent surface with no visible marks, joints, seams, sheen, texture or color difference.

- H. Where new construction is to join with or match existing work, it shall be finished exactly to that work so as to form a complete unified and finished element.

 - I. Visual Requirements: Do not cut and patch operating elements or related components in a manner that would, in the University's Representative's opinion, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace construction cut and patched in a visually unsatisfactory manner, including by not limited to.
 - 1. Repair and patch in areas where finishes have been visually disturbed by cutting and patching to the nearest intersections.
 - 2. Processed concrete finishes
 - 3. Firestopping
 - 4. Acoustical ceilings
 - 5. Flooring
 - 6. Carpeting
- 3.05 Refer to the Following Attachment
- A. Coring/Sawcutting Notification

END OF SECTION 01 73 00

CORING/SAWCUTTING NOTIFICATION

LOCATION: _____ PROJECT#: _____
TITLE: _____

TRACKING NUMBER: _____
(Provided by PO&M)

HCAI #: _____ DATE: _____

TO: Facilities Design & Construction UC Davis Health 4800 2nd Avenue, Suite 3010 Sacramento, CA 95817 P: 916-734-7024 <u>(calubawy@health.ucdavis.edu)</u>	FROM: _____
--	--------------------

SCOPE: _____

HAS USA BEEN NOTIFIED? YES NO *When?* _____

ARE ALL KNOWN UTILITIES MARKED? YES NO *By Whom?* _____

LOCATION OF WORK SHOWN ON ATTACHED SITE PLANS? YES NO *Purpose:* _____

DATE(S) CORING OR SAWCUTTING WILL TAKE PLACE: _____ Signed: _____

<u>UC DAVIS HEALTH USE ONLY</u>	
DATE RECEIVED: _____	
WHO FROM UNIVERSITY WILL AUTHORIZE, SUPERVISE AND VERIFY? PHONE: _____	
Utilities Verified by IOR? <input type="checkbox"/> YES <input type="checkbox"/> NO	
Activities coordinated with: <input type="checkbox"/> PO&M <input type="checkbox"/> Fire <input type="checkbox"/> Telecom <input type="checkbox"/> Occ. Safety <input type="checkbox"/> Other (Itemize): _____	
COMMENTS: Signed: _____ DATE AUTHORIZED: _____ University Representative PO&M: _____	
COMPLETION DATE: _____	
COMMENTS: (Unknown Utilities Encountered, Disruptions, Successes, Weather, etc.)	
SIGNED: _____	
Copies to: University Consultants, PO&M, Fire, Telecom, File, Others:	

SECTION 01 74 00

CLEANING

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Construction Cleaning.
- B. Requirements for cleaning during progress of Work, at Substantial Completion of Work and at Acceptance of Work.
- C. Disposal of waste materials, debris and rubbish during construction.

1.02 RELATED SECTIONS

- A. General Conditions of the Contract: Cleanup.
- B. Additional Requirements: Cleaning for specific products or elements of Work are described in Specification Sections describing that Work.
- C. Section 015610 Airborne Contaminants Control have procedures and practices that shall be implemented and followed by the Contractor for this project.
- D. Section 013900 Green Building Policy Implementation: Waste Management Program

PART II - PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning agents and materials that will not create hazards to health or property and that will not damage surfaces.
- B. Use only those cleaning agents, materials and methods recommended by manufacturer of the material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning agent manufacturer.

2.02 EQUIPMENT

- A. Provide covered containers for deposit of waste materials, debris, and rubbish.
- B. Provide at each entry point to the Work, and at other areas as directed by University's Representative, a clean room sticky mat. Replace mats daily or as requested by University Representative.

PART III - EXECUTION

3.01 CLEANING

- A. Construction Cleaning: During Construction, maintain buildings, premises and property free from waste materials and rubbish. Dispose of such waste and debris at reasonable intervals off of University property.
1. Maintain areas under Contractor's control free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
 2. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to closing such spaces.
 - a. All horizontal surfaces above ceilings shall be cleaned prior to ceiling closer.
 3. After every concrete placement clean all wet concrete from all surfaces.
 - a. Interior and exterior
 4. Clean interior areas daily to provide suitable conditions for Work. Remove debris from areas of work on a daily basis at a minimum, or more often as required to provide suitable conditions for work.
 5. Broom clean with sweeping compound or HEPA Vacuum interior areas prior to start of surface finishing, and continue cleaning on an as needed basis.
 6. Control cleaning operations so that dust and other particles will not adhere to wet or newly coated surfaces.
 7. Provide a mat, as specified above, for project entrances and exits. Item to be of sufficient size to allow personnel exiting project site to clean debris and dust from shoes. Tracking dust and debris through working areas of hospital and/or related buildings is not acceptable.
 8. Any dust or debris tracked out of the construction site, either by foot traffic or by debris hauling vehicles shall be cleaned by the contractor. If the dirt or other debris is determined by the University's Representative to be from the contractor's activities at the jobsite it shall be cleaned in a timely manner regardless of how far from the site it is.
- B. Conduct cleaning and disposal operations in compliance with Waste Management Program per 013900 and all applicable codes, ordinances, regulations, including anti-pollution laws.

3.02 SUBSTANTIAL COMPLETION CLEANING

- A. Execute a thorough cleaning prior to Substantial Completion review by University's Representative.

- B. At roof areas remove all unused materials and construction waste including but not limited to screws, nails, fasteners, sheet metal cuttings, scrapes, oil, grease and adhesive. Wash down roof horizontal and vertical surfaces. Clean out all debris at roof drains.
- C. Clean walkways, driveways and streets by thorough brooming and wash-down.
- D. Clear debris from storm drainage lines and ways, leaving site ready for stormy weather.
- E. Rake landscaped areas clean.
- F. Remove waste and surplus materials, rubbish and temporary construction facilities, utilities and controls.
- G. Disinfect containment and protection areas as directed by University Representative.
- H. For Airborne Contamination areas: Construction cleaning use wet cleaning methods and HEPA-filtered vacuum cleaners are required to minimize release of airborne contaminants. Contain waste materials, debris and rubbish.

3.03 FINAL COMPLETION CLEANING

- A. Complete final cleaning before submitting final Application for Payment.
- B. Employ professional building cleaners to thoroughly clean building immediately prior to final inspection.
- C. Remove the following but not limited to concrete splatters, paint splatters, pencil marks, pen marks, chalkline marks, tape, protective films & coatings, grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from all sight-exposed interior and exterior surfaces.
- D. Restore damaged or marred surfaces.
- E. Remove dust from all horizontal surfaces not exposed to view, including light fixtures, ledges and fixture lenses.
- F. Clean and polish all glass, mirrors, and bright metal work. Clean and disinfect all plumbing fixtures.
- G. Damp wash all resilient flooring. Waxing of resilient flooring shall be done by the University.
- H. Thoroughly sweep all floors and vacuum all carpets.
- I. Cleaning of Work provided by University under separate contracts, will not be required except if soiled by construction activities under this Contract.
- J. Thoroughly clean and polish all resilient flooring, metal and plastic surfaces; remove labels and protective coatings.
- K. Replace filters and clean heating and ventilating equipment used for temporary heat and ventilation.

- L. Remove waste material or equipment that has been damaged, touch up and /or repair exposed areas; such repairs to be approved by University's Representative.
- M. Should final cleaning be inadequate, as determined by University's Representative, and Contractor fails to correct conditions, University's Representative may order thorough cleaning and deduct the cost from Final Payment.

3.04 FINAL COMPLETION SITE CLEANING

- A. Broom clean exterior paved surfaces. Rake clean other surfaces of the grounds.
- B. Power Wash, Hose down and scrub where necessary all concrete and walks dirtied as a result of the construction work. Thoroughly remove mortar droppings from all walks and pavements.
- C. Remove from the site all tools, equipment, construction waste, unused materials, excess earth, and all debris resulting from the Work.

3.05 DISPOSAL

- A. Conduct cleaning and disposal operations in compliance with all applicable codes, ordinances, regulations, including anti-pollution laws.
- B. Do not bury or burn rubbish or waste material on University premises.
- C. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
- D. Remove waste materials, debris, and rubbish from site and dispose of off-site.

3.06 INSPECTION

- A. Prior to Beneficial Occupancy, Substantial Completion or Final Completion; Contractor and University's Representative shall jointly conduct an inspection of sight-exposed interior and exterior surfaces to verify that entire Work is clean.

END OF SECTION 01 74 00

SECTION 01 75 00
STARTING AND ADJUSTING SYSTEMS

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Procedures for Starting Systems

1.02 RELATED SECTIONS

- A. Section 018100 – PLUMBING/HVAC TESTING PROCEDURES
- B. Section 018200 – DEMONSTRATION AND TRAINING
- C. Section 019100 - COMMISSIONING
- D. Division 22
- E. Division 23
- F. Division 25
- G. Division 26
- H. Division 27

1.03 SUBMITTAL REQUIREMENTS

- A. Submit preliminary schedule listing times and dates for start-up of each item of equipment in sequence in writing, minimum of ninety (90) calendar days prior to any start-up.
 - 1. Start up, testing and Commissioning of equipment shall be integrated and coordinated with the contract schedule.
 - a. Adjustments will be made as project progresses, but the sequencing will be maintained.
- B. Submit manufacturer's representative reports within one (1) week after start-up, listing satisfactory start-up dates.
- C. Provide information, manufacturer and model number of all testing equipment to be used and current certification that the testing equipment has been calibrated within the last 6 months.
- D. Maintain log with dates and results of Starting and Adjustments, and provide electronic copy to University's Representative.

1.04 PROJECT CONDITIONS

- A. Building enclosure shall be complete and weather-tight.
- B. Excess packing and shipping bolts shall be removed.
- C. Interdependent systems shall have been checked and made operational.
- D. Permanent Power is connected and operational to the building.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 INSPECTION

- A. Verify Project conditions comply with requirements for start-up.
- B. Verify status of Work meets requirements for starting equipment and systems.

3.02 PREPARATION

- A. Coordination: Coordinate sequence for start-up of various item of equipment.
- B. Notification: Notify University in writing, minimum of fourteen (14) calendar days prior to start-up of each item of equipment.
- C. **Contractor** Quality Assurance Manager shall take the lead role for Starting and Adjusting the equipment; coordinate and work with the University's Representative and Inspectors throughout the entire process.
 - 1. Coordinate all start-up with the Commissioning Agent for the project.
- D. Information on hand: Have Contract Documents, shop drawings, product data, and operation and maintenance data at hand during entire start-up process.
- E. Verify each piece of equipment is anchored correctly per the manufacturer's requirements and the Contract Documents prior to energizing or starting.
- F. Verify each piece of equipment is connected to the correct power source, the breaker and conductors are the correct size. Overcurrent protection in place and required shut offs adjacent to the equipment are in place.
- G. Verify each piece of equipment has been checked for proper lubrication, drive rotation, belt tension, control sequence, and other conditions that may cause damage prior to energizing or starting.
- H. Verify control systems are fully operational in automatic mode.
- I. Manufacturer's Criteria: Verify tests, meter readings and specific electrical characteristics agree with electrical equipment manufacturers' criteria.

- J. Bearings: Inspect for cleanliness: clean and remove foreign matter, verify alignment. Take corrective action as required.
- K. Drives: Inspect for tension on belt drives, adjustment of vari-pitch sheaves and drives, alignment, proper equipment speed, and cleanliness. Take corrective action as required. Verify shaft grounding protection is in place.
- L. Motors: Verify motor amperage agrees with nameplate value. Inspect for conditions that produce excessive current flow and that exist due to equipment malfunction. Take corrective action as required. Verify shaft grounding protection is in place.

3.03 STARTING SYSTEMS

- A. Execute start-up under supervision of responsible **Contractor** personnel.
- B. Place equipment in operation in proper sequence in accordance with sequencing schedule and the contract schedule.
- C. Follow manufacturer's requirements and recommendations for Starting and Adjusting, including any University requirements that may be listed in the Contract and Construction Documents.
- D. Equipment manufacturers representatives shall be on site for Starting and Adjusting that equipment.
- E. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- F. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- G. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 01 75 00

SECTION 01 76 00

PROTECTION of EXISTING and INSTALLED CONSTRUCTION

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Protection for Products Including University Provided Products, After Installation.
- B. Protection of Existing Utilities, Interference and Underground Structures.
- C. Protection of Existing Structures and Work adjacent to new construction and demolition.

1.02 RELATED SECTIONS

- A. Section 013100 – COORDINATION
- B. Section 013900 – GREEN BUILDING POLICY IMPLEMENTATION
- C. Section 015100 – TEMPORARY UTILITIES

1.03 EXISTING UTILITIES

- A. Known Utilities: Known existing utilities are shown on Contract Drawings in approximate locations. **Contractor** shall exercise care in avoiding damage to existing facilities. **Contractor** shall be responsible for repair of same if damaged through **Contractor's** action. Hand excavation shall be utilized when digging in close proximity to existing utilities. University does not guarantee that all utilities or obstructions are shown, or that locations indicated are accurate.
- B. As part of the Contract Work the investigation and excavation to locate existing utilities and underground structures shall be as follows, Contractor shall assume the existing known utility is within a 5 feet zone on either side of the location indicated on the Contract Documents. If the existing known utility is not located within a 5 feet zone on either side of the location indicated on the Contract Documents, the Contractor shall immediately notify the Universities Representative. The Contractor shall continue excavating until the existing utility is located. The Contractor shall be compensated for any additional excavation beyond the 5 feet zone on either side of the existing utility per 1.03D.
- C. Electrical Equipment: No work shall be performed on energized electrical equipment unless scheduled with University's Representative. University reserves right to specify specific conditions for all work involving energized high voltage electrical equipment and its scheduled modification proposal.

- D. Uncovering Facilities: Prior to any earthwork for new construction, **Contractor** shall uncover all existing piping where crossings, interferences or connections are shown on Contract Drawings, from one (1) foot below proposed construction limit to the existing ground surface. Any variation in actual elevations and indicated elevations shall be brought to University's Representative attention. If **Contractor** does not expose all existing utilities, **Contractor** shall not be entitled to additional compensation for work necessary to avoid unknown interferences.
- E. Interferences: If interferences occur at locations other than general locations shown on Contract Drawings, and such utilities are damaged before such locations have been established, or create an interference, **Contractor** shall immediately notify the University's Representative and a method for correcting said interference shall be supplied by the University. Payment for additional work due to interferences not shown on Contract Drawings shall be in accordance with the General Conditions of the Contract. Cost of repair to damaged utilities shall be deducted from the Contract Sum.
- F. Accuracy of Drawings: Drawings showing location of equipment, piping, etc. are diagrammatic and job conditions will not always permit installations in locations shown. When a conflict situation occurs, immediately bring to attention of University's Representative for determination of relocation.
- G. Deviations from Drawings: Information shown relative to existing power and signal service is based upon available records and data but shall be regarded as approximate only. Minor deviations found necessary to conform with actual locations and conditions shall be made at no change to the Contract Sum.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 PROTECTION AFTER INSTALLATION

- A. Installed Equipment and Materials: Adequately protect all installed equipment and materials until completion and acceptance by University's Representative.
- B. Existing Facilities: All existing areas, improvements and facilities shall be protected from damage of any type resulting from operations, equipment or workers of **Contractor** during the construction process.
- C. Subsequent Operations: Protect installed products and control traffic in immediate area to prevent damage from subsequent operations.
- D. Traffic Areas: Provide protective coverings at walls, projections, corners, and jambs, sills, and soffits of openings in and adjacent to traffic areas.
- E. Elevators: Cover walls and floors of elevator cabs, and jambs of cab doors, when elevators are used by construction personnel. Protect the elevator call buttons, switches, communication devices, lights, thresholds and other components.
- F. Moisture and Humidity Protection: Protect all new installed work and existing work per the manufacturer's requirements from moisture or humidity damage including but not limited to stored materials, finishes, gypsum board, insulation, doors, casework, millwork, equipment and all other building components.
- G. Finished Floors: Protect finished floors and stairs from dirt, wear, and damage:

1. Secure heavy sheet goods or similar protective materials in place, in areas subject to foot traffic.
 2. At all transitions to adjacent areas not under construction.
 3. Lay rigid materials in place in areas subject to movement of heavy objects and where storage of products will occur.
- H. Waterproofed and Roofed Surfaces:
1. Restrict use of surfaces for traffic of any kind, and for storage of products.
 2. When an activity is mandatory, obtain recommendations for protection of surfaces from manufacturer. Install protection and remove on completion of activity. Restrict use of adjacent unprotected areas.
 3. No Construction work shall be conducted on any unprotected roof weather new or existing.
 4. All pathways to work on the roof shall be protected.
- I. Lawns and Landscaping: Restrict traffic of any kind across planted lawn and landscaped areas.
- J. Adjacent Facilities: Care shall be exercised to prevent damage to adjacent facilities including walks, curbs, and gutters. Adequate protection shall be placed where equipment will pass over such obstructions, and facilities damaged by construction operations shall be removed and replaced at **Contractor's** expense.

3.02 Protection of Existing Structure and Work adjacent to new construction and demolition.

- A. The **[Contractor]** shall protect existing in place work at the exterior and interior, including but not limited to finishes, materials, products, utilities, fixtures, and equipment adjacent to new construction and demolition. Any existing in place work at the exterior and interior that is damaged by the **[Contractor]** shall be repaired or replaced at no extra cost to the University.
- B. Overloading: **[Contractor]** shall be responsible for overloading any part or parts of structures beyond the calculated capacities of the design. Placing materials, equipment, tools, machinery, or any other item shall be done with care to avoid overloading. No loads shall be placed on floors or roofs before they have attained their permanent and safe strength.
- C. Damaged Work: All damaged work shall be replaced, repaired, and restored to its original condition without change to the Contract Sum. Repair or replace all damaged work promptly as directed by University's Representative.
- D. Damaged Utilities: Where existing utilities are damaged or disrupted on account of any act, omission, neglect, or misconduct of the **Contractor** in the manner or method of executing the Work, or due to non-execution of work, such damage shall be immediately repaired to maintain operation regardless of the time of occurrence.
- E. Temporary Construction: Provide temporary construction necessary for protection of building and its parts. Close in buildings as soon as possible to protect from weather and vandalism. Protect existing buildings and controlled temperature areas from damage.

- F. Doors and Casework: Protect doors, millwork and mill counters and cases and hardware from damage, including abrading and scratching of finishes. Protect doors and frames and hardware from mechanical damage and damage to anodic coatings.
- G. Protective Coatings: Remove protective coatings, etc., as required to leave work in condition for painting and finishing, final cleaning, etc.
- H. Exterior Work: Protect all exterior work, including existing asphalt paving and landscaping and buildings.

END OF SECTION 01 76 00

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Project Closeout Procedures
- B. Contract Closeout Procedures
- C. Punch List of Incomplete Work or Corrections

1.02 RELATED SECTIONS

- A. Section 013100 – COORDINATION
- B. Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES: Administrative general requirements for submittals.
- C. Section 013900 – GREEN BUILDING POLICY IMPLEMENTATION
- D. Section 015600 – TEMPORARY BARRIERS, ENCLOSURES AND CONTROLS: Removal of Controls.
- E. Section 017400 – CLEANING: Final Cleaning.
- F. Section 017800 – CLOSEOUT SUBMITTALS

1.03 FINAL COMPLETION ACTIONS

- A. On Application for Payment that coincides with date Substantial Completion is claimed, show 100% completion for portion of Work claimed substantially complete.
- B. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
- C. Notify the University's Representative fourteen (14) calendar days prior to the Project being ready for permanent cores and keying.
- D. Complete start-up testing and Commissioning of systems, and instruction of University personnel. Remove temporary facilities from site, along with construction tools, mock-ups, and similar elements.

1.04 SUBSTANTIAL COMPLETION REVIEW

A. Preliminary Punch List Review:

1. **Contractor** shall provide an electronic file as indicated in Item 1.04, C., (Preliminary Punch List) of items not installed, to be completed, not functioning correctly or to be corrected. The list shall include the anticipated dates of when the work is to be installed, completed or corrected.
2. Organize the List per Item 1.04, C.
3. List shall identify items by location (e.g., room number and name) and consecutive number (e.g., 307-5 might identify item 5 in room 307, Roof-4 would identify item 4 on Roof).
4. Segregate architectural, plumbing, HVAC and electrical Work on separate lists.
5. University's Representative and **Contractor** shall conduct a brief walk-through of Project to review scope and adequacy of list.

B. **Contractor** 's Certification: When determined by [**Contractor**]that Work is substantially complete, **Contractor** shall notify University's Consultant and University's Representative.

1. Submit to University's Representative written certification that:
 - a. Contract Documents have been reviewed.
 - b. All portions of Work have been carefully inspected.
 - c. Work is complete in accordance with Contract Documents.
 - d. Equipment and systems have been commissioned, tested, adjusted and balanced and are fully operational.
 - e. Indicate Operation of systems that have been demonstrated to University personnel and which systems have not been demonstrated to University personal.
 - f. Work is ready for University's Consultant's Substantial Completion review.
2. Provide minimum fourteen (14) calendar days' notice to University's Representative prior to desired date for Punch List review.

C. Organization of List (Punch List):

1. 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.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Format Requirements: Provide the following:
 - a. Organized electronic file that is able to be filtered or queried by the following categories:
 - 1) Contractor or Subcontractor
 - 2) Building Area/Floor if applicable
 - 3) Room Number or specific interior or exterior area.
 - 4) Photo Number if applicable
 - 5) Open or Closed
 - 6) Columns for use by University's Representative
 - a) Responsible Design Consultant
 - 7) Comments
 - b. Other Punchlist Software may be used if approved by the University's Representative.
 - c. Include the following information at the top of each page:
 - 1) Project name and Number.
 - 2) Date.
 - 3) Name of University's Representative.
 - 4) Name of **Contractor**.
 - 5) Page number.

D. Punch List Review: University's Representative and University's Consultants as may be required, will attend a Contract closeout review and conduct a walk-through of Project to review **[Contractor's]** list of items to be completed and corrected (Punch List). **[Contractor]** and University's Consultant shall note deficiencies, if any.

1. **[Contractor]** shall prepare list and record additional items as University's Representative may determine require completion and correction from walk-through.

- a. If deficiencies are noted University's Representative and University's Consultant shall promptly notify [**Contractor**] in writing, listing observed deficiencies.
 - b. If no deficiencies are noted, or when noted deficiencies are removed from the Punch List, University's Representative shall promptly notify **Contractor**.
2. **Contractor** shall edit the electronic file and distribute list with University's Representative and University's Consultant's additions.
 3. **Contractor** shall remedy deficiencies.
 4. Costs of additional visits to site by University's Consultants to review completion and correction of Work shall be deducted from the Contract Sum.
- E. Uncorrected Work: Refer to requirements specified in SECTION 014500 – QUALITY CONTROL regarding Contract adjustments for non-conforming work.
- F. Cleaning and Clearing: Prior to Substantial Completion review, execute cleaning and clearing site of temporary facilities and controls, as specified in SECTION 015600 – TEMPORARY BARRIERS, ENCLOSURES AND CONTROLS and SECTION 017400 CLEANING
- G. Testing and Inspection: Prior to Substantial Completion review, complete all tests and inspections and submit applicable reports and approvals. Provide commissioning of building systems per Section 013900 GREEN BUILDING POLICY IMPLEMENTATION.
1. Complete materials tests and inspections.
 2. Complete commissioning, testing, inspection, balancing, sterilization and cleaning of plumbing and HVAC systems.
 3. Complete commissioning, testing and inspection of electrical system.
 4. Complete commissioning and operational tests of equipment.
 5. IF HCAI PROJECT: Submit electronic file of **Contractor's** Final HCAI Verified Reports to University's Representative certifying completion of the Work in conformance with the Contract Documents. Report forms will be supplied by University's Representative.
- H. Acceptance of the Work shall not relieve **Contractor** of any responsibility for defects that develop during the guarantee period and are caused by **Contractor** 's failure to perform work in accordance with requirements of Contract Documents.

1.05 FINAL COMPLETION SUBMITTALS (See 017800 CLOSEOUT SUBMITTALS)

1.06 STATEMENT OF ADJUSTMENT OF ACCOUNTS

A. Submit final statement reflecting adjustments to Contract Sum indicating:

1. Original Contract Sum
2. Previous Change Orders
3. Changes under allowances (Mark as NOT USED if not project applicable.)
4. Changes under unit prices (Mark as NOT USED if not project applicable.)
5. Deductions for uncorrected work
6. Penalties
7. Deductions for liquidated damages
8. Deductions for re-inspection fees
9. Other adjustments to Contract Sum
10. Total Contract Sum as adjusted
11. Previous payments
12. Sum remaining due

B. University will issue a final Change Order reflecting approved adjustments to Contract Sum not previously made by Change Order.

1.07 APPLICATION FOR FINAL PAYMENT

A. Final Payment: After completion of all items listed for completion and correction, after submission of all documents and products, and after final cleaning, submit final Application for Payment, identifying total adjusted Contract Sum, previous payments and sum remaining due. Refer to SECTION 012900 – MEASUREMENT AND PAYMENT and the General Conditions of the Contract.

B. Submit As-Built Documents to University's Representative with final Application for Payment.

PART II - PRODUCTS – Not Applicable to this Section

PART III - PART III - EXECUTION

3.01 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use.

3.02 REPAIR PERIOD (GUARANTEE OR WARRANTY PERIOD)

- A. Upon acceptance of the project or a portion thereof from the **[Contractor]** the "Guarantee to Repair Period" of one year or more will begin as described in Article 9 of the General Conditions. The University Representative will become responsible for receiving notices of Defective Work from building occupants and securing **[Contractor]** compliance where applicable. The University Representative shall have prime responsibility for follow-up & monitoring of **Contractor** activities. (Refer to Article 12 of General Conditions).
1. If the **Contractor** must "Shut-down" the fire and security alarms in an occupied building, then the **Contractor** shall be responsible to provide a fire and security watch until the system, at no additional cost to the University.

END OF SECTION 01 77 00

SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Equipment Data
- B. Operation and Maintenance Instructions
- C. Instruction of University personnel
- D. Schedule of Submittals
- E. Spare Parts and Maintenance Materials
- F. Guarantees, Warranties, Bonds, Service and Maintenance Contracts
- G. Project As-built Documents

1.02 RELATED SECTIONS

- A. Section 013100 – COORDINATION
- B. Section 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- C. Administrative general requirements for submittals.
- D. Section 013900 – GREEN BUILDING POLICY IMPLEMENTATION
- E. Section 014500 – QUALITY CONTROL: Manufacturer's tests and inspections as a condition of warranty.
- F. Section 014550 – INSPECTION AND TESTING OF WORK
- G. Section 016100 – PRODUCT REQUIREMENTS
- H. Section 017700 – CLOSEOUT PROCEDURES

1.03 FILE FORMATS

- A. All printed documents submitted per this section shall be in PDF format
 - 1. The PDF files will be unlocked and searchable.
 - 2. All PDF documents will be bookmarked.
 - 3. The exception to electronic format for As-Built drawings will be noted in the specific specification section where they are required.
- B. Digital Photography

1. All files will be submitted in JPEG

1.04 EQUIPMENT DATA AND OPERATION AND MAINTENANCE (O&M) INSTRUCTIONS

- A. Preparation of data shall be done by persons:
 1. Trained and experienced in maintenance and operation of described products.
 2. Familiar with requirements of this Section.
 3. Skilled in technical writing to extent required for communication of essential data.
 4. Skilled as drafters competent to prepare required drawings
- B. O&M Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at time of Section Submittals. Submit reviewed manual content formatted and organized as required by this Section. Prepare in the form of a data and instructional manual.
- C. Submit PDF electronic files of operation and maintenance manuals. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to the University. The exception to electronic format will be indicated in the specific specification section requiring hard copies of the manual.
 1. Name each indexed document file in composite electronic index with applicable item name. Include a completed electronically linked operation and maintenance directory.
 - a. List Project title and Project number and particular building as applicable.
 - b. Enable inserted reviewer comments on draft submittals.
 2. Organization: Arrange content by systems under Section numbers and sequence in accordance with the Project Specifications Table of Contents.
- D. Table of Contents, Each Volume: Provide title of Project, Project number, with names, addresses, and telephone numbers of University's Representative, as applicable, and **[Contractor][CM/Contractor]**, including name of contact person. Provide schedule of products and systems, indexed to content of the volume.
 1. For each Product or System: List names addresses and telephone numbers of subcontractor, original supplier and manufacturer, as applicable, including name of contact person. Include name and address of local source of supplies and replacement parts.
 2. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete information not applicable.
 3. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project As-Builts Documents as maintenance drawings.
 4. Additional Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in SECTION 014500 – QUALITY CONTROL.
 5. Warranties and Bonds: Include in each applicable section.

E. Manual for Materials and Finishes:

1. Building Products, applied Materials, and Finishes: Provide PDF composite electronically indexed file. Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured Products.
2. Instruction for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
3. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
4. Additional Requirements: As specified in individual Specification Sections.
5. Table of Contents: Provide PDF electronic file with links to individual sections.

F. Manual for Equipment and Systems

1. Record Instructions: Forward to University's Representative, upon completion of work, and before work will be considered for acceptance, complete PDF composite electronically indexed file of instructions of entire plant and component parts, including manufacturer's certificates, warranty slips, parts lists, descriptive brochures, and maintenance and operating instructions, in quantities set forth in various Divisions. Submit drafts for review before preparing final PDF electronic file.
2. O & M Instructions: Provide and install, where directed, printed sheet under clear plastic cover, giving concise operating and maintenance instruction for equipment.
3. Each Item of Equipment and Each System: Inclusive description of unit or system, Model Number, Serial Number, and component parts. Identify function, normal characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts. Best to include all information provided in final approved equipment submittal. Design drawing shall be updated to reflect what was actually provided.
4. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications.
5. Wiring Diagrams: Include color-coded wiring diagrams as installed.
6. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and any special operating instructions.
7. Maintenance Requirements: Include routine procedures and guide for troubleshooting; disassembly, repair, and re-assembly instructions; and alignment, adjusting, balancing, and checking instructions. Provide servicing and lubrication schedules, and list of lubricants required.
8. Instructions: Include manufacturer's printed operation and maintenance instructions. Include sequence of operation by controls manufacturer.
9. Parts Data: Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance. Provide list of original

- manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
10. Control Data: Provide as installed control diagrams by controls manufacturer.
 11. Piping Data: Provide [Contractor][CM/Contractor]'s coordination drawings, with color piping diagrams as installed. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
 12. Design Data: Provide a listing in table of Contents for design data, with tabbed binder divider page and space for insertion of data.
 13. Reports: Include test and balancing reports as specified.
 14. Additional Requirements: As specified in individual Specification Sections.
- G. Instruction of University's Personnel: Instruct University designated personnel to their full and complete understanding, procedures necessary to operate and maintain equipment and systems on continuing basis. Provide training of staff.
1. Schedule: Before final inspection, instruct University designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times. For equipment requiring seasonal operation, perform instructions for other seasons within six (6) months of completion.
 2. Basis of Information: Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
 3. Instructional Material: Prepare and insert additional data in the manual when need for such data becomes apparent during instruction.
- H. Equipment Data and Operation and Maintenance Instructions Submittals:
1. Submittals: Comply with administrative requirements specified in SECTION 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
 2. Preliminary Draft O&M Submittal: Submit electronic files of each manual at least **[180]** calendar days before commencing demonstration and training. University's Representative will review draft and return with comments.
 - a. The comments or corrections shall be incorporated into the Final O&M submittal.
 - b. Correct or revise each manual to comply with the University's Representatives comments. Submit electronic copies of each corrected manual within **[15]** calendar days of receipt of University's Representative's comments.
 - c. University's Representative will notify the **[Contractor][CM/Contractor]** when the edits have been accepted for incorporation into the final O&M submittal.
 3. Advance Submittals: For equipment, or component parts of equipment to be put into service during construction and operated by University, submit documents within ten (10) calendar days after equipment approval.
 4. Final O&M Submittal: After completion of instruction of University operation and maintenance personnel and final inspection, revise content of documents to include additional information deemed necessary from instruction experience of

University's personnel and any changes made during construction. Submit each manual in the final form prior to requesting inspection for Substantial Completion. The University's Representative will return comments electronically.

- a. Submit electronic copies of each manual prior to requesting training.

1.05 SPARE PARTS, EXTRA STOCK AND MAINTENANCE MATERIALS

- A. Products Required: Where called for in Contract Specifications, deliver to University's Representative, materials, etc., for use in maintenance work. Provide list of materials delivered to University's Representative, indicating date and acceptance by University's Representative.
 1. Provide quantities of products, spare parts, maintenance tools, and maintenance materials specified in individual Sections to be provided to University's Representative, in addition to that required for completion of the Work.
 2. Products supplied shall be identical to those installed in the Work. Include quantities in original purchase from supplier to avoid variations in manufacture.
 3. Provide itemized list of all spare parts, materials and transmittal to the University's Representative for acceptance.
- B. Storage, maintenance: Store products with products to be installed in the Work, as specified in SECTION 016100 – PRODUCT REQUIREMENTS: Product Storage and Protection.
- C. Delivery to site: Prior to final payment, deliver and unload spare products to project site. Coordinate with University's Representative and obtain receipt. University will handle and store products.

1.06 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 1. List of Documents: Include a table of contents for each O&M and emergency, operations listed per CSI Specification number.
 2. List of Systems and Subsystems: Include references to operation and maintenance manuals that contain information about each system.
 3. List of Equipment: List equipment for each system, organized by system. For pieces of equipment not part of system, list separately.
 4. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists,

assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

5. This Directory shall be submitted to the University's Representative for review and acceptance.

1.07 MAINTENANCE AGREEMENTS

- A. Prior to Closeout all Maintenance Agreements required by the Contract Documents shall be assembled and submitted electronically with the Closeout Submittal Requirements.

1. Provide all Maintenance Agreements in PDF form.
 - a. Submit individual files for each Maintenance Agreement with a directory assembled by CSI division.
 - 1) Combine all project Maintenance Agreements including the directory into one PDF for record.
 - 2) Files will be formatted for printing with a footer identifying the CSI number and UC Davis Health project number.
 - 3) There will be a front cover to the file that contains all project information including the **[Contractor][CM/Contractor]** contact information.

1.08 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.

- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of University's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

1.09 WARRANTIES AND GUARANTEES

- A. Warranties and Guarantees, general: Guarantees from subcontractors shall not limit **[Contractor][CM/Contractor]**'s warranties and guarantees. Whenever possible, **[Contractor][CM/Contractor]** shall cause warranties of subcontractors to be made directly to University. If such warranties are made to **[Contractor][CM/Contractor]**, **[Contractor][CM/Contractor]** shall assign such warranties to University prior to final payment. When equipment and products, or components thereof, bear a manufacturer's warranty or guarantee that extends the time period of **[Contractor][CM/Contractor]**'s warranty or guarantee, so state in the warranty or guarantee.
 - 1. Standard Product Warranties: Preprinted written warranties published by individual manufacturers for particular products and specifically endorsed by manufacturer to University.
 - 2. Special Warranties: Written warranties required by or incorporated in Contract Documents, to extend time limits provided by standard warranties or to provide greater rights for University.
 - 3. Provisions for Special Warranties: Refer to General Conditions of the Contract for terms of **[Contractor][CM/Contractor]**'s special warranty of workmanship and materials.
 - 4. Specific Warranty Requirements: requirements are included in the individual Sections of Division 2 through 49 of the Contract Specifications, including content and limitations.
 - 5. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve **[Contractor][CM/Contractor]** of warranty on work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractor's requirement to countersign special warranties with **[Contractor][CM/Contractor]**.
 - 6. Related Damages and Losses: When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.
 - 7. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to original warranty with an equitable adjustment for depreciation.
 - 8. Replacement Cost: On determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements

- of Contract Documents. **[Contractor][CM/Contractor]** shall be responsible for cost of replacing or rebuilding defective work regardless of whether University has benefited from use of the work through part of its useful service life.
9. University Recourse: Written warranties made to the University are in addition to implied warranties, and shall not limit duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which University can enforce such other duties, obligations, rights, or remedies.
 10. Rejection of Warranties: University reserves right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
 11. University reserves right to refuse to accept work where a special warranty, or similar commitment is required, until evidence is presented that entities required to countersign commitments are willing to do so.
 12. When designated portion of Work is completed and occupied or used by separate agreement with **[Contractor][CM/Contractor]** during the construction period, submit properly executed warranties to University's Representative within fourteen (14) calendar days of completion of that designated portion of the Work.
 13. Submit written guarantees, in the form contained at end of this Section.
- B. Form of Warranty or Guarantee: All written warranties and guarantees, excepting manufacturers' standard printed warranties and guarantees, shall be submitted on **[Contractor][CM/Contractor]**'s, subcontractor's, material supplier's, or manufacturer's own letterhead, addressed to University. Warranties and guarantees shall be submitted in duplicate and complying with the form letter following. Warranty and guarantee letters shall be signed by all responsible parties and by **[Contractor][CM/Contractor]** in every case, with modifications only as approved by University to suit the conditions pertaining to the warranty or guarantee.
- C. Submission requirements:
1. **[Contractor][CM/Contractor]** shall collect and assemble required warranties, guarantees, bonds, and service and maintenance contracts. Provide PDF electronically signed or signed and scanned copies of each. Organize documents into an orderly sequence based on the table of contents of the Project Manual CSI divisions.
 2. Table of Contents: Provide PDF electric file with links to individual warranty sections. Include the following information.
 - a. Product or Work item.
 - b. Product or work suppliers firm name, address, telephone number and name of principal.
 - c. Scope of guarantee, bond, service or maintenance agreement.
 - d. Date of beginning of guarantee, bond, service or maintenance contract.
 - e. Duration of guarantee, bond, service or maintenance contract.
 - f. **[Contractor][CM/Contractor]**'s name, address, telephone number and name of principal.

- g. Provide information for University personnel:
 - 1) Proper procedure in case of failure.
 - 2) Circumstances that might affect validity of guarantee or bond.

D. Warranty Submittal

- 1. Provide all warranties in PDF composite electronically indexed files.
 - a. Submit individual files for each warranty with a directory assembled by CSI division.
 - 1) Combine all project warranties including the directory into one PDF for record
 - 2) Files will be formatted for printing with a footer identifying the CSI Number and UC Davis Health Project Number.
 - 3) There will be a front cover to the file that contains the title "WARRANTY, GUARANTEE AND BOND" as well as all project information including the **[Contractor][CM/Contractor]** contact information. Title of Project and UC Davis Health Project Name and Number.
 - 4) Coordinate copies of each warranty to be included in operation and maintenance manuals.
 - 5) Final Submittal shall be incorporated into one PDF, bookmarked and searchable document.

- F. Time of Submittals: Submit **[60]** calendar days prior to request for final payment. When work activity is delayed materially beyond date of Substantial Completion, provide updated submittal within ten (10) calendar days after Final Completion, listing date of Final Completion as the start of the Guarantee period.

1.10 AS-BUILT DOCUMENTS

A. Definitions:

- 1. The terms "As-Built Documents" or "As-builts" shall mean the marked-up version of the Contract Documents prepared by **[Contractor][CM/Contractor]** to record as-built conditions, changes, and selections made during construction.

B. Preparation of data shall be done by person(s):

- 1. Trained and experienced in the maintenance, preparation, and submittal of As-Built Documentation.
- 2. Familiar with requirements of this Section.

- C. As-built Documents Content:
1. As-built Drawings and Specifications
 2. As-built Schedule
 3. Miscellaneous As-Built Submittals
- D. As-Built Drawings and Specifications: Provide a complete set of As-Built Drawings and Specifications, showing and noting every change from the Contract Set, including but not limited to:
- Changes made in response to RFI's
 - Amended Construction Documents (ACD) and related RFI's
 - Change Orders/Field Orders and related RFI's.
 - Architect's Supplemental Information (ASI) and related RFI's.
 - Changes to locations, including access panels, windows, doors, plumbing, etc.
 - Changes caused by obstructions and the obstructions notated
 - Changes made in response to inspections
 - Final dimensions
 - Deferred Submittals (see "Miscellaneous As-Built Submittals" below)
 - Shop Drawings (see "Miscellaneous As-Built Submittals" below)
 - Final product selections
1. Format Requirements:
 - a. Provide in PDF format with bookmarks. All annotations shall be neat and legible.
 - b. File naming conventions:
 - 1) Drawings: YY_MMDD_University's Project Number_As-Built_Dwgs
 - 2) Specifications: YY_MMDD_University's Project Number_As-Built_Spec
 - c. Provide text (preferably 1/4" or larger) on each drawing and on the cover of the specifications indicating the submission date, the University's Project Number, and the term "As-Built". The text shall be the same size and general location on all sheets of the drawings and care should be taken to locate the text in a place as to not obscure text or linework on the drawings.
 - d. Bookmarks: Provide bookmarks in the following format:
 - 1) Drawings: Sheet Number – Sheet Name. Do not add additional categories or disciplines.
 - 2) Specifications: The first page of each section shall be bookmarked with: Section Number – Section Name.
 - Exception: If a hyperlinked Table of Contents is provided the bookmarks may be excluded.
 - e. Supplemental sheets: When adding a supplemental sheet containing sketches or other information that describe changes to

the Contract Documents:

- 1) Provide a two-digit numerical suffix that starts with .01 and ascends for every supplemental sheet:
Example: If the supplemental sheet contains sketches that describe changes to the hypothetical sheet "A1-01" the first supplemental sheet will be numbered "A1-01.01".
 - 2) The sheet name and number are to be similar in text size and location to the sheet being supplemented.
 - 3) Include supplemental sheets in bookmarks.
- E. As-Built Schedule: Provide As-Built schedule per SECTION 013200 CONTRACT SCHEDULES
1. Format Requirements:
 - a. Schedule to be in PDF format.
 - b. File naming conventions:
 - 1) YY_MMDD_ University's Project Number_As-Built_Schedule
- F. As-Built Shop drawings:
1. Format Requirements:
 - a. File naming convention for shop drawings:
 - 1) YY_MMDD_ University's Project Number_ShopDwg_Spec
Section Number
- G. As-built Documents Submittal: Submit all As-Built Documents together after Final Completion and in accordance with SECTION 017700 CLOSEOUT PROCEDURES. Allow 10 business days for initial review and for each resubmittal.

1.11 AS-BUILT PRODUCT DATA

EDIT NOTE: PM to verify product data is required as part of close out submittal in addition to submittals collected during construction

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 1. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 2. Format: Submit Product Data as annotated PDF electronic file Include As-Built Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.12 AS-BUILT PRODUCT SAMPLES

EDIT NOTE: PM to verify physical samples are required as part of close out submittal. PM to make storage arrangements if physical samples are to be submitted.

- A. Preparation: Mark Samples to identify the material and location or use on project; indicate finish designations of materials and products, where designations are indicated on Drawings. Cross-reference Samples with corresponding Product Data submitted.
 - 1. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 1. Note related Change Orders, As-Built Specifications, and As-Built Drawings where applicable.
 - 2. Format: Submit As-Built Samples in same size and format as indicated for each sample in the specification's sections. Pack samples securely, with protective wrapping. Include As-Built Samples directory organized by Specification Section number and title.
 - 3. Each Sample will be labeled with Manufacturer, Model, Product Number, CSI Section and UC Davis Health Project Name and Number.

1.13 PHOTOGRAPHS

- A. General: Prior to Closeout all photographic documentation required per 013220 Construction Progress Reporting shall be assembled and submitted with the Closeout Submittal Requirements.

1.14 CONSENT OF SURETY AND FINAL CERTIFICATES

- A. General: Prior to closeout Consent of Surety and Final Certificates required by the Contract Documents shall be assembled and submitted with the Closeout Submittal Requirements.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 Refer to the following attachments

- A. Guarantee
- B. Report of Work Required by Warranty

END OF SECTION 017800

GUARANTEE

Project Title: _____

Project Location: _____

Project Number: _____ DATE: _____

GUARANTEE FOR _____ (the "Contract"),
(Specification SECTION and Contract No.)
between The Regents of the University of California ("University") and

("Contractor"[CM/Contractor]).
(Name of Contractor[CM/Contractor] or Subcontractor)

hereby guarantees to University that the portion of the Work described as follows:

which it has provided for the above referenced Project, is of good quality; free from defects; free from any liens, claims, and security interests; and has been completed in accordance with Specification SECTION _____ and the other requirements of the Contract.

The undersigned further agrees that, if at any time within _____ months after the date of the guarantee the undersigned receives notice from University that the aforesaid portion of the Work is unsatisfactory, faulty, deficient, incomplete, or not in conformance with the requirements of the Contract, the undersigned will, within 10 days after receipt of such notice, correct, repair, or replace such portion of the Work, together with any other parts of the Work and any other property which is damaged or destroyed as a result of such defective portion of the Work or the correction, repair, or replacement thereof; and that it shall diligently and continuously prosecute such correction, repair, or replacement to completion.

In the event the undersigned fails to commence such correction, repair, or replacement within 10 days after such notice, or to diligently and continuously prosecute the same to completion, the undersigned, collectively and separately, do hereby authorize University to undertake such correction, repair, or replacement at the expense of the undersigned; and Contractor[CM/Contractor] will pay to University promptly upon demand all costs and expenses incurred by University in connection therewith.

SUBCONTRACTOR

Signed: _____ Title: _____

Typed Name: _____

Name of Firm: _____

Contractor[CM/Contractor] License Classification & Number: _____

Address: _____

Telephone Number: _____

CONTRACTOR

Signed: _____ Title: _____

Typed Name: _____

Name of Firm: _____

Contractor[CM/Contractor] License Classification & Number: _____

Address: _____

Telephone Number: _____

SECTION 01 82 00
DEMONSTRATION AND TRAINING

PART I - GENERAL

1.01 SECTION INCLUDES

- A. Procedures for Demonstration of Equipment Operation and Instruction of University Personnel.

1.02 RELATED SECTIONS

- A. Section 017800 – CLOSEOUT SUBMITTALS
- B. Section 018100 – PLUMBING/HVAC TESTING PROCEDURES

1.03 SUBMITTALS

- A. Submit preliminary schedule for University Representative approval, listing times and dates for demonstration of each item of equipment and each system, in writing, minimum of thirty (30) calendar days prior to activities.
- B. Submit reports and videos within (14) calendar days after completion of demonstrations and instructions. Give time and date of each training session, and hours devoted to training with a list of persons present and the corresponding video.

1.04 QUALITY ASSURANCE

- A. Equipment installed under Contract shall operate quietly and free of vibration. Adjust, repair, balance properly, or replace equipment producing objectionable noise or vibration in occupied areas of building. Provide additional brackets, bracing, etc., to prevent such noise or vibration. Systems shall operate without humming, surging or rapid cycling.
- B. University will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon time.

PART II - PRODUCTS – Not Applicable to this Section

PART III - EXECUTION

3.01 PREPARATION

- A. Verify equipment has been inspected, commissioned, and put into operation.
- B. Send approved pdf version of completed operation and maintenance manual 7 calendar days prior to training.

3.02 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of equipment and systems to University two (2) weeks prior to date of final inspection. For equipment requiring seasonal operation, perform instructions for other seasons within six (6) months of completion.
- B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance. Display on a video screen and demonstrate the use of bookmarks and searches to find information being sought.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled times, at equipment location.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

END OF SECTION 01 82 00

SECTION 01 91 00

COMMISSIONING

PART I - GENERAL

1.01 SUMMARY

- A. Commissioning (Cx) is the process of ensuring that all building systems are installed and perform interactively according to the design intent; those systems are efficient, cost effective and meet the University's Project Requirements and operational needs; that the installation is adequately documented; and that the operations staff are adequately trained. This is achieved by a full understanding of all building systems through construction, acceptance and warranty period with actual verification of performance. It also establishes testing and communication protocols in an effort to advance the building systems from installation to full dynamic operation and optimization.
- B. The Commissioning process does not relieve responsibility of the **[Contractor]** to provide a finished and fully functioning Project. The **[Contractor]** and Subcontractors provide the quality control for installation and start-up of the building systems.
- C. The specified commissioning activities shall demonstrate compliance with the University, LEED and California Code Commissioning requirements.
- D. Commissioning is a condition of the Contract and shall not be excluded from the base bid.
- E. Commissioning requirements extend to all alternates and change orders, as well as all subcontracts and purchase orders for work under the **[Contractor's]** control.
- F. Related Documents:
 - 1. Division 00 Procurement and Contracting Requirements, apply to this Section.
 - 2. Drawings and general provisions of Contract, and other Division 01 Specification Sections, apply to this Section.
 - 3. Technical Divisions of the Specifications apply to this Section.

1.02 DEFINITIONS

- A. Acceptance Phase: This is the phase of the project when the facility and its systems and equipment are inspected, tested, verified, and documented, and when most of the Functional Performance Testing (FPT) and final training occurs. This will generally occur after the Construction Phase is complete (i.e., start-up and checks have been accomplished). The Acceptance Phase typically begins with certification by the **[Contractor]** that the systems have been started in accordance with the approved protocols and the submission of the documentation of that start-up. The Acceptance Phase ends with the successful completion of all FPT and sign-off by the CA and the University.
- B. Action Item: Any issue that requires a response, completion, corrective or additional work, or any other action. Examples include a Request for Information (RFI), a work directive, a clarification request, a to-do item, an identified deficiency, or any other like item. Action Items must be categorized as appropriate.
- C. Action List: This is a list that is maintained and updated by the CxA that includes all Action Items that relate to Cx activities.
- D. Commissioning (Cx): The process of ensuring that all building systems perform interactively according to the design intent and that the system operations are efficient and cost effective and meet the University's functional needs.
- E. Commissioning Agent (CxA): The individual retained by the University who will oversee the Cx process, develop and stipulate many of the Cx requirements (including FPTs), manage the Cx process, and ensure and verify that systems and equipment are installed, and tested to meet the University's requirements.
- F. Commissioning Coordinator (CC): The **[Contractor]** shall provide a Commissioning Coordinator. The CxA, the University's Representative and the CC will comprise a commissioning management team. While the CxA leads the overall commissioning process, the CC is responsible for managing contractors in their day-to-day performance of the specified commissioning work. The CC is an employee of the **[Contractor]** who is regularly and frequently on site. Qualifications for the Commissioning Coordinator include experience and excellent abilities to schedule, coordinate and manage subcontractors. The following tasks are some of the critical items included in the CC's scope of work:
1. Integrating the specified commissioning activities into the overall contract construction schedule, updating the schedule and providing three-week look-ahead schedules showing the upcoming commissioning related activities.
 2. Providing all commissioning submittals to the University's Representative and CxA.
 - a. O&M Manuals per Division 017700 Close-out Procedures and 017800 Close-out Submittals

3. Coordinating University training and ensuring that training is provided in accordance with the Division 017700 Close-out Procedures and the technical specifications.
 4. Ensuring that subcontractor and supplier review and complete the CxA provided FPT procedures and forms then submitted in accordance with the specifications. This includes providing written comments (even if no exception is taken) regarding issues pertaining to safety, equipment protection/warranty and appropriateness of the procedure for the systems as provided from all required FPT participants for each FPT.
 5. Coordinating development and submittal of specified flushing, cleaning and start-up procedures and ensuring that these procedures are completed, and documentation is submitted.
 - a. Providing test reports and progress reports in accordance with the 017800 Close-out Submittals, commissioning, and technical specifications.
 6. Managing the **[Contractor]** participation in the FTP process in accordance with the commissioning specifications.
 7. Managing the **[Contractor]** participation in resolution of issues identified during pre-commissioning meetings and during the commissioning process.
 8. Ensuring that subcontractors perform preliminary testing to verify readiness for final FPT demonstrations, submitting documented verification that systems will pass functional tests with acceptable results as documented in the FPTs and coordinating the demonstration of the FPTs to the University and the CxA.
 9. Coordinating repeat FPTs that fail due to contract deficiencies until acceptable results are achieved and managing the reimbursement of the University's costs for repeated tests in accordance with the commissioning specifications.
- G. Commissioning Plan: This is a detailed document prepared and maintained by the CxA that describes the entire commissioning process.
- H. Commissioning Specifications (Cx specs): Includes the Cx specification section and Cx-related subsections of other specifications. All **[Contractor]** requirements relating to Cx.
- I. Commissioning Team: The parties involved in the commissioning process for any given system. The Cx Team will include a core group involved with all systems. This core group will typically include the CxA, the University's Cx coordinator, and **[Contractor]** CC and/or MEP Coordinator. At any given point the team may include the project manager, members of the design team, the project inspector, product representatives, and operation and maintenance personnel.
- J. **[Contractor]** As used herein, **[Contractor]** is a general reference to the installing parties and can therefore refer to the **[Contractor]** the subcontractors, or vendors as inferred by its usage.

- K. Construction Phase: Phase of the project during which the facility is constructed and/or systems and equipment are installed and started. **[Contractor]** and subcontractors complete the installation complete start-up documentation, submit O&M information, establish trends, and perform other applicable requirements to get the systems started. The Construction Phase will generally end upon completed start-up and TAB of systems and equipment.
- L. Contract Documents: The documents governing the responsibilities and relationships between the parties involved in the construction of the project including, but not necessarily limited to, the agreement/contract, construction plans and drawings, specifications, addenda, and change orders.
- M. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents.
- N. Functional Completion: A milestone that marks the completion of the Acceptance Phase and successful documentation of the FPTs by the CxA.
- O. Functional Performance Testing (FPT): This process verifies that the systems within the commissioning scope function in accordance with the Contract Documents, the University's design intent and the Design Team's Basis of Design. The process includes the documented testing of the systems under actual and simulated operating conditions. Functional Performance Test (FTP) procedures are detailed instructions that allow experienced system technicians to perform the FPTs with repeatable results. The repeatability of the procedures and results validate the tests. Final performance testing of systems will begin only after the **[Contractor]** certifies that such systems are completely installed and ready for functional testing and after the CxA has completed the subsequent installation verification process for the systems to be tested.
- P. Installation Verification Process: This process includes the on-site review of related system components for conformance to the Contract Documents. Upon receipt of the completed **[Contractor's System Readiness Manual]**, the CxA will conduct this review and verify system readiness for final functional testing procedures. The CxA will document issues identified during this process and assign them to the appropriate party for resolution.
- Q. MEP Coordinator: **[Contractor's]** staff member who is responsible for all MEP equipment and system installation, coordination, and start-up is the primary contact for the Cx Agent and shall be responsible to organize and lead the start-up and commissioning meetings, tracks response to Action Items from Cx Agent and generate minutes.
- R. Ready to Commission statement: The subcontractor's written statement, through the System Readiness Checklist (SRC), that the equipment or system described has been completely installed, started, and tested to ensure that it has met all the requirements of the contract documents and is ready for commissioning.
- S. Start-up: Refers to the quality control process whereby the **[Contractor]** verifies the proper installation of a device or piece of equipment, executes the manufacturer's starting procedures, completes the start-up checklists, energizes the device, verifies it is in proper working order and ready for dynamic testing, and completes the start-up tests.

- T. System Readiness Checklists (SRCs): These checklists are provided by the CxA and include equipment installation and start-up items specified to be performed and verified by the **[Contractor]**. These checklists shall be compiled along with associated start-up forms by the **[Contractor]** to create the **[Contractor]**'s System Readiness Plan. They shall be completed during installation and returned to the CxA as components of the **[Contractor]**'s System Readiness Manual prior to the final CxA installation verification and functional performance testing process.
- U. System Readiness Manual: This document includes, for each system within the commissioning scope of work, completed and signed versions of each form submitted by the **[Contractor]**'s .
- V. System Readiness Plan: This document shall be completed by the **[Contractor]** and submitted to the CxA prior to the final installation verification and functional performance testing process. By submitting these completed forms, the **[Contractor]** signals that the relevant systems are installed, operational and will meet functional testing acceptance criteria. The System Readiness Plan is compiled by the **[Contractor]** and includes, for each system within the commissioning scope of work, the System Readiness Checklists provided by the CxA, followed by the associated **[Contractor]**'s Start-up and Test Forms. The **[Contractor]** System Readiness Plan shall be submitted to the CxA for review and approval prior to installation of the systems.

1.03 REFERENCES

- A. American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE):
 - 1. ASHRAE Guideline 0-2013, The Commissioning Process
 - 2. ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for The Commissioning Process.
 - 3. ASHRAE Standard 202-2013, Commissioning Process for Buildings and Systems
- B. US Green Building Counsel (USGBC), Leadership in Energy and Engineering Design (LEED):
 - 1. Reference Guide for the version of LEED pursued by project
- C. California Building Standards Code (California Code of Regulations, Title 24):
 - 1. Part 6, Building Energy Efficiency Standards for Residential and Nonresidential Buildings
 - 2. Part 11, CALGreen

1.04 SYSTEMS TO BE COMMISSIONED

- A. All systems and equipment identified in the contract documents as having quality assurance or acceptance testing requirements are included in SYSTEMS TO BE COMMISSIONED by reference.
- B. All systems and equipment identified in the contract documents as requiring startup are included in SYSTEMS TO BE COMMISSIONED by reference.
- C. All systems and equipment identified in the contract documents requiring training are included in SYSTEMS TO BE COMMISSIONED by reference.
- D. Commissioning shall be system based.
 - 1. Equipment and sub-assemblies are to be installed, started and tested as components of each respective system rather than as a category of equipment or by specification section.
- E. The systems to be commissioned shall include but are not limited to the following:
 - 1. Air Handling Units
 - 2. Exhaust Fans
 - 3. HTHW Heat Exchangers
 - 4. Pumps
 - 5. Fan Coils
 - 6. Terminal Devices (VAV boxes)
 - 7. Sump Pumps
 - 8. Air Transfer Fans
 - 9. Hot Water Heaters
 - 10. Building Control System - Direct Digital Control System
 - 11. Energy Management System
 - 12. Workshop Airflow Control System
 - 13. Hydronic Systems
 - 14. Heat Exchangers
 - 15. Automated Lighting control systems
 - 16. Emergency generators
 - 17. Transfer switches

18. Environmental Rooms (hot or cold)
19. Utility Meters and sub-metering system
20. VFDs
21. Power to Mechanical Systems
22. Lighting Inverter
23. Irrigation Systems
24. Window Switches related to natural ventilation control
25. Solar Photovoltaic Power Systems
26. Solar Domestic Hot Water Systems
27. Water Reuse Systems
28. VRF Systems
29. Radiant Heaters
30. Heat Recovery boxes
31. Stair Pressurization Fans
32. Irrigation systems
33. Anaerobic Digester
34. Renewable Energy Systems
35. Fire alarm / Fire Detection System.
36. Data Systems.
37. Audio/Visual Systems.
38. Intercom / Telecom Systems.
39. Miscellaneous Low Voltage Systems.
40. Pneumatic Tube System.
41. Building Envelope.
42. Other Systems as Specified.

1.05 CONSTRUCTION AND ACCEPTANCE PHASE COMMISSIONING

- A. The **[Contractor][CM/Contractor]** will be an active participant in the construction and acceptance phase commissioning activities. The commissioning tasks and responsibilities include following:
1. Respond to requests from the CxA for interpretation/clarification of equipment selection and sequence of operation during functional performance test development.
 2. Review, and provide direction as necessary on, the functional performance tests developed by the CxA for conformance with the design intent, within an agreed time interval.
 3. Supporting the commissioning process by diligently executing the contract requirements to provide a fully functional facility ready for testing and working closely with the commissioning team to integrate the commissioning process into the project delivery schedule.
 4. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
 5. Cooperate with the CxA for resolution of issues recorded during the commissioning process.
 6. Schedule and attend commissioning kick-off meeting and commissioning coordination meetings.
 7. Integrate and coordinate commissioning process activities with construction schedule.
 8. Develop quality assurance process to verify and document proper installation, access, startup, adjusting, check out and maintenance of commissioned systems.

9. The CxA will develop the System Readiness Checklist (SRC) forms for each system within the commissioning scope of work. These forms summarize specific aspects of the installation of each system that the **[Contractor]** must verify prior to conducting functional performance testing. The SRC forms will be submitted to the **[Contractor]** and subcontractors for review and comments and subsequently compiled into the System Readiness Plan.

As part of the commissioning submittals, the **[Contractor]** shall submit a System Readiness Plan to the CxA. This document is typically a binder organized into sections with one section per system, each of which includes the SRC for that system followed by Manufacturer – or installation subcontractor-provided installation checklists, detailed start-up procedures, blank TAB forms and other project specific test forms. The CxA will review the System Readiness Plan and document any missing or erroneous forms. After the **[Contractor]** provides the correct forms, the CxA will provide final approval and acceptance of the System Readiness Plan for use by the **[Contractor]** and/or installation subcontractors. Once approved, the System Readiness Plan is subsequently referred to as the System Readiness Manual.

10. Review and accept commissioning functional performance test procedures provided by the CxA.
11. Ensure cooperation and participation of specialty subcontractors.
12. Provide to CxA a completed Functional Verification Checklist certifying that for all (listed) systems and equipment to be commissioned, that all systems, subsystems, equipment, and controls are ready for testing.
13. Ensure participation of major equipment manufacturers in appropriate training and testing activities.
14. Execution of the Functional Performance Test protocols for CxA to witness.
15. Manage every aspect of the training program including being responsible for all training requirements. An outline of the training requirements shall be developed with the University and CxA.
16. Responsible for developing and implementing a formal equipment maintenance program to ensure that all equipment specified to be installed on the project is received and maintained in good working order until accepted by the University.

1.06 SUBMITTALS

- A. The **[Contractor]** shall provide the CxA a list of required equipment/system submittals to the CxA. The CxA will identify submittals to be submitted to the CxA concurrent with submission to the University's Representative for review.
- B. The **[Contractor]** shall provide the CxA the requested submittals for the CxA concurrent review, with submission to the University for review
- C. One set of searchable and bookmarked electronic file of coordination drawings which includes all commissioned systems e.g., mechanical, electrical, fire protection, plumbing, and telecom.
- D. Names of **[Contractor]** and subcontractor's personnel who will be responsible for the start-up and commissioning of the facility. To include names, email, and telephone contact information.
- E. Start-up and commissioning schedule. To include detailed plan of the sequence of construction with start and completion dates for each phase.
- F. Start-up forms for equipment and systems installed in the building. Documents to be used by sub-contractors to ensure that the building complies with the requirements of the contract documents.
- G. All Subs, through the **[Contractor]** shall submit required installation, start-up, and preventive maintenance equipment data sheets to the CxA within 45 calendar days of equipment acceptance by the University.
- H. All Subs, through the **[Contractor]** shall submit initial O&M data for system and equipment being commissioned under this specification. Initial O&M data shall be submitted within 45 calendar days of equipment acceptance by the University, but no less than 8 weeks prior to the beginning of functional testing.
- I. The **[Contractor]** shall submit an electronic copy of the construction meeting minutes, updated construction schedule, RFI log, and Bulletin log to the CxA within seven (7) calendar days of each meeting or update.
- J. **[Contractor]** shall submit an electronic copy of training plan and training materials to the CxA for review and approval prior to providing training.
- K. Consolidated close out list with all training, Final O&M manuals, As-Built documentation and surplus stock listed by spec section. Information to be compiled from the specifications.

PART II - PRODUCTS

2.01 TEST EQUIPMENT

- A. The **[Contractor]** shall supply all personnel and equipment for the demonstration and testing, including, but not limited to, tools, instruments, ladders, lifts, computers, software, cables, etc. **[Contractor]** supplied personnel must be competent with and knowledgeable of all project-specific systems, and automation hardware and software. All training documentation, O&Ms, and submittals shall be at the job site before functional testing commences.
- B. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the division contractor for the equipment being tested. For example, the mechanical contractor of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC system and control systems in Division 23.
- C. Special equipment, tools and instruments (only available from vendor/Subs, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be provided by the **[Contractor]** and left on site, for the CxA to use during functional testing, seasonal testing, and deferred testing. The equipment, tools, and instruments will be returned to the vendor/Subs after successful conclusion of the commissioning effort.
- D. The controls contractor shall provide the CxA with temporary software license to be loaded on the CxA's computer, and any necessary network connection cables, for accessing the direct digital control system field panels for system testing. The controls contractor shall also provide a palm device (if applicable) with attachments, software, and cables, to check setpoint values of terminal device controllers. The controls contractor shall provide the CxA with log on ID, password, and LAN IP connection criteria for remote connection to direct digital control system. All the software, cables, and modems provided to the CxA will be returned at the successful conclusion of the commissioning effort.
- E. All testing equipment used by the contractors shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Contract Document Specifications (Project Manual). If not otherwise noted, the following minimum requirements apply to test and measurement equipment: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.1°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.

PART III - EXECUTION

3.01 AFTER AWARD OF CONTRACT

- A. The **[Contractor]** shall identify the person on their staff who will serve as the Commissioning Coordinator (CC). This person shall be responsible for all startup and commissioning issues on the project. Specific duties are identified in Part 1 of this Section.
- B. Within the first 30 calendar days of the project the **[Contractor]** shall meet with the University and the commissioning agent to discuss the process to be used on the project for managing communication to and from the Cx agent. This is to include the means for communication issues, commissioning reviews, processing submittals, RFIs, change orders, etc., meeting minutes, schedule information, Cx agent observations, and the action item lists. If a mutually agreeable process cannot be agreed upon, the Cx agent's process and software tools will be utilized.
- C. Within the first 60 days of the project there will be a meeting of the GC, the Cx agent and the key subcontractor's personnel to review how the Cx process will be implemented on the project and how the communication and documentation requirements will be met. The subcontractors are expected to send the staff that will be participating in the start-up and commissioning meetings.
- D. The **[Contractor]** will submit a schedule listing the key startup and Cx activities. The initial schedule can be general in nature. As the project progresses, the details on the schedule must be sufficient to list the activities of each **[Contractor]** for each phase of the project and what work must be accomplished before each listed task.
- E. The **[Contractor]** is to identify the team members from each subcontractor who will be participating in the start-up and commissioning meetings. This list is to include the name and contact information for the subcontractor's commissioning coordinator.
- F. The **[Contractor]** is to compile a listing of all factory tests that will take place prior to the start of the start-up and commissioning meetings. The consolidated list, along with an approximation of when they are expected to take place, shall be forwarded to the Cx agent.

3.02 Cx MEETINGS

- A. Eight weeks prior to supplying potable water to the building or the permanent power, the Commissioning Coordinator (CC) will schedule the first start-up and commissioning meeting. The meetings will not be concurrent with the **[Contractor's]** MEP coordination meeting and are to be scheduled at a mutually agreeable time between the **[Contractor]**, the Cx agent, and the University.

- B. The meetings will initially be held every second or third week as appropriate, and then increase in frequency to weekly as the bulk of the start-up and commissioning work is taking place.
- C. During each meeting an updated start-up and commissioning schedule will be distributed. In addition to the hard copies distributed at the meeting, electronic versions shall be forwarded to the Cx agent and the University.
- D. During the meetings a consolidated training, O&M, and attic stock list drawn from the contract document requirements will be distributed. Decisions on the O&M review, when the training will take place, and how the stock will be turned over the University will be made based on this document. In addition to the hard copies distributed at the meeting, an electronic version shall be forwarded to the Cx agent and the University.
- E. Minutes of the start-up and commissioning meetings will be generated and distributed by the Commissioning Coordinator (CC). The minutes are to incorporate findings from the Cx agent. In addition to the hard copies distributed at the meeting, electronic versions shall be forwarded to the Cx agent and the University.
- F. The updated FPTs will be provided to the **[Contractor]** by the Cx agent.
- G. The **[Contractor]** and the subcontractors will be required to coordinate their activities, and work collaboratively, with the test and balance contractor hired by the University.
- H. The **[Contractor]** will coordinate the schedules for two review meetings to be led by the Cx agent. The first will be a comprehensive test and balance review and needs to include the mechanical subcontractor's wet and dry side foreman. The second meeting will be a controls review. This meeting is to be attended by the controls subcontractor's lead on the project and the programmer. Each meeting is to last at least two hours.

3.03 FIELD START-UP AND TESTING

- A. The dates for all field start-up activities shall be listed on the start-up and commissioning schedule.
- B. The CxA works with the Subs in developing startup plans and startup documentation formats, including providing the Subs with pre-functional checklists to be completed, during the startup process.
- C. The TAB contractor submits their TAB plan, along with the TAB Plan Review Checklist, for approval by the CxA prior to starting TAB work.
- D. In general, the checkout and performance verification proceeds from simple to complex, from component level to equipment to systems and intersystem levels with pre-functional checklists being completed before functional testing.

- E. The CxA shall review shop drawings and material certifications, review of reports from independent testing agencies, independent on-site periodic construction observation and attendance of selected quality control-related meetings (e. g., Pre-installation Conferences).
- F. Pre-Functional Test Phase:
 - 1. The **[Contractor]** shall prepare the equipment and systems for start-up in accordance with the Contract Documents, industry standard guidelines and the guidelines of the equipment and systems manufacturers. Start-up shall be performed by the **[Contractor's]** and/or manufacturer's start-up technicians in accordance with the Contract Documents, industry standard guidelines and the guidelines of the equipment and systems manufacturers. The **[Contractor][CM/Contractor]** shall test the systems to verify that they perform in accordance with the Contract Documents, including the commissioning FPT procedures.
 - 2. The CxA will witness equipment start up and testing. The **[Contractor]** shall notify the CxA in writing at least fourteen (14) calendar days in advance of the start-up and testing dates so that the CxA can schedule attendance. If the CxA is not notified in advance of a scheduled start-up or testing activity, the start-up or testing shall be rescheduled and repeated to the satisfaction of the CxA. When scheduled start-up activities are not executed because of lack of preparation or coordination by the **[Contractor]** the **[Contractor]** will be subject to back-charges in accordance with the Contract Documents.
 - 3. The **[Contractor]** shall complete and compile all start-up forms, test forms and SRCs for the System Readiness Manual and submit to the CxA.
 - 4. Upon receipt of the completed System Readiness Manual forms, the CxA will perform an Installation Verification by providing various inspections and back-checks of the completed System Readiness Manual forms. Issues notes during this process will be documented by the CxA in the Commissioning Issues Log.
 - 5. Upon acceptance of the System Readiness Manual, which includes the draft TAB report, functional performance testing shall be scheduled. Functional performance testing shall not commence until all critical issues identified during the Installation Verification process are resolved.
- G. Upon completion of the start-up and contractually required work, the **[Contractor]** shall submit a 'Ready to Commission' document to the University for the Specific Equipment and/or system that is complete. It is only after this document is received that the FPTs will commence.

3.04 Functional Performance Testing:

- A. Functional Performance Testing of commissioned systems shall begin after all critical issues discovered during the installation verification process have been corrected.
- B. The procedure for developing and performing the FPTs shall be as follows:
 - 1. The **[Contractor]** shall provide the equipment and commissioning submittals as specified in the Contract Documents.

2. The Commissioning Authority will draft the FPT procedures based on the **[Contractor's]** submittals as approved by the Design Team. The draft procedures will be submitted to the Commissioning Team for review.
3. Each **[Contractor]** and equipment supplier that is specified as an FPT participant in the FPT Summary Tables in the specifications shall participate in the development and performance of the associated FPTs. Each FPT participant shall provide written comments on the associated FPT procedures regarding each of the following issues:
 - a. Verify that the procedures can be performed without compromising the safety of the participants
 - b. Verify that the procedures can be performed without compromising the warranties of equipment, components, and systems
 - c. Verify that the procedures are appropriate for the equipment, components and systems as provided
4. The CxA will complete the working drafts of the FPT procedures.
5. Subcontractors and suppliers shall provide the personnel, expertise and test equipment to operate and maintain the systems during testing.
6. The **[Contractor]** shall test all systems within the commissioning scope of work, using the FPT procedures until the acceptable results specified in the FPT procedure are verified and documented. If necessary to obtain acceptable results, the **[Contractor]** may consult with the CxA to acquire clarification and resolve issues. The CxA will be available for on-site assistance of this nature.
7. The **[Contractor]** shall submit documentation that verifies that the acceptable results specified in the FPT procedures have been verified and that they are ready to demonstrate the FPTs with acceptable results. Acceptable documentation consists of completed FPT record forms which document acceptable FPT results or indication on the Systems Readiness Checklists that the **[Contractor's]** pre-functional testing has verified that functional performance testing of the equipment and associated system demonstrate the acceptable results as specified.
8. After the CxA has accepted the **[Contractor's]** documentation of acceptable results, the FPT shall be conducted and demonstrated to the CxA. If acceptable results are not demonstrated for an FPT, the **[Contractor]** shall resolve the issue(s) and the demonstration shall be repeated.

9. The **[Contractor]** shall verify and document acceptable FPT results for all equipment components and systems. The FPTs may be demonstrated for a sample of the systems that comply with all of the following criteria. This process is referred to in this document as “demonstration sampling”.
 - a. There shall be many of the systems with similar components that have identical sequences of operation which are implemented using identical control software programming.
 - b. The components and systems to be included in the Demonstration Samples will be chosen by the CxA at the time of demonstration.
 - c. The sample size will be in accordance with the Functional Performance Test (FPT) Demonstration Sampling Tables in the specifications.
 - d. Acceptable results must be demonstrated for the entire sample. If the FPT results are not acceptable due to a lack of preparation or coordination by the **[Contractor]** for any system or component sampled, the FPT shall be demonstrated for all the systems and components for which it was written. Whenever the demonstrated results are not acceptable, the **[Contractor]** shall make corrections and the FPT shall be demonstrated again. The cost of back-checking FPTs with unacceptable results is not included in the Commissioning Authority’s scope of work. Back-charging applies to additional back-checking required due to lack of preparation by **[Contractor]**.
10. The CC is responsible for scheduling and coordinating functional testing activities. The **[Contractor]** shall demonstrate the FPTs after they have verified that performing the FPTs will yield the documented acceptable results. The **[Contractor]** is subject to back-charging, as specified herein, if acceptable results are not demonstrated because of work that should have been verified during pre-demonstration testing prior to the submittal of the System Readiness Manual. Acceptable results must be obtained during a single demonstration. No more than two delays of less than 15 minutes each are acceptable for each test.
 - a. In addition to conducting the functional tests developed by the CxA, the **[Contractor]** shall be required to complete all start-up and testing procedures as specified elsewhere in the Contract Documents.
 - b. Where the CxA requires BMS trending, the CxA will provide a points list within the FPT form that may include both hardware (input/output) and software (virtual) points and appropriate trending intervals.
11. The **[Contractor]** shall provide trend data to the CxA in electronic format. As a University approved alternative, the **[Contractor]** can provide the CxA remote access to the BMS and provide training that will allow the CxA to directly download trend data.
12. The CxA will analyze and review the trend data and associated system performance.

3.05 Cx AGENT Functional Performance Testing (FPT)

- A. Upon receipt of the Ready to Cx statement, the Cx Agent will coordinate a time with the **[Contractor]** to witness the FPTs.
- B. The CxA develops specific equipment and system functional performance test procedures. The **[Contractor]** and manufacturer review the procedures to make sure the tests are safe for the equipment provided.
- C. The functional test procedures are executed by the **[Contractor]**s, under the direction of, and documented by the CxA.
- D. The CxA will direct a TAB verification, with support from the TAB **[Contractor]**, to verify the values reported in the final TAB report.
- E. Items of non-compliance in material, installation or setup are corrected at the Sub's expense and the system retested.
- F. All deficiencies noted will be tracked via the CxA issues log. The **[Contractor]****[CM/Contractor]** will be responsible for obtaining sign-off of corrected items.
 - 1. The **[Contractor]** is responsible for scheduling and coordinating commissioning activities. The **[Contractor]** shall reimburse the University for the cost of commissioning activities that must be repeated because of a lack of preparation or coordination by the **[Contractor]**. Reimbursable costs include CxA fees for services billed at the CxA's standard hourly rate. Activities subject to back-charging include: Repeated back-checking: Commissioning issues are documented in the Commissioning Issues Log. The **[Contractor]** shall submit a brief written statement describing when and how each issue has been resolved, which shall be added to the Issues Log maintained by the CxA. The CxA will back-check these issues on a one-time-per-issue basis to verify they have been resolved. If the back-checked issues that have not been resolved as reported, the associated cost of the unsuccessful back-check shall be subject to back-charging.
 - 2. Repeated installation verification: Once the **[Contractor]** has submitted the completed System Readiness Manual forms, the CxA will perform final installation verifications on selected systems. Discrepancies discovered will be reported in the Commissioning Issues Log. Back-checking the correction of these discrepancies shall be subject to back-charging.
 - 3. Repeated witnessing of FPT demonstrations: As specified in this section, the **[Contractor]** demonstrates the functional performance tests after they have verified that performing the FPTs will yield the documented acceptable results. The cost of witnessing demonstrations that do not demonstrate specified acceptance criteria shall be subject to back-charging.

3.06 SAMPLING

- A. As noted in the specifications, multiple identical pieces of non-life-safety or otherwise non-critical equipment will be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Subs is allowed in pre-functional checklist execution.
- B. Sampling strategy referenced in the Specifications as the “xx% Sampling—yy% Failure Rule” is defined by the following example:
1. xx = the percent of the group of identical equipment to be included in each sample.
 2. yy = the percent of the sample that if failing, will require another sample to be tested.
- C. The example below describes a 20% Sampling—10% Failure Rule.
1. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.” If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
 2. If 10% of the units in the second sample fail, test all remaining units in the whole group. If at any point, frequent failures are occurring, and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

3.07 FAILURE DUE TO MANUFACTURER DEFECT:

- A. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the **[Contractor]** the University, the A/E, or the CxA. In such case, the **[Contractor]** shall provide the University with the following:
1. Within one week of notification **[Contractor]** or manufacturer’s representative shall examine all other identical units making a record of the findings. The findings shall be provided to the University within two weeks of the original notice.

2. Within two weeks of the original notification, the **[Contractor]** or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation. The University will determine whether a replacement of all identical units or a repair is acceptable.
3. Two examples of the proposed solution will be installed by the **[Contractor]** and the PM will be allowed to test the installations for up to one week, upon which the University will decide whether to accept the solution. Upon acceptance, the **[Contractor]** and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

3.08 DEFERRED TESTING

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the University, A/E, and CxA. These tests will be conducted in the same manner as the seasonal tests as soon as possible.
- B. Seasonal Testing: During the warranty period, seasonal testing shall be completed as part of this contract. Seasonal testing is intended to test the performance of systems under full load conditions that cannot be simulated during the functional testing period. For example, it is impossible to test the heating system under full load conditions in July, so the heating system would be full load tested during the winter months. The CxA shall coordinate this activity. Tests will be executed, documented, and deficiencies corrected by the appropriate Subs, with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and As-Builts due to the testing will be made by the **[Contractor]**.

3.09 TRAINING OF UNIVERSITY PERSONNEL

- A. The **[Contractor]** shall be responsible for training coordination and scheduling and ultimately for ensuring that training is complete. The CxA will be responsible for overseeing and approving the adequacy of the training of University personnel for commissioned equipment.
 1. Instructor capabilities shall be commensurate with level of instruction required. Instructor qualifications shall be submitted to University and CxA for review prior to training.
 2. The specific training requirements of University personnel by Subs and vendors as directed within the specifications.

3. Each Sub and vendor responsible for training shall submit a written training plan to the CxA for review and approval prior to training. The plan shall include the following elements:
 - a. Equipment (included in training)
 - b. Intended audience
 - c. Location of training
 - d. Objectives
 - e. Subjects covered (description, duration of discussion, special methods, etc.)
 - f. Duration of training on each subject
 - g. Instructor name and qualifications for each subject
 - h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
4. The CxA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA recommends approval of the training to the University.

3.10 COMMISSIONING ISSUES LOG:

- A. Issues identified during the commissioning process, including during site observations, pre-functional testing verification and functional testing, will be logged in the commissioning issues log. The CxA will maintain the master log. For each issue, the CxA will make a recommendation regarding who they believe is in the best position to provide the resolution. However, it is the **[Contractor]**'s responsibility to manage issue resolution, including the determination of how the issue will be resolved and who will do the work.
- B. Each issue on the list will be classified with a "status" of either "resolved", "unresolved", or "resolved-unverified". "Resolved" issues are closed, having either been addressed by the **[Contractor]** and verified as corrected by the CxA or having been accepted by the University. "Resolved-unverified" issues have been reported as resolved by the **[Contractor]** but are not yet verified by the CxA as resolved. "Unresolved" issues have not been reported as addressed by the **[Contractor]**. Updated unresolved issues lists will be distributed to team in MS Word/Excel format.
- C. Material and method issues discovered during commissioning, but that pertain to **[Contractor]** construction shall be promptly reported to the A/E, CxA and the University's Representative.

- D. When a commissioning issue is resolved, the **[Contractor]** shall submit an updated list with a written response describing when and how the issue is resolved. The CxA or an applicable member of the Design Team shall then back-check the resolution of said issue. The CxA scope of work includes one back-check of issues that the **[Contractor]** reports as resolved. Back-charging applies to back-checking required due to lack of preparation of **[Contractor]**.

3.11 OPERATION AND MAINTENANCE MANUALS:

- A. The specific content and format requirements for the standard O&M manuals are detailed in Section 017800 Closeout Submittals. Special requirements for TAB contractor in appropriate Division 23 Sections and for the Controls contractor are found in appropriate Division 23 Sections. Electrical requirements are located in the appropriate Division 26 Sections. Refer to the specifications for additional O&M requirements.
 - 1. System Narrative. The **[Contractor]** shall include in the beginning of the O&M manuals a separate section describing the systems including:
 - a. A system narrative describing the type and function of the system.
 - b. Site information, including facility description and current requirements
 - c. Simplified professionally drawn single line system diagrams on 8 ½" x 11" or 11" x 17" sheets. These shall include chilled water distribution system, water system, condenser water system, heating system, supply air systems, and exhaust systems and others as designated. These shall show major pieces of equipment such as pumps, heat exchangers, humidifiers, control valves, expansion tanks, coils, service valves, etc.
- B. CxA Review and Approval. Prior to material completion, the CxA shall review the O&M manuals, documentation and redline As-Builts for systems that were commissioned and list other systems documentation that the CxA should review to verify compliance with the Specifications. The CxA will communicate deficiencies in the manuals to the University or A/E, as requested. Upon a successful review of the corrections, the CxA recommends approval and acceptance of these sections of the O&M manuals to the University or A/E. The CxA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the A/E's review of the O&M manuals according to the A/E's contract.

3.12 CLOSE-OUT PROCESS

- A. All start-up documentation generated by the subcontractors shall be submitted to the Cx agent and the University in an electronic format.
- B. The sign-in sheets for all training sessions shall be submitted to the Cx agent and the University in electronic format.
- C. All training activities will be scheduled at mutually agreeable times between the **[Contractor]** the University, and the Cx agent.

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END OF SECTION 01 91 00

SECTION 01 91 10**BUILDING ENVELOPE COMMISSIONING**

NOTE: This section should be used for **ALL** new construction and *some* renovation projects (stucco repair, etc.). Use of this section **MUST** be coordinated with Section 01 43 00 Mock-Ups.

PART I - GENERAL

1.01 SUMMARY

- A. Building Envelope Commissioning is the overall building enclosure quality assurance process and requirements in addition to quality assurance procedures specified in individual Sections.
- B. Perform and document Building Envelope Commissioning (BECx). This Section supplements but does not supersede specific testing requirements found elsewhere in the Contract Documents. Include below-grade and above-grade construction as follows:
 - 1. Below-grade construction including foundations, foundation walls, slabs-on-grade, and basements.
 - 2. Above-grade Building Envelope including assemblies of exterior walls (sheathing, insulation, framing, interior finish), windows and glazing systems, doors and other exterior wall penetrations.
 - 3. Roof construction, including roofing system, insulation, skylights, hatches, and other roof penetrations.
 - 4. Interconnection between materials, components, and systems including flashing, expansion joints, and sealants.

Note to PM: Verify actual section numbers and titles with Design Professional, or edit Sections to meet Project Requirements

C. Related Sections:

1. Section 014100 REGULATORY REQUIREMENTS
2. Section 014500 QUALITY CONTROL
3. Section 017700 CLOSEOUT PROCEDURES
4. Section 017800 CLOSEOUT SUBMITTALS
5. Section 019100 COMMISSIONING
6. Section 014300 MOCK-UPS
7. Section 018200 DEMONSTRATION and TRAINING
8. Section 042200 CONCRETE UNIT MASONRY
9. Division 07 – All Sections
10. Division 08 – All Sections
11. Section 092400 PORTLOAND CEMENT PLASTER
12. Section 099113 EXTERIOR PAINTING
13. Section 099600 HIGH PERFORMANCE COATINGS

1.02 REFERENCE STANDARDS

- A. ASHRAE Guideline 0-2005, 'The Commissioning Process'
- B. ASTM E2813-12, 'Standard Practice for Building Enclosure Commissioning'
- C. National Institute of Building Sciences 'Building Enclosure Commissioning Process BECx', Guideline 3, latest edition.

1.03 QUALITY ASSURANCE

- A. The University will employ the Building Envelope Commissioning Manager (BECx)
 1. The BECx shall manage, coordinate and supervise the Building Envelope Commissioning activities including the following:
 - a. Coordinate submittals and requests for information with the University's Representative pertaining to this specification section.
 - b. Coordinate inspection and testing activities with the **[Contractor]**. Create a detailed testing plan which identifies when the various tests will be completed and actions to be taken if deficiencies are found.

- c. Supervise the Building Envelope commissioning process and coordinate the commissioning activities with the **[Contractor]** and the University Representative. **[Contractor]** to assign a coordinator authorized as a representative of each trade in commissioning activities.
- B. Coordination Meetings:
1. The BECX shall plan and conduct coordination meetings including, University Representative, **[Contractor]**, and other required parties as construction progresses.
 - a. A kick-off meeting shall be scheduled at least 30 calendar days prior to the start of foundation installation. The objectives of the meeting are to review the building enclosure commissioning work scope, to clarify team member roles and responsibilities, and to plan the commissioning activities for the entire duration of the project.
 - b. Subsequent meetings shall be scheduled every two weeks or as needed during the completion of the building enclosure. The objective of these meetings is to facilitate coordination of the Work and resolve conflicts and deficiencies before performance testing of the Mockup and the following construction.

1.04 SUBMITTALS

- A. Building Envelope Commissioning Plan and Schedule: **[Contractor]** to provide a recommended schedule for commissioning activities and provide specific information on the date and duration of individual tests for all components that make up the building enclosure from below grade to the highest point on the building to the BECx for coordination with the Building Envelope Commissioning Plan. BECx shall review the schedule and make recommendations back to the **[Contractor]** for final insertion into the Project Schedule.
- B. The **[Contractor]** to coordinate with submittal requirements within related specification section as it pertains to this section.

1.05 **[CONTRACTOR]****[CM/CONTRACTOR]**'S RESPONSIBILITIES

- A. Provide all materials, labor and documentation to execute the Building Envelope commissioning activities described in the Contract Documents.
- B. Coordinate the commissioning work included herein and ensure that all trades execute their responsibilities according to the Contract Documents.
- C. Include Building Envelope Commissioning and required testing and inspection activities in the contract schedule

- D. Attend commissioning meetings and provide meeting notes of those meetings.
- E. Building Envelope Commissioning Coordinator (BECC): The **[Contractor]** shall provide a Building Envelope Commissioning Coordinator. The BECC, the University's Representative and the BECC will comprise a commissioning management team. While the BECC leads the overall commissioning process, the BECC is responsible for managing the day-to-day performance of the specified commissioning work. The BECC is an employee of the **[Contractor]** who is regularly and frequently on site and shall be responsible for only the Building Envelope portion of all Cx activities. Qualifications for the BECC include experience and excellent abilities to schedule, coordinate and manage subcontractors. The following tasks are some of the critical items included in the BECC's scope of work:
1. Integrating the specified commissioning activities into the overall contract construction schedule, updating the schedule and providing three-week look-ahead schedules showing the upcoming commissioning related activities.
 2. Providing all commissioning submittals to the University's Representative.
 3. Coordinating University training and ensuring that training is provided in accordance with the commissioning specifications.
 4. Ensuring that subcontractor and supplier reviews of the BECC provided procedures and forms are completed and submitted in accordance with the specifications. This includes providing written comments (even if no exception is taken) regarding issues pertaining to safety, equipment protection/warranty and appropriateness of the procedure for the systems as provided from all required testing.
 5. Providing test reports and progress reports in accordance with the commissioning specifications.
 6. Managing the [Contractor][CM/Contractor]'s participation in the testing process in accordance with the commissioning specifications.
 7. Managing the [Contractor][CM/Contractor]'s participation in resolution of issues identified during commissioning.
 8. Ensuring that subcontractors perform preliminary testing to verify readiness for final testing, submitting documented verification that systems will pass tests with acceptable results to the University's Representative and the BECC.
 9. Coordinating repeat tests that fail due to Contract deficiencies until acceptable results are achieved and managing the reimbursement of the University's costs for repeated tests in accordance with the commissioning specifications.

1.06 PERFORMANCE REQUIREMENTS

F. Testing

1. Perform testing on the building during construction according to the approved Building Envelope Commissioning plan.

Note to PM: select duration below in conjunction with water intrusion consultant and coordinated with size and complexity of the project.

2. In addition to testing the Mock-up, provide for 8 hours of select testing on the building as determined and directed by University's Representative.
3. Provide reports after each test, stating the results, and recommended re-testing if necessary.
4. Submit reports to University's Representative for review.
5. Do not proceed with re-testing until University's Representative has completed its review and stated so in writing.

G. Mock-ups:

1. Reference Section 01 43 00 Mock-ups and specifications for location and specific configuration requirements.
2. All testing and retesting shall occur on the mock-ups unless otherwise allowed by the University's Representative.
3. Color choices may be incorporated into the mock-ups but shall in no way impact or delay the mock-up and testing schedule.
4. Upon approval of the mock-up, the **[Contractor]** shall be released to begin installation on the building.
5. The University's Representative shall review the building, including construction sequence and technique, for comparison to the mock-up.

H. In Place Testing:

1. **[Contractor]** can elect for any required testing or re-testing to be in place on the building only as accepted by the University Representative.
2. Coordinate in-place testing with the completion of exterior systems and prior to the closing-in of the interior of walls or ceilings related to the testing location to allow for results to be evaluated and any required correction of deficiencies complete within construction sequencing.

1.07 SYSTEMS PERFORMANCE TESTING

Note to PM: confirm the list of tests to include with the Design Professional, The Building Commissioning Agent and water intrusion consultant. Then, have the DP coordinate requirements with technical sections as appropriate.

- A. Make the following tests of the mock-ups in the order listed:
1. Preliminary loading at 20 psf.
 2. Air Infiltration (Static Pressure): ASTM E783- Field Measurement for Air Leakage through Installed Exterior Windows and Doors, except test pressure difference shall be 6.24 psf. Infiltration for entire assembly shall not exceed 0.1cfm/sf/min.
 3. Water Penetration (Cyclic Pressure): ASTM E 1105 - Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference. Test to full design pressure without de-rating. No water intrusion is acceptable. The definition of water intrusion includes any water visible from the finished building interior, whether or not defined as controlled.
 4. Water penetration testing of exterior wall claddings. CBC Section 1403.2. Test all claddings, following this test procedure. Test to the code prescribed minimum pressure or building design pressure, whichever is greater.
 5. Other testing as required by the specifications.
- B. The required tests for the final in-place building systems are as follows:
1. Whole building pressurization testing.
 2. Building air leakage testing:
 - a. ASTM E779: Standard Test method for Determining Air Leakage Rate by Fan Pressurization
 - b. ASTM E1827: Standard Test Method for Determining Air Tightness of Buildings Using an Orifice Blower Door
 - c. Leakage rates range from [0.1 to 0.6 CFM 75/SF per ASHRAE] [0.3 per LEED]
 3. Water intrusion testing for building envelope and penetrations via AAMA 501.1.
 4. Roof water intrusion tests via ASTM D5957.
 5. Envelope thermal barrier testing: infrared thermography (for use after building is completed.)

6. Thermal performance tests CAN/CGSB 149-GP-2MP
7. Air Leakage testing: ACE and/ or NEBB Standard (specify zones: whole building, window/wall sections/ building areas)
8. Adhesion pull testing per ASTM D4541-17 (for pull-off strength of coatings from metal (woods or plastic) surfaces: ASTM D7234 is for use for coatings from concrete surfaces)
9. Other testing as required by the specifications.

PART II - PRODUCTS – Not applicable to this section.

PART III -EXECUTION

3.01 QUALITY CONTROL

- A. All testing shall be witnessed by the University's Representative, BECx, Architect and Special Inspector, as required. Notify the University's Representative of testing schedule 48 hours in advance.
- B. Testing procedures:
 1. **[Contractor]** shall conduct tests of mock-ups and final in place building systems in the presence of the University's Representative and the BECx. Proceed with each test as coordinated with the University Representative after **[Contractor]** notification that systems are ready, and the detailed outline of test procedure is accepted.
 2. Test protocol requires that air infiltration testing precede water tests. Should it be necessary for a water test to be performed in advance of the air test, the specimen must be allowed to completely dry before air test.
 3. The testing documentation shall be distributed and approved prior to proceeding to the next stage of envelope construction and at completion of the envelope.
 4. Test reports shall include a description of the specific building enclosure system at the time of testing, date and time of test, description of test performed, listing of testing results, and all supporting measures data along with corrective recommendations as required.
 5. If corrective work is to be performed, test shall be repeated, and a revised report submitted.

C. Corrective Measures:

1. Correct any deficiencies in the mock-up observed during testing and repeat tests as may be required to show compliance with the specified performance standards and the Contract Documents. Resubmit any submittals affected by these corrections. Resubmit Shop Drawings with changes made to assemblies to successfully complete preconstruction testing.
2. Deficiencies requiring repair or modification to the mock-up shall mandate a complete retesting of the mock-up beginning with the specified Preliminary Test unless otherwise requested by the University's Representative. If compliance with the performance standards is not achieved after 2 complete retests the **[Contractor]** shall replace mock-up completely with revised construction and start testing from the beginning.
3. Incorporate corrective measures indicated by the test report into the final exterior wall assemblies after review by the University's Representative.

D. Final Acceptance of the mock-up shall be done in writing:

1. Successful testing results and the completed test report are required for this acceptance and prior to start of work on final building systems in place.

3.02 BECx INSPECTIONS AND TESTING REQUIREMENTS

A. Provide all materials, labor, testing and documentation to execute the commissioning activities as described below and for elements of the building envelope as described in their individual Sections, including, but not limited to the following:

1. Water intrusion: 100% visual inspection of installed Work, performed in progress, documented by field reports, and in addition:
 - a. Below-grade construction, including foundation walls, below grade drainage and slabs-on-grade:
 - 1) Inspections performed by qualified inspector approved by waterproofing system manufacturer provided by University Representative.
 - b. Above-grade construction, including: exterior wall systems and assemblies
 - 1) Inspections performed by qualified Building Envelope Consultant provided by the University.
 - 2) Perform water penetration testing on 10% of installed fenestration, of each type (glazed window, curtain wall and sloped glazing (skylight) systems).
 - 3) Perform Stucco Wall Area Performance Testing at two additional locations as selected by the University's Representative.

- 4) Perform water penetration testing on a sample penetration within each type of enclosure system.
- c. Roofing systems:
- 1) Steep-slope and low-slope roofing
 - a) Inspections performed by Certified Registered Roofing Observer provided by the University.
 - 2) Waterproofing systems and assemblies over occupied space: outdoor plazas, planters and paving
 - a) Inspections performed by the qualified Building Envelope Consultant provided by the University.
- d. Interface conditions (flashings, expansion joints, and sealant) between each of the materials, components and systems that comprise the above and below grade Building Envelope
- 1) Inspections performed by qualified Building Envelope Commissioning Consultant provided by the University.
 - a) Other testing as required by the specifications.

3.03 SEASONAL / DEFERRED TESTING

- A. Provide an allowance for 8 hours' time to assist the University's Representative with seasonal or deferred functional performance testing during the warranty period.

END OF SECTION 01 91 10

SECTION 132800

ASBESTOS ABATEMENT AND IN-PLACE MANAGEMENT

PART I - GENERAL

1.01 DESCRIPTION

- A. The safe abatement and in-place management of asbestos containing materials (ACM) and presumed asbestos containing materials (PACM) at the A/C 9558960 Sub 07 East Wing Tower & Radiology SPC 4D, is the primary purpose of this specification. The contract provisions are designed to protect University community members from exposure as a result of work being performed by the Contractor.

1.02 SCOPE OF WORK

A. Work Included – General

1. The Contractor shall furnish all labor, materials, equipment, services, testing, employee training, fit tests, medical exams, transportation, insurance, and daily expense to meet the requirements of this specification.
2. The Contractor shall obtain all required permits, licenses, registrations, and notifications, and regulatory approvals required by law and UCDCM policy.
3. All asbestos abatement activities associated with this contract shall be performed between the hours of **7:00 AM to 5:00 PM** unless coordinated with the University's Representative.
4. The Contractor shall guard against unnecessary disturbances or damage to sensitive finishes on buildings, building systems, and equipment.
5. Any job with more than one class designation (see T8 CCR 1529) shall be performed at the higher standard. For example, a contract let for class II and class III work will be performed at the class II level.

B. Work Included – Specific

1. In general, the project will include investigation of structural components and connections throughout the East Wing for seismic upgrade work. The Contractor is responsible for identifying the exact locations and number of work areas listed below by referring to University supplied project drawings and by working with the University's Representative.
2. The East Wing Tower & Radiology SPC 4D project area has been tested for asbestos containing materials by various independent asbestos consultants. Asbestos materials have been identified in the project area and may be impacted by the planned project. See Section 1.03 Site Characterization and the table identifying the different asbestos materials present in the project area.
3. This project may include removal of asbestos containing fireproofing materials in spot locations for structural investigations. In the East Wing, asbestos containing fireproofing is present on the underside of the roof deck with a considerable amount of fireproofing debris on top of the ceiling system and within the interstitial cavities between walls. Due to the asbestos contamination assumed to

be present on top of ceilings and assumed to be present within the open top plaster wall cavities, all plaster wall and ceiling materials within the East Wing are considered as asbestos containing materials. In addition, all ducts, insulation, electrical wiring, piping, conduit, electrical wiring, etc., located in the attic space and wall cavities are considered contaminated with asbestos.

4. The project may include access into the attic space to conduct the work required. Small amounts of fireproofing might required to be removed for investigation work. This project will require a licensed asbestos contractor registered with DOSH to perform removal of all selected asbestos containing materials and asbestos contaminated materials within work environments in accordance with Title 8 1529 Asbestos in Construction in order to accomplish the tasks.
5. It is anticipated that work might be required in asbestos contaminated attic spaces by other non-asbestos abatement trade workers. This may require trades that are trained in asbestos and respiratory protection to work in asbestos contaminated work environments to perform this work.
6. Concrete slab floors are assumed to be contaminated with black flooring mastic or fireproofing. If coring work is done through concrete slabs, additional cleaning and removal of all sides of affected concrete will be necessary. Structural concrete columns and beams are known to be asbestos containing and will require asbestos work practices for any work affecting this material.
7. Work practices and procedures for asbestos removal are provided in these specifications.
8. The asbestos contractor will be responsible for replacement of the fireproofing materials in the same locations removed following the attachment to the exposed sections of structure by the other trades. The new fireproofing materials shall be hand packed by the asbestos contractor. See other specifications regarding materials, execution and performances for this required work.
9. The asbestos contractor will be responsible for soft demolition of items from the work area to minimize potential disturbance to asbestos materials.

1.03 SITE CHARACTERIZATION

An asbestos inspection was conducted by the University's Representative's Hazardous Materials Consultant who is a California Certified Asbestos Consultant. Materials found or presumed to contain asbestos at this job site are listed in the table below. The table below does not suggest all of the materials are to be removed. It is provided to inform the contractor on all asbestos containing materials that have been identified in the project area that the contractor will be working near and around during execution of the project.

Asbestos Containing Materials in East Wing				
<i>Building System Description</i>	<i>NESHAP Class</i>	<i>Cal/OSHA Class I, II, or III</i>	<i>% of Asbestos</i>	<i>Location</i>
Fireproofing in Attic Space on Floors 1-8	RACM	I	5-10%	Throughout East Wing
Pipe Insulation in Attic Space and Interstitial Wall Cavities on Floors Basement to 8 th level	RACM	I	5-15%	Throughout East Wing
Wall Plaster - Cavities with Fireproofing or Pipe Insulation Debris on Floors Basement to 8 th level	RACM	I	Assumed > 1%	Throughout East Wing
Ceiling Plaster – Attic Spaces with Fireproofing or Pipe Insulation Debris on Floors Basement to 8 th level	RACM	I	Assumed > 1%	Throughout East Wing
9" Vinyl Floor Tiles on Floors Basement to 8 th level	Cat I	II	3%	Throughout East Wing – May be Present Beneath Visible Flooring
Floor Mastic and Base Cove Mastic on Floors Basement to 8 th level	Cat II	II	5%	Throughout East Wing
Rough Plaster	Cal/OSHA ACCM	II	<1%	East Wing 8 th Floor Janitor Closet 8122
Structural Concrete Columns & Beams Throughout East Wing	Cal/OSHA ACCM	II	<1%	Throughout East Wing
Concrete Slab Floors / Ceiling Decks Throughout East Wing	Cal/OSHA ACCM		<1%	Throughout East Wing
Concrete Slabs considered surface contaminated with black flooring mastic or spray-applied fireproofing. Cleaning of affected area will render slab non-asbestos containing.				

1. Asbestos inspection reports including asbestos laboratory reports with results by polarized light microscopy (PLM) are available to the Contractor by contacting the University's Representative.
- B. Non-asbestos containing materials have been identified and sampled for this project. The table below includes a list of materials sampled and found not to contain asbestos. If the Contractor discovers building materials on the project not included in either Table A (Asbestos Containing List) or Table B (Non-asbestos Containing List) the Contractor shall bring this to the attention of the Project Manager, which may result in asbestos sampling by the University's Certified Asbestos Consultant.

Building Materials Sampled and Found Not to Contain Asbestos	
Material Description	Location
Drywall & Joint Compound	Newer renovated areas in East Wing
Various 12" Vinyl Floor Tile & Yellow Mastic	East Wing
Concrete Walls	East Wing
Concrete Slabs (Surface Cleaned)	East Wing
Sheet Vinyl Flooring	East Wing 1 st Floor Vacant Room 1119

- C. Hazardous materials, other than ACM/PACM that have the potential to be disturbed at this job site are listed in the table below:

<i>Material Description</i>	<i>Type of Hazard</i>	<i>Quantity (approx.)</i>
Fluorescent Light Bulbs	Mercury	See Drawings
Light Ballasts	PCB's	See Drawings
Light Ballasts	Universal Waste	See Drawings
Mold Contamination	Mold	Undetermined
Thermostat Switches	Mercury	See Drawings
Exit Signs	Radioactive Gas Tritium	See Drawings
Painted Surfaces & Ceramic Products	Lead in Paint and Glaze	See 13281

1. The Contractor shall review non-asbestos hazardous material required protocols with the University's Representative and the EH&S Representative. Lead related work will be addressed in Section 13281 specifications, if applicable.

1.04 JOB WALK PROTOCOL

- A. The pre-bid walk may include the inspection of contaminated areas cited in 1.02.A or 1.02.B. All bidders are required to wear respirators and protective clothing per CCR, Title

8 1529. Prior to entering contaminated areas, the bidder must show proof of (1) AHERA or asbestos awareness training and (2) a respirator fit test within the past 12 months.

- B. For access into attic spaces in project areas identified with known asbestos containing fireproofing or pipe insulation materials resulting in asbestos debris on top of plaster ceilings, a controlled access will be required by Contractors who desire to look or inspect the attic spaces. Access will require a controlled mini-containment to minimize potential asbestos contamination into the space below the ceiling system. Some attic spaces in the project area are contaminated with asbestos pipe insulation.
- C. Short Duration Access into the Attic Space (≤ 30 minutes/day) – Mini-containment
 - 1. Entry protocols - Put on respirator, perform negative pressure and positive pressure fit tests. Put on a disposable protective clothing (over street clothes) and enter the mini-containment to view the contaminated space from a ladder.
 - 2. Exit protocol – Close the ceiling access. Remove any visible debris that may have fallen into the mini-containment using a HEPA-filtered vacuum followed by damp wiping of the entire interior of the containment. Take off the disposable protective clothing and place into the asbestos waste bag located inside of the mini-containment. Damp wipe and HEPA vacuum the exterior of the waste bag. Damp wipe exposed skin and place wipes into waste bag. HEPA vacuum street clothes. While still wearing the respirator, place the waste bag outside of the containment and exit the mini-containment. Remove the respirator outside of the mini-containment and tape opening to respirator filters. Damp wipe the respirator, hands and face, and place wipes into waste bag. Seal the waste bag with duct tape and place it into a second waste bag. Seal the second waste bag with duct tape.
- D. Long Duration Access (> 30 minutes/day) -
 - 1. Not Available unless by special request.

1.05 ABBREVIATIONS AND DEFINITIONS

- A. Abbreviations
 - 1. ACM: Asbestos Containing Material
 - 2. AHERA: Asbestos Hazard Emergency Response Act
 - 3. CARB: California Air Resources Board
 - 4. CSLB: Contractor's State Licensing Board
 - 5. CDPH: California Department of Public Health
 - 6. DOP: Dispersed Oil Particulate
 - 7. DOSH: Division of Occupational Safety and Health (Cal/OSHA)
 - 8. ELAP: Environmental Laboratory Accreditation Program
 - 9. EH&S: UCDMC Department of Environmental Health & Safety
 - 10. NEA: Negative Exposure Assessment
 - 11. NPE: Negative Pressure Enclosure
 - 12. NVLAP: National Voluntary Laboratory Accreditation Program
 - 13. PACM: Presumed Asbestos Containing Material
 - 14. RACM: Regulated Asbestos Containing Material
 - 15. TSI: Thermal System Insulation

16. University or University of California Davis Medical Center (UCDMC), or Owner shall be considered the same entity when used in these specifications.
- B. Definitions: The following definitions are provided for additional clarification to the California Code of Regulations (CCR), Title 8, 1529 and the Sacramento Metropolitan Air Quality Management District (SMAQMD) Rule 902.
1. ACM and PACM are defined in 8 CCR 1529; which includes friable and non-friable asbestos. These regulations include the use of worker protection, negative pressure enclosures (NPE), air monitoring, etc.
 2. Ambient Air Quality refers to the quality of local air conditions prior to the commencement of asbestos related work.
 3. Per T8 CCR 1529, Class I asbestos work involves the removal (abatement) of TSI or Surfacing material when (1) more than one glove bag is used or (2) removal of TSI or Surfacing material consisting of more than one 60" X 60" waste bag.
 4. Per T8 CCR 1529, Class II asbestos work involves the removal (abatement) of non-TSI or non-surfacing material if the work is not repair or maintenance as defined by Class III. Examples of Class II work include removal of floor tile, floor mastics, gypsum wallboard with joint compound, roofing and siding shingles, construction mastics, etc.
 5. Per T8 CCR 1529, Class III asbestos work involves repair and maintenance of friable ACM/PACM that is either TSI or Surfacing materials, but does not exceed the removal of ACM/PACM that exceeds either one glove bag or one 60" x 60" disposal waste bag.
 6. Per T8 CCR 1529, Class IV asbestos work refers to contact but no disturbance of ACM/PACM. Class IV work refers to clean-up operations of Class I, II, or III projects. Class IV work does not refer to incidental contact by maintenance workers (see 8 CCR 5208 for custodial/maintenance workers guidelines).
 7. Negative Pressure Enclosure (NPE) refers to full containment and mini-containments under negative pressure with HEPA filtered exhaust.

1.06 SUBMITTALS

- A. The submittals listed in 1.06 B must be completed and accepted by the University's Representative with the concurrence of the EH&S Representative prior to the contractor beginning any work.
- B. List of Submittals:
1. References to include three projects of similar scope and size.
 2. Notifications to Cal/OSHA and Sacramento Metropolitan AQMD (if applicable).
 3. Permits if applicable (federal, state, local, or UCDMC).
 4. Current certificates of AHERA Asbestos Training for Workers and Supervisors. See Section 3.07.
 5. Copies of all asbestos training and respiratory training for various Trade workers who will be working in the contaminated work spaces. See Section 3.07.
 6. Current respiratory fit test records (within past 12 months) for all workers required to wear a respirator.
 7. Physician's certificates of medical fitness for respiratory use for all workers

- wearing a respirator and medical evaluation for asbestos related work (within 12 months) for all asbestos abatement workers.
8. DOSH Registration for asbestos related work.
 9. DOP certificates for all HEPA vacuums and negative air machines, which are required to be tested onsite and witnessed by UCDHS EH&S or the University's Asbestos Consultant. Submit after equipment has arrived on campus and has been tested. Provide information of the company providing the DOP challenge testing of the HEPA filter systems showing proficiency in the testing. Include evidence of the training of personnel conducting the challenge testing.
 10. List of HEPA vacuums and negative air machines to be used on the project (mfg. model and serial numbers).
 11. Safety Data Sheets for all products used at the job site.
 12. List all laboratories used by Contractor for air or bulk samples. Provide proof of current AIHA Proficiency Analytical Testing (PAT) Program with passing scores.
 13. California Contractor's License C22 for asbestos.
 14. Waste Disposal Plan including name of disposal site, waste transporter, and waste transporter certification.
 15. Substitute Materials Information (for any material not listed in 2.01).
 16. General liability insurance certificate with Owner and asbestos consultant named as additional insured.
 17. Auto insurance certificate.
 18. Workers Compensation Insurance certificate.
 19. Written work plan including schedule, emergency plans, route of waste transport from project site to waste bin.
 20. Manufacturer's documentation of 5.0 micron filter that shall be used for filtration of all water from the shower and other asbestos related work.

1.07 CONTRACTOR QUALIFICATIONS

- A. The contractor performing asbestos abatement work shall be currently licensed as an Asbestos Contractor (C22) with the California Contractor's Licensing Board.
- B. The contractor performing asbestos abatement work shall be currently registered for asbestos with the California Department of Industrial Relations, Division of Occupational Safety and Health (DOSH).
- C. The contractor's personnel performing asbestos abatement work shall meet the following training requirements:
 1. Class I and II Asbestos Work: Supervisors and Workers must be AHERA trained and shall have current refresher training certificates for asbestos related work.
 2. Class III Asbestos Work: Supervisors and Workers shall have received at least 16 hours of asbestos training. Depending upon the work trade such as electricians, plumbers, carpenters, etc., the number of hours of asbestos training may be less than 16 hours, if these trades are not involved in asbestos removal activity. Trade work involving this class of workers may only require a minimum of 6-8 hours of asbestos training for Class III work where they are working in asbestos contaminated work spaces, drilling holes in materials containing asbestos for conduit or pipe installation, attaching to building surfaces conduit, or other minor disturbance to asbestos materials, but not involved in actual removal

of asbestos. Work in the asbestos contaminated attic spaces of the East Wing is one example of Class III work where workers will require asbestos training with emphasis on decontamination procedures and respiratory protection. Removal of small amounts of asbestos such as fireproofing for attachment of hangers for electrical, plumbing or other utilities would require a higher level of training (Class I). All class I work shall be performed by a licensed asbestos contractor.

3. Class IV: Supervisor must be AHERA trained. Workers must have a minimum of "asbestos awareness" level training.

1.08 REGULATIONS

- A. The contractor performing asbestos abatement work shall comply with applicable federal, state, local, and University laws and regulations. The list of regulators and regulations, cited below, is not meant to be comprehensive, but to serve as reference for the most commonly used standards:

1. FEDERAL
 - a. EPA
 - 1) 40 CFR, Part 763, Subpart E – AHERA
 - b. OSHA
 - 1) 29 CFR 1926.1101 - Construction Standard
 - 2) 29 CFR 1910.1001 - General Industry Standard
 - 3) 29 CFR 1910.147 - Lock Out - Tag Out
 - c. NESHAP
 - 1) 40 CFR 61, Subpart M - Asbestos Emissions
 - 2) 40 CFR 61, Subpart A
 - d. DOT - Regulations
2. STATE
 - a. Cal/OSHA
 - 1) CCR, Title 8, Section 1529 – Asbestos Construction Standard
 - 2) CCR, Title 8, Section 3203 - Injury Illness Prevention
 - 3) CCR, Title 8, Section 5194 - Hazard Communication
 - 4) CCR, Title 8, Section 5157 - Confined Space
 - 5) CCR, Title 8, Section 5208 - General Industry Standard
 - 6) CCR, Title 8, Section 5144 – Respiratory Protection Standard
3. LOCAL
 - a. Sacramento Metropolitan Air Quality Management District (SMAQMD)
 - 1) Rule 902
4. UCDCMC
 - a. Policy and Procedures

1.09 NOTIFICATION AND PERMITS

- A. Contractor is responsible for notifying federal, state, local agencies, obtaining all required permits/extensions, and bearing all related costs. Contractor shall provide a copy of all notifications and permits to the UCDMC Representative prior to the start of the work and during the project if additional notifications or permits are obtained.
- B. UCDMC
 - 1. Hot or Hazardous Material Permit (Call the UCDMC Fire Department at 916-734-3060 for instructions).
 - 2. EH&S Waste Manifest Protocols (Call EH&S Representative, at 916-734-2740 for instructions). Only EH&S staff will be allowed to sign Waste Manifests.
- C. Sacramento Metropolitan Air Quality Management District
 - 1. Provide ten (10) days notification to Sacramento Metropolitan Air Quality Management District (SMAQMD) for any demolition or renovation job with RACM, or materials that will become RACM which exceeds a combined amount of 260 linear feet, 160 square feet or 35 cubic feet.
- D. NESHAP
 - 1. The US EPA NESHAP does have jurisdiction on UCDMC projects located outside of Sacramento County; therefore, notification to NESHAP and CARB is required on projects outside of Sacramento County.
- E. CAL/OSHA
 - 1. Only DOSH registered contractors are permitted to perform class I, II, and III work at UCDMC where removal of asbestos is required. Contractor trades such as electricians, carpenters, plumbers, etc., who have received Class III asbestos training due to the potential for disturbance of asbestos materials are not required to be registered with Cal/OSHA if they are not removing asbestos materials. Drilling holes or attachments to building surfaces that might contain asbestos (such as gypsum wallboard or plaster systems) or accessing an asbestos contaminated work area for example is not considered asbestos removal. Removal of small amounts of fireproofing for attachment and support hangers (if required for the project) shall be performed by a licensed asbestos contractor. Contractor shall provide written notification to the local Cal/OSHA office 24 hours prior to the start of work.

1.10 UNIVERSITY CONTACTS

- A. University's Representative: Casey Lubawy, SE
Phone: 916-612-3617
FAX: n/a
- B. EH&S Representative: Kaila Benton-Vitz
Phone: 916-734-2740
FAX: 916-734-7360

- C. University's Representative's Asbestos Consultant: Ryan Metzen
Phone: 916-517-3082
FAX: 916-632-6812

PART II - MATERIALS AND EQUIPMENT

2.01 MATERIALS

- A. Safety Data Sheets (SDS)
1. As specified in the Cal/OSHA Hazard Communication standard (Title 8 5194), the Contractor shall provide safety data sheets (SDS) for all products they use on UCDMC campus. The SDS files shall be submitted prior to the start of the project and shall be located in or near the job site entrance.
- B. Surfactants
1. Contractor may use Foster 32-90, Certane 2075, or equal, for amended water applications. The Foster product is manufactured by H.B. Fuller Co., Foster Products Corporation, Oakdale, MN. The Certane product is manufactured by Certech, Eden Prairie, MN.
- C. Encapsulants
1. The following products or their equals are to be applied using a brush, roller or an airless sprayer, when an encapsulant is required on the project. Contractor shall follow strict manufacturer instructions regarding surface preparation, ambient air retractions, depth of penetration or recommended thickness (dry), and curing time.
 - a. For penetrating & lockdown purposes use Foster 32-60 or Certane 909, or equal.
 - b. For bridging purposes use Foster 32-32 or Certane 2000, or equal.
 - c. For high temperature applications, e.g., steam pipes, use Foster 84-18 or Certane 1000, or equal.
 2. Any proposed equal to the products listed above must meet the following criteria: Submit product information prior to the start of the job and receive approval by the University's Representative with the concurrence of the EH&S Representative; non-toxic and non-irritating as defined by the Hazardous Substance Control Act; sufficiently tinted to provide contrast with the material being coated; and have a minimum 60 lbs./inch Batelle Standard impact rating.
 3. All products will be rated UL Class A and have a flame resistance/spread rate less than or equal to 25 as designated by the ASTM code E 162.
- D. Polyethylene Bags and Sheeting
1. Bags and sheeting used for capturing asbestos waste are required to be (1) six mil thick and (2) meet the following standards: UL Standard No. 263, ASTM E-84, NFPA Standard 701 & 255; and have a flame resistance/spread rate less

than or equal to 25 ASTM (E-162).

2. Startex Corp.(Lakeville, MN), North Plastics (Cottage Grove, MN) Bermis Co. (Terre Haute, IN) provides acceptable bags and sheeting. If an equal is proposed, comply with the provisions in 2.1 C 2 above.
3. The contractor will ensure all asbestos waste is properly labeled per Cal EPA, DOT, Cal/OSHA, and EH&S standards prior to disposal.

E. Adhesive Removers

1. All adhesive removers shall meet the Hazardous Substance Control Act standards for non-toxic, low odor, and non-irritating properties.
2. All adhesive removers shall be (a) non-flammable and (b) contain less than 1% (by volume) of any chlorinated hydrocarbon solvents.
3. Whenever possible, adhesive removers shall be mixed into a slurry/paste using diatomaceous earth to control migration through the substrate. This requirement especially applies where there are existing building spaces below the project area.

2.02 EQUIPMENT

- A. All HEPA filtered vacuums and HEPA filtered negative air machines shall pass a leak (challenge) test on-site by a firm independent of the contractor before they are allowed to be used on the project. The challenge testing must be witnessed by the UCDHS EH&S or the University's Representative Asbestos Consultant.
- B. Tools and equipment shall arrive at the job site free of significant visible debris and dust. No ACM debris shall be allowed to be brought onto the site at any time. All vacuum ports and other openings to negative air units shall be sealed when the units arrive on the project site and sealed when they leave the project site. The Owner or Owners' Representative reserves the right to reject any equipment brought onsite by the asbestos contractor that is deemed contaminated with suspect asbestos materials from a prior project.
- C. All electric tools and equipment shall be connected to a GFCI when in use.

PART III - EXECUTION

3.01 SAFETY MEETING

- A. In accordance with State and Federal laws, the Contractor is responsible for conditions of the project site, including the safety of all persons and property during the performance of the work. To ensure effective communications in safety matters, the Contractor shall participate and conduct the following meetings:
 1. Pre-construction safety meetings may include representatives from the following groups: FD&C, Infection Prevention, EH&S, affected building occupants, general contractor, asbestos subcontractors (if applicable), and the UCDMC Hazardous Materials Representative. The following subjects will be discussed: impact to building occupants, waste disposal, ICRA Permit and compliance, and work related safety programs.
 2. On the first day of work, Contractor shall conduct a safety meeting for its

employees which alerts them to the specific hazards of the job. The Contractor shall conduct the safety meetings in primary language of its employees.

3. Contractor shall conduct a safety meetings with its employees during the course of the project to discuss health and safety issues related to the project.

3.02 WORK SITE PREPARATION

- A. Prior to beginning any on-site work preparation, Contractor shall walk the job area with the UCDMC Project Manager and with the UCDMC Representative Asbestos Consultant to discuss site characterization, ICRA Permit and compliance, regulated area set-up, access controls, security, and safety issues. The contractor is responsible for providing locks and security to the project site to prevent the public and other hospital staff from entering the project area during work hours and during off work hours.
- B. Post all regulatory notices, permits, sign in/out roster at the primary entrance to the job site.
- C. Contractor, in coordination with the University's PO&M, shall ensure all electrical and HVAC equipment servicing the work area is disconnected and locked out, when possible. Electrical tools in the work zone shall be connected to a ground-fault circuit interrupter (GFCI).
- D. The contractor shall seal air tight all HVAC supply and return registers, exhaust registers and other critical openings with tape, double layers of plastic and cardboard or plywood inserts as necessary.
- E. Contractor shall ensure all negative air machines and HEPA vacuums are delivered to the site clean and sealed.
- F. Contractor shall ensure all HEPA filtration units are challenge leak tested on site and witnessed by EH&S or the approved UCDMC Asbestos Consultant. Each piece of equipment shall be tested in compliance with the ANSI Z9.9 Standard (trapping and retaining 99.97% of all particles challenged with 0.3 micron diameter particles). The asbestos contractor shall provide copies of the challenge tests for all HEPA filtered systems showing proof of passing the challenge test. All HEPA filtered systems shall have a sticker applied to the surface showing passage of the challenge test. The company performing the challenge test procedure shall show evidence of proficiency and training in the test procedure that will be used. The challenge leak test is valid for six months. After six months the HEPA systems are required to be re-tested and certified.
- G. In order for the UCDMC Project Manager to conduct timely inspections, Contractor is obligated to inform the UCDMC Project Manager and the UCDMC Representative Asbestos Consultant when they are ready to be inspected at least 24 hours prior to the requested inspection.
- H. All Cal/OSHA Class I, II, and III asbestos work shall be conducted within a regulated area per 8 CCR 1529.
- I. Temporary anterooms shall be erected at entrance/exist areas from the construction work. The anterooms shall be sized to accommodate equipment and materials being introduced and waste materials being removed from the construction work area. The plastic separation walls shall be constructed with zippered doors at the entry points. At least one

recording manometer shall be installed at the entrance to the anteroom to monitor the negative pressure within the construction work area.

- J. Where there is work in the attic space, loss of negative pressure will occur when the ceiling system is opened up. To meet the requirement for -0.020" water column negative pressure within the anteroom compared to the surrounding non-construction work area, the following configuration is required when access into the attic space is required.
1. Two anterooms shall be erected inside of the space, attached together with zippered doors.
 2. The first anteroom is the main entry from the public access or non-construction zone. It will allow access into the second anteroom that is attached to the opened ceiling leading to the attic space. A manometer shall be attached to this first anteroom. A flexible duct shall be attached to this first anteroom from a HEPA filtered negative air unit to create a minimum -0.020" water column negative pressure in the first anteroom.
 3. The second anteroom is attached to the first anteroom by means of a zippered door. Access into the attic space shall be through this second anteroom. The opening into the attic space shall be sized according to dimensions prescribed by the Owner. A flexible duct shall be attached to this second anteroom from a HEPA filtered negative air unit to create negative pressure from the first anteroom.
 4. To accomplish the above negative pressure requirements, the contractor may use one large negative air unit and split the intake duct into two smaller flexible ducts attached to the two anterooms. The second anteroom shall have the greater amount of air exhausting from this space compared to the first anteroom by adjusting the exhaust volume, since it is undesirable to draw air from the dirty space (second anteroom) into the cleaner space (first anteroom). Use of small variable speed HEPA filtered negative air units approximately 600-1000 cfm in size are the most effective means of meeting these pressure requirements.
 5. To facilitate air pressure in the two anterooms, the contractor shall seal the opening to the attic space using a hard lid to partially cover the opening for the majority of the time unless materials and personnel are entering/exiting the attic space. The hard lid can be a material that is acceptable to the Fire Marshall and is simply intended on being placed on top of the opening to the attic space to close off the access opening in order to increase negative pressure in the two anterooms below.
 6. The negative air units shall be exhausted outside of the building via windows or other locations where the exhaust can be outside the building envelope.
 7. When it is not feasible to exhaust air from the work area out of the building, the contractor shall exhaust the HEPA filtered negative air units into a location deemed acceptable by the Project Manager. The exhaust of the negative air unit may be required to be exhausted into a diffusion chamber constructed with pleated filters making up the diffusion chamber to equally disperse the exhaust air in a broad pattern. This approach is to minimize a high velocity exhaust into occupied areas of the hospital.

3.03 WORK SITE CONTROL

- A. Contractor shall restrict the work areas to authorized, trained and protected personnel; including, the Contractor's employees, University Representatives, and state agency representatives.
- B. At regulated job sites, the Contractor shall use plastic barriers to demarcate the boundary of the work zone and post on the interior door a warning sign as required by 8 CCR 1529:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS
AREA

- C. All unauthorized personnel are to remain outside the regulated area. Contractor is to call the University's Representative or the Project Manager if unauthorized personnel enter the regulated area and do not leave upon request by the Contractor.
- D. If inclement weather threatens the job site, Contractor shall take all necessary measures to ensure asbestos contaminated debris does not migrate from the regulated areas.
- E. If wind speed threatens the job site, Contractor shall erect a wind barrier or suspend operations until the wind is below 15 mph.

3.04 RECORD KEEPING

- A. Contractor shall maintain the following records at the regulated work area:
 - 1. Site Log (sign-in/sign-out for all people entering the containment).
 - 2. Incident Log & Emergency Action Plan.
 - 3. Personal air sampling results including chain of custody forms and laboratory analysis.
 - 4. Laboratory results from area samples collected inside and outside the regulated area.
 - 5. Asbestos supervisor and worker training certificates, current respirator fit tests, current medical clearance certificates.
 - 6. All applicable notifications, including, but not limited to SMAQMD and Cal/OSHA and any revised notifications during the course of the project.
 - 7. Copies of all Safety Data Sheets for materials present or used on the project.
- B. The UCDMC Representative's shall retain all records of samples related to the project and report results in the closeout documentation to be submitted at the end of the project.

3.05 ADMINISTRATIVE CONTROLS

- A. Asbestos work will be performed during normal working hours (Monday-Friday, 7:00 AM to 5:00 PM)
- B. Construction work performed in high heat environments requires the Contractor to provide sufficient breaks and drinking water to maintain a safe work environment and to reduce the potential for heat stress.
- C. Contractor shall clean the work site before all breaks and at the end of the shift. Asbestos containing materials and debris shall be HEPA vacuumed daily to maintain a clean work area. At least one HEPA vacuum shall remain inside of the work area every day and available for use during work activities.
- D. During the removal process for class I, II and III asbestos work, an AHERA trained Contractor/Supervisor must be on-site. During work in asbestos contaminated attic spaces, an asbestos Competent Person, as defined by T8 CCR 1529, shall be present at all times to oversee safe access and control measures.

3.06 ENGINEERING CONTROLS

- A. Negative Pressure Enclosure (NPE)
 - 1. See Section 3.02 describing the required negative air unit configuration to meet the Cal/OSHA requirements for asbestos related work, which requires a minimum -0.020" water column negative pressure between the work area and the surrounding space.
 - 2. A negative pressure enclosure is required when asbestos containing materials are being removed or disturbed on this project site.
 - 3. There are two types of negative pressure enclosures: full containment and mini-containment. Both containments require proper warning signs in accordance with Cal/OSHA to establish a restricted asbestos regulated area.
 - 4. Full containment for asbestos related work requires the contractor to comply with all provisions in CCR, 8, 1529 and SMAQMD Rule 902. The following items are provided as a reminder of key elements and is not meant to be comprehensive: two layers of six-mil polyethylene on floors, two layers of four-mil polyethylene on walls, three stage decontamination unit with shower, sufficient negative pressure to maintain at least -0.020" of water column pressure differential, clear viewing ports, recording manometer, fire extinguishers, and emergency response protocols.
 - 5. Removal of the asbestos containing fireproofing may be required in spot locations for structural investigation. The specific locations of abatement shall be determined by the various trades requiring the removal of the asbestos to perform their work. The spot abatement of fireproofing materials, ceiling systems and other asbestos contaminated materials shall be performed only by the asbestos contractor. Fireproofing shall be wetted continuously with water and a wetting agent and removed slowly by a team of at least two employees, capturing the fireproofing into waste containers or pans held up to the underside of the area being abated.
 - 6. The construction of a mini-containment for asbestos work requires at least one layer of six mil polyethylene with zippered doors to restrict airflow and a HEPA filtered vacuum. A negative air unit shall be attached to the mini-containment to

maintain negative pressure inside the mini-containment on this project. Comply with all mini-containment requirements as stated in Title 8 CCR 1529. Mini-containments shall have zippers on the enclosure to allow access to attic spaces, walls or subfloor spaces. Only zippered type partitions will be allowed. The older method of flapped plastic entries will not be accepted.

7. If asbestos containing pipe insulation is to be removed as indicated on the project drawings, removal shall be by the glove bag method for worker safety, reduced Owner liability and a cleaner work environment. Asbestos related work requiring glove bags to remove asbestos shall comply with the provisions in 8 CCR 1529. The type of glove bag must correspond to the type of activity, e.g., angle glove bags for curved pipe sections, vertical glove bags for vertical pipe, etc. Glove bags must be smoke tested after installed by the Contractor prior to removing asbestos to assure they do not leak. All glove bag work requires at least two people working together as required in Title 8 1529.
8. An Infection Control Risk Assessment (ICRA) Permit will be developed for this project by the University's Representative and approved by the Medical Center's Infection Prevention with oversight by EH&S. Depending upon the location of the work and the potential for dust generation that could impact patient care, the ICRA may require more stringent controls than those described under this specification. Adequacy of controls may be verified by periodic airborne particle counting, conducted by EH&S or by a representative of the owner. Contractor understands that any operations generating particles in excess of particle count requirements will require the Contractor to modify the project site engineering controls and work practices. Contractor is responsible for maintaining engineering controls and work practices so excessive airborne particulate is not released.
9. Sticky mats are required to be present in the decontamination unit (first anteroom) and immediately outside of the first anteroom in the non-construction work area. The sticky mats shall be changed on a daily basis to keep them effective at cleaning the soles of the shoes. The sticky mats are a requirement of the ICRA Permit for the duration of the project through completion of all new construction. They will be required through final detail cleaning or final terminal cleaning for each space the construction work activity has impacted.
10. Cleaning of concrete slab surfaces must be performed inside an NPE. Concrete slab material contains <1% asbestos and may be affected by mechanical means of removal such as rotohammers or other chipping instruments. Material should be kept wet at all times during surface cleaning.

B. Wet Methods

1. Prior to removing ACM/PACM, the contractor shall adequately wet the material with water that may have an approved surfactant added. Once removed, the waste must be kept wet until it is placed into six-mil asbestos labeled bags. Asbestos debris generated during the project shall remain wetted at all times until the waste debris is sealed into waste bags.

3.07 WORKER PROTECTION

- A. The following protective measures are required for asbestos related work associated with

this project:

1. Respiratory Protection

- a. Respiratory protection shall be provided to all Contractor employees where there is the potential for exposure to asbestos at or above the permissible exposure limit. In addition, all work in the attic spaces where there is asbestos containing fireproofing or other asbestos debris, will require workers to wear respirators. Respiratory protection shall be provided at no cost to the Contractor's employees per 8 CCR 1529 and 5144.
- b. At a minimum, half-face respirators with P-100 (HEPA) filters shall be provided to all employees required to work inside of the asbestos contaminated spaces. Employers shall provide full-face powered air purifying (PAPR) or full hood type respirators to those employees who request one at no additional cost to the employee pursuant to 8 CCR 1529. If personal air sampling of specific work practices identify asbestos exposures above the protection factor of a half-face respirator, the contractor will be required to go to a higher level of protection which will include the use of a tight fitting full-face powered air purifying respirator.
- c. If personal air samples exceed the protection factor of the respirator, work shall stop for that trade contractor performing the work. Engineering controls and work practices shall be evaluated by the UCDCM Asbestos Consultant to determine reasons for the elevated exposures. Changes to work practices and engineering controls will be required in order for the contractor to begin work again, in addition to the requirement for those employees to wear full-face PAPRs.
- d. The asbestos abatement workers shall wear full-face powered air purifying respirators (PAPRs) during removal of fireproofing, ceiling plaster, and other mechanical systems and electrical equipment that is contaminated with asbestos. The contractor shall use the manufacturer's flow meter every day for all respirators at the start of the day and after break periods to make sure the air flow into the PAPRs meet the minimum air flow into the face piece.
- e. Contractor asbestos employees who wear a respirator shall have passed a respirator fit test within the previous 12 months to perform work on the project. All workers required to wear a tight fitting respirator shall be clean shaven and not have any facial hair interfering or contacting the seal of the respirator with the worker's face. Workers who are observed inside of the asbestos contaminated work area with facial hair contacting the respirator seal will be asked to immediately leave the work area and shall not be allowed to return until clean shaven and a new respirator fit test has been provided and the individual passes.

2. Protective Clothing

- a. Workers shall be provided with sufficient sets of protective clothing whenever there is potential exposure to asbestos dust at or above the permissible exposure limit. Tyvek, Kleenguard coveralls, or an equal with attached hood and foot coverings are required. The protective clothing shall be available at no cost to the Contractor's employees, UCDCM consultants, and state officials. Disposable protective clothing shall be replaced or repaired when they rip or tear or become damaged to the point where they are not providing protection to the worker. At no time

shall workers performing work in an asbestos contaminated work area leave the containment while wearing the disposable protective clothing. The protective clothing shall be removed inside of the mini-containment or work containment prior to the worker exiting the enclosure.

- b. At no time shall workers be allowed to leave the general construction work area in work shoes tracking out dust onto the floor. The ante room shall be used to clean shoes before entering into the adjacent corridors. The sticky mats shall be changed at sufficient frequency and at least daily to minimize tracking out dust outside of the construction work area.
- c. Contractor shall provide rubber or latex gloves, rubber boots, eye protection, ear plugs and hard hats as needed per the California Code of Regulations, Title 8, Hazard Communication and Personal Protective Equipment sections.

3. Medical Surveillance

- a. As required by 8 CCR 1529, the asbestos Contractor shall establish a medical surveillance program for all employees who may be exposed to asbestos at or above the permissible exposure limit. This requires an asbestos medical exam in accordance with Title 8 1529. All employers shall provide copies of the physician's written opinion for each employee who works on the project pursuant to 8 CCR 1529.
- b. Contractor will provide copies of the physician's written opinion for each employee who is required to wear a respirator confirming the ability of the employee to wear a respirator with no restrictions in accordance with 8 CCR 5144. This requirement applies to all asbestos employees and to all other employees required to work in the asbestos contaminated attic space, while wearing a respirator.
- c. All asbestos workers and asbestos supervisors shall pass the medical examination, FVC, FEV and chest x-ray examinations prior to working on the project.

3.08 PERSONAL HYGIENE

- A. No employee will be allowed to consume food, tobacco products or beverage in the regulated work area or any part of the building scheduled for asbestos abatement or in-place management operations. No food containers, water bottles, or any food will be allowed inside of the containment while work is performed under asbestos contaminated work conditions.
- B. Contractor shall establish a location outside the work area, which will be designated for employee eating and drinking. Employees must utilize the on-site decontamination facilities prior to entering the designated eating/drinking location. All workers entering the work containment shall wear proper shoes. Tennis shoes are not acceptable.
- C. The asbestos contractor shall install a three-stage decontamination unit for the asbestos abatement work and it shall be contiguous with the area that is being accessed. The clean room shall be sized and equipped to adequately accommodate the work crew. Lighting, heat and electricity shall be provided as necessary for comfort. This space shall not be used for storage of tools, equipment or materials (except as specifically designated), or as office space. Shower room shall contain one or more showers as necessary to adequately accommodate workers. The shower enclosure shall be constructed to ensure against

leakage of any kind. In addition, the shower shall be a separate unit from the decontamination unit walls. The shower unit cannot be made from poly. Metal or hard plastic is acceptable. The third chamber equipment room (dirty room) shall be sized to accommodate movement of materials, equipment and supplies into and out of the containment work area.

- D. An adequate supply of soap, shampoo and towels shall be supplied by the Contractor and available at all times. The shower shall provide hot water, which will require the contractor to bring a portable hot water heater for this purpose. Shower water shall be drained, collected and filtered through a system with at least 5.0 micron particle size collection capability. The shower pan in the shower chamber shall be, at least, 3' x 3' in size. The shower chamber shall be constructed so that no water from the shower can spray out of the chamber, or any water run down the sides of the poly and miss the pan. The shower chamber dimensions shall be determined by the size of the shower pan but are not to be smaller than 3' wide by 3' long by 7' tall. At least one shower shall be provided for each 10 workers.
- E. After the asbestos abatement work has been completed by the asbestos contractor, the shower shall remain attached to the second anteroom for use by the various trade contractors if they choose to use the shower.

3.09 AIR MONITORING PROGRAM

- A. Personal Air Samples - Contractor Responsibility
 1. The asbestos Contractor must presume Class I, II, and III work will exceed the PEL and conduct air sampling for asbestos in accordance with 8 CCR 1529. The air sampling results will not be used to determine if respiratory protection will be required. Respiratory protection will be required during all asbestos abatement activities and during access at any time into the attic spaces, regardless of the air sampling results. The air sampling results will be used to assess the effectiveness of engineering control measures.
 2. At least 25% of the asbestos workers per work shift shall be evaluated for asbestos assessment on a daily basis by the Contractor using personal air sampling. The asbestos contractor is responsible for collection of air samples on the various trade workers performing work in asbestos contaminated work spaces.
 3. Sample results shall be emailed to UCDCM Project Manager Representative, Casey Lubawy; UCDCM EH&S Kaila Benton-Vitz FAX (916) 734-7309; and UCDCM Representative's Consultant, Ryan Metzen, Entek Consulting Group. FAX (916) 632-6812.
 4. Daily monitoring may be discontinued for a particular operation when a negative exposure assessment has shown the operation was performed below PEL for three continuous shifts. This exception does not apply when the scope of the job has changed, ACM/PACM has changed or the UCDCM Representative feels the work protocol is compromised, e.g., less skilled workers are not performing up to standard.
 5. Personal air samples for asbestos exposures shall be collected of workers in the asbestos contaminated attic space or in locations with ceiling open to the attic

space during work installing plumbing, electrical, HVAC, ceiling system and other trade work.

6. A Negative Exposure Assessments (NEA) established outside the University is unacceptable. NEAs performed on the campus that "closely resemble" current work shall be considered. Final acceptance of an NEA is made by EH&S and the UCDMC Representative. Review and acceptance of NEAs will not be used to exclude the use of respiratory protection.
7. Air sample results are required to assess the trade workers in the attic space to determine if a higher level of respiratory protection is required (PAPR), additional work practices are required, and if showering by the trade workers will be required.

B. Area Sampling

1. Daily Monitoring - University's Representative's Responsibilities

- a. The UCDMC Representative is responsible for monitoring air quality within the regulated area; including the clean room and immediately outside of the clean room. Any sample at or above 0.1 f/cc in the clean room or outside of the clean room requires a cessation of work until the area is cleaned, the cause of the problem has been determined and remedied. Air samples in the work zone that exceed the protection level of a respirator require a cessation of activity and review of work practices by the Contractor's supervisor and the UCDMC Representative. The UCDMC Representative may utilize the asbestos contractor's personal air sampling results to assess the work area air concentrations if the sampling protocol used by the contractor are deemed reliable.

3.10 SPECIFIC WORK PROTOCOLS

- A. The specific work protocols are intended as a supplement to the contract provisions. Contractor shall comply with specific work protocols and all other specifications. Where a conflict in specifications exists, the higher standard applies. Not all of the asbestos materials described below might be impacted by the project. They are provided in the event the project expands and the specific materials are impacted.

1. Acoustical Ceiling Tiles (suspended ceiling)

- a. Class II or III
- b. Friable
- c. Respirator Required
- d. No NPE if Class III, NPE for Class II, HEPA vacuum, Wet Method
- e. Work Practices:
 - 1) Remove individual ceiling tiles from grid work using caution not to damage the metal grid work. Protect lighting fixtures and smoke/heat detectors scheduled to remain.
 - 2) Where removal of metal grid work is required, tie-up lighting fixtures and/or heat/smoke detectors. Removal of metal grid work will include all wire hangers, perimeter and interior grid work.

- 3) Where lighting fixtures are scheduled to be removed, clean lighting fixtures and apply a single layer 6-mil plastic or bag and sealed with tape. All lighting fixtures shall be turned over to the University's Representative.
 - 4) HEPA vacuum and wipe down all exposed surfaces above the ceiling system removed and then apply an approved encapsulant or lockdown material.
2. Acoustical Wall and Ceiling Tiles (glued on – whether the mastic contains asbestos or not)
- a. Class II or III
 - b. Friable
 - c. Respirator Required
 - d. NPE, Wet Method, HEPA vacuum
 - e. Work Practices:
 - 1) Remove tile in small sections capturing individual tiles in a container as close to the point of removal as possible, in order to minimize the amount of material dropping to the floor.
 - 2) Debris and waste spilled onto floors, ladders or other surfaces shall be cleaned up as soon as possible. Under no circumstances shall debris be left at the end of the workday.
 - 3) Scrape and remove tile adhesive flush with wall and ceiling surfaces.
3. Plaster (interior and exterior)
- a. Class II or III
 - b. Friable
 - c. Respirator Required
 - d. No NPE if class III, NPE for class II, HEPA vacuum, Wet Method
 - e. Work Practices:
 - 1) Remove plaster material in manageable sections without sizable quantities of materials dropping to the floor.
 - 2) Work shall include removal and disposal of plaster, expanded metal mesh and non-structural ceiling joists. Bag all materials as removed. Tape sharp edges as needed to prevent the bag from being punctured.
 - 3) Do not use power tools to cut material to be removed. Keep all cut material edges and surfaces moistened to minimize dust.
 - 4) Keep debris and minor dropped waste to a minimum, and immediately moisten and clean up. Under no circumstances shall debris be left at the end of the workday.
 - 5) HEPA vacuum and wipe down all exposed surfaces to remain prior to applying an approved encapsulant or lockdown material.
4. Structural Concrete Columns/Beams

- a. Class II or III
 - b. Friable and Non-friable
 - c. Respirator Required
 - d. No NPE if class III, NPE for class II, HEPA vacuum, Wet Method
 - e. Work Practices:
 - 1) Material confirmed to contain <1% asbestos. Mechanical removal is possible without creating RACM.
 - 2) Remove material in manageable sections and lengths without sizable quantities of materials dropping to the floor or ground using wet methods.
 - 3) All waste material to be put into leak-tight containers for disposal.
5. Floor Tiles, rubber cove base and adhesive
- a. Class II or III
 - b. Non-friable
 - c. Respirator Required
 - d. No NPE if class III, NPE for class II, Wet Method, HEPA vacuum
 - e. Work Practices:
 - 1) Flooring shall be removed only by hand or mechanical methods which do not create dust. These include dry ice/blanket, hand and power scrapers, spud bars, etc. Do not sand, grind, blast or mechanically chip or abrade.
 - 2) Adhesive shall be removed only by wet methods or by approved solvent.
6. Concrete Slabs
- a. Class II or III
 - b. Friable and Non-friable
 - c. Respirator Required
 - d. No NPE if class III, NPE for class II, Wet Method, HEPA vacuum
 - e. Work Practices:
 - 1) Material confirmed to contain <1% asbestos. Mechanical removal is possible without creating RACM as long as no visible bulk material present.
 - 2) Assumed to be contaminated with black flooring mastic or spray applied fireproofing. Cleaning of bulk material and then scouring of surfaces via the use of roto hammers or chisels will render material non-asbestos containing.
 - 3) All concrete waste material to be put into leak-tight containers for disposal.
 - 4) All bulk floor mastic or fireproofing disposed of as ACM or RACM.
19. Above Ceiling Work - Areas with Asbestos Containing Fireproofing or Pipe debris

- a. Class III - only for repair or maintenance work, no abatement
- b. Friable
- c. Respirator Required
- d. NPE, Mini-containment
- e. Work Practices:
 - 1) A mini-containment or other NPE must be set up and used by employees to safely enter the attic space above the ceiling system. The mini-containment/NPE must be kept under negative pressure using at a minimum a HEPA vacuum that has been certified within the last year or last filter change, whichever is more recent. The HEPA filtered negative air machine or vacuum must be operating prior to opening the ceiling and can not be turned off until the mini-containment has been detail cleaned. The inlet of the negative air machine and vacuum must be covered when not in use.
 - 2) The mini-containment must be inspected prior to each use for holes and tears. Repair as necessary prior to using again.
 - 3) Don the respirator and protective clothing prior to entering the mini-containment. For tasks that only involve inspection activities a single set of disposable protective clothing is acceptable. For activities involving the removal or disturbance of asbestos-containing fireproofing or insulation, or where the ladder used to access the ceiling space will be left inside the mini-containment for use during another shift, a second set of disposable protective clothing is required. After entering the mini-containment, the zipper seal must be closed prior to opening the above-ceiling access.
 - 5) Immediately after opening the above-ceiling access clean the entry area above the ceiling with a HEPA vacuum before completely entering the space.
 - 6) If practical, vacuum visible insulation debris for the full path of travel. If this is not practical the employee must use other procedures to ensure safe removal of visible insulation debris in the path of travel that would be disturbed by the crawl. For example, wet paper towels and plastic bags may be used to pick up and contain visible debris. Other control methods may be used provided they meet the following criteria:
 - a. dry sweeping is not permitted
 - b. employees must not walk on, crawl on or otherwise crush visible recognizable or suspected insulation debris
 - c. the control method must not result in a release of airborne fibers
 - 7) If removal of asbestos-containing fireproofing or pipe insulation is performed, removal must be conducted in accordance with 8 CCR 1529. The contractor must submit the removal method to the University and the Asbestos Consultant for approval.

- 8) If disposable protective clothing get torn or punctured during the work activity, immediately repair the torn protective clothing with duct tape or exit the area, remove the damaged protective clothing following doffing procedures and put on new protective clothing .
- 7) If a single set of protective clothing was worn, e.g. for inspection activities, the protective clothing shall be cleaned, removed and placed in the waste bag only after the ceiling access is closed and the interior of the mini-containment has been decontaminated in accordance with the requirements. If the worker was wearing two sets of protective clothing the first may be removed once the ceiling is closed. The second protective clothing shall be cleaned and removed once the containment has been detail cleaned and prior to exiting the mini-containment.
- 8) Upon completion of work at that location, inspect the floor outside of the mini-containment where the mini-containment was located and remove any debris using damp rags and the HEPA vacuum.

3.11 INSPECTIONS

A. Inspection Responsibilities - Contractor

1. Prior to beginning any asbestos-related work, Contractor's asbestos supervisor shall inspect the regulated work areas for any building damage, hazardous conditions, and/or irregularities that may contribute to an unsafe work environment. Any condition that poses a hazard or potential hazard to the Contractor's employees or the University community must be immediately reported to the UCDMC Representative.
2. Contractor is responsible for monitoring and enforcing all requirements of this specification. This responsibility includes communicating scheduling changes to the UCDMC Representative to allow inspections at each phase of the project.
3. Contractor shall provide protocols for responding to loss of negative pressure after they have left the job site. Under no circumstances shall Contractor shut off negative air machines at the end of the shift, unless the job has received final clearance. Emergency mobile telephone numbers shall be provided of key asbestos Supervisors on the project to the University's Representative in the event they need to be contacted after off hours.
4. At the end of each shift, the Contractor shall adequately wet waste, collect all loose debris, place it in double 6 mil poly bags, and label the material. The asbestos waste may remain inside the containment, provided access controls are secure. If the Contractor cannot guarantee access control, the asbestos waste must be secured in a locked storage container.
5. The Contractor supervisor shall perform a thorough pre-final visual of the containment work area and adjacent surfaces prior to requesting that the University's Hazardous Materials Representative conduct a final visual inspection. The pre-final visual performed by the Contractor shall verify that all materials have been completely removed from the work area.

- B. Inspection Responsibilities – UCDMC Representative – (Asbestos Consultant) Responsibilities
1. Shall walk the job site with the Contractor to review pre-cleaning operations and any safety or security issues and may attend contractor safety meetings.
 2. Shall verify pre-cleaning was performed in accordance with the specifications.
 3. After the Contractor has completed set-up and before commencing operations, the UCDMC Representative shall check completeness of the following items: regulated area is demarcated and posted with Cal/OSHA asbestos warning signs, permits are posted, poly sheeting is six mil, double layers, all HEPA equipment is challenge leak tested and passed the challenge tests, electrical tools are connected to GFCI, HVAC is shut off and all supply and return registers (if possible), exhaust register are sealed with six mil poly, electrical panels are tagged and locked out (if possible), electrical outlets are sealed with 6 mil poly, a fire extinguisher is available outside the containment, and water connections are made with a back flow prevention device. If a NPE is used, the inspector will verify: a minimum of -0.020" of water pressure is maintained, three-stage decontamination is sealed and air flow is correct, and the shower is functioning with a hot water heater, soap, shampoo, and disposable towels.
 4. Prior to asbestos abatement or in-place management activities beginning, the UCDMC Representative shall match on-site personnel with asbestos training certificates, fit tests and medical exam records. Workers without current and valid on-site documentation shall not be allowed in the regulated area.
 5. The UCDMC Representative is responsible for reviewing all samples and alerting EH&S staff and the UCDMC Project Manager, of any personal or area air samples exceeding 0.1 f/cc.
 6. During abatement or in-place management activities, the UCDMC Representative shall check for the following: all personnel are signing in and out, wet methods are being used, debris is collected at the end of each shift, workers are properly wearing disposable protective clothing and respirators, and work is performed in a safe manner.
 7. The UCDMC Representative shall file a report with the UCDMC Project Manager in the frequency desired by the UCDMC Project Manager.
 8. When only spot removal of fireproofing is performed for attachment of bracing, etc., clearance air sampling is not planned for the small spot abatement work in the attic space.
 9. In the event of asbestos abatement when encapsulation is required, the following will apply. After abatement or in-place management activities are complete and before lockdown or encapsulant is sprayed, the UCDMC Representative shall verify completeness of abatement or in-place management work by conducting a thorough visual inspection of the work area, confirm and approve the lockdown (encapsulant) being used, and confirm all SDS are on-site for materials used by the contractor.
 10. The UCDMC Representative shall review clearance protocols with the Contractor prior to clearance monitoring. If clearance is not achieved, the Contractor shall re-clean the containment area prior to re-sampling the regulated area. All re-sampling costs due to clearance monitoring failure are the responsibility of the contractor.

11. After clearance has been achieved the UCDMC Representative shall ensure the work area is clean and free of all equipment, all waste has been removed in accordance with University protocols, keys are returned and the Contractor has restored the room to its original condition or to an otherwise agreed upon state.

3.12 CLEAN-UP

A. Daily Clean-Up

1. The project work area shall be cleaned on a regular basis. The interior of the anterooms shall be free of all visible debris and materials. At the end of each work shift, the floor of the anterooms shall be HEPA vacuumed or wet wiped or both to remove all debris from the plastic surfaces. The sticky mats shall be change on a regular basis to be effective.
2. Where asbestos is removed from spot abatement, all asbestos debris shall be adequately wetted, collected, and placed into two 6 mil plastic bags with Cal/OSHA asbestos warning labels attached. Additional labeling requirements will be required for friable waste materials. Excess air shall be HEPA vacuumed from the bag, and shall be closed in a goose-necked fashion and secured with tape. No bag shall exceed a gross weight of 30 lbs.
3. Materials exceeding the size of a 60" bag may be sealed in "burrito" wrap fashion which requires the materials to be adequately wetted, then double wrapped in 6 mil plastic sheeting and sealed air tight with tape, Cal/OSHA asbestos warning labels attached or the black diamond label, generator name and address and Waste Manifest number attached if the waste is friable asbestos materials.
4. At the end of each work shift, all asbestos waste shall be secured in a locked container. The containment shall also be made secure such that unauthorized access is not allowed during off-work hours.

B. Final Clean-Up

1. HEPA vacuum all visible debris and dust on the inner (top) layer of poly.
2. Wipe down interior surface of the inner (top) layer of poly of all gross asbestos debris.
3. Remove inner (top) layer of poly and dispose as asbestos waste.
4. HEPA vacuum or wipe all visible dust and debris from the outer (bottom) layer of poly.
5. Apply encapsulant inside of the entire containment area.
6. Remove the outer (bottom) layer of poly and clean all visible dust and debris that is present behind this poly shall be cleaned by HEPA vacuuming and wet wiping. At this time only the critical barriers shall remain in place with the building finishes exposed and in need of final detail cleaning. Floor and wall poly shall be removed prior to the clearance air sampling, unless specific changes have been approved by the UCDMC Representative.
7. When step 6 is achieved, the area is ready for clearance sampling with the critical barriers and decontamination unit left in place with the work area still under negative pressure.

3.13 WASTE DISPOSAL

A. Hazardous Waste Disposal

1. The Contractor shall propose, in writing, their choice of waste site for non-RCRA hazardous waste that accepts asbestos to EH&S and obtain EH&S approval of the hazardous waste site before the Contractor ships off the waste material. EH&S must be contacted at least five working days prior to the date of first shipment.
 - a. Contractor shall comply with all waste protocols established by EH&S. These protocols explicitly require Contractor to properly complete the Uniform Waste Manifest form. Failure by Contractor to complete Contractor's portion of the form shall result in the Contractor assuming the fine imposed by the responsible agency.

2. Packaging Asbestos Waste

All friable asbestos containing waste material must be packaged in one of three ways: (1) placed in two 6 mil clear polyethylene bags that are sealed with the "gooseneck" style, (2) placed in one 6 mil clear polyethylene bag and then placed into a sealed drum (DOT approved) or (3) double wrapped in opaque 6 mil polyethylene sheeting (AKA "burrito style"). For options 1 and 3 wet wipe the outer surface before storing material.

3. Labeling Asbestos Waste

Each bag, drum, or "burrito" wrap shall have a label affixed with the following information: (1) Hazardous Waste warning, (2) Generator's Name, address, and phone number, (3) Location information, e.g., Building, department, room, (4) manifest document number, (5) date, and (6) Generator's EPA Identification Number. Contractor can generate the label or use bags with label information stenciled on the side. For non-hazardous asbestos waste, a Hazardous Waste Manifest is not required; however, at a minimum, the Cal/OSHA asbestos warning label is required per Title 1529.

Each asbestos package or container must have a caution label affixed to the outside. That label must be conspicuous and contain legible lettering that spells the following warning [29 C.F.R. § 1926.1101 (j)(5), 1926.1101(k)(8); Cal. Code Regs Title 8 § 5208 (j)(5)]:



4. Uniform Hazardous Waste Manifest Procedures

Prior to transporting waste from the project site to a disposal facility, the Contractor shall prepare a California Uniform Hazardous Waste Manifest (form DTSC 8700-22). After completing Contractor's portion of the form, Contractor shall return the Manifest to EH&S for signature between the hours of 8:00 AM to 5:00 PM Monday to Friday, and will require a 24 hour notice to EH&S for the signature. Only authorized EH&S personnel can sign on behalf of the University. The Generator is UCDMC. EPA ID No. CAD076124981. The Generator address is 2315 Stockton Blvd., FSSB 2400, Sacramento, CA 95817.

5. The Manifest Verification Form must be completed by the Contractor to comply with waste stream identification requirements (Title 22, CCR). The Manifest Verification form is provided at the end of this section and must be submitted to EH&S for their approval.

B. Non-Hazardous Asbestos Disposal

1. The Contractor shall propose their choice of non-hazardous waste site that accepts asbestos to EH&S and obtain EH&S approval of the non-hazardous waste site before the Contractor ships off the waste material. EH&S must be contacted at least five working days prior to the date of first shipment. Examples of non-hazardous asbestos waste include: materials containing greater than 1% asbestos but are non-friable and will remain non-friable until they have been properly handled by the properly permitted waste disposal facility; materials that contain equal to or less than 1% asbestos (note: this applies to materials in their condition prior to becoming a waste. Dilution of the asbestos content in a waste stream to change the designation from hazardous to non-hazardous is not permitted)

- a. Contractor shall comply with all waste protocols established by EH&S. These protocols explicitly require Contractor to properly complete the Non-Hazardous Waste Manifest form, Manifest Verification Form, or other acceptable documentation for purposes of tracking the waste. Failure by Contractor to complete Contractor's portion of the form shall result in the Contractor assuming the fine imposed by the responsible agency.

2. Packaging Asbestos Waste

All non-friable asbestos containing waste material must be packaged in one of two ways: (1) placed in one 6 mil clear polyethylene bag that are sealed with the "gooseneck" style, or (2) double wrapped in opaque 6 mil polyethylene sheeting (AKA "burrito style"). Wet wipe the outer surface before storing material.

C. Materials containing less than 1% asbestos

1. Waste to be disposed of as a material containing equal to or less than 1% asbestos must be verified by the point count 400 or 1000 method. Materials that contain any detectable amount of asbestos by polarized light microscopy that have not been point counted must be considered an Asbestos-Containing Material and disposed of accordingly.
2. The Contractor shall propose their choice of waste site that accepts non-hazardous asbestos waste material to EH&S and obtain EH&S approval of the waste site before the Contractor ships off the waste material. EH&S must be contacted at least five working days prior to the date of first shipment.
 - a. Contractor shall comply with all waste protocols established by EH&S for general construction debris.

3. Packaging Waste Material with Less than 1% Asbestos

All <1% asbestos containing waste material must be packaged in one of two ways: (1) placed in one 6 mil clear polyethylene bag that are sealed with the "gooseneck" style, or (2) double wrapped in opaque 6 mil polyethylene sheeting (AKA "burrito style"). Wet wipe the outer surface before storing material.

D. Mixed Waste

1. Waste of multiple types must be disposed of according to the most stringent of applicable standards. An example of a mixed waste is waste that includes an asbestos-containing floor tile mastic that has become friable during removal and a mastic remover that has hazardous components. Such wastes must be designated for disposal and shipped to facilities permitted to receive both asbestos and chemical hazardous wastes.

E. Transporting Waste

All sealed waste bags removed from the work area containment shall be transported inside of closed leak tight plastic bins with lids on wheels that can be rolled from the project area in the building to the waste bin located outside of the building. The door of the waste bin shall have the required asbestos warning sign attached and visible during all loading of the asbestos containing waste.

E. Storing Asbestos Waste Outside of a Building

At the end of each shift, all asbestos waste shall be stored in a locked container or shipped off site. Accumulated waste shall not be allowed to remain in the regulated work area overnight, unless prior approval is provided the EH&S. No container shall be allowed to remain on campus for greater than 90 continuous days from date the first asbestos waste container was generated.

J. Transporting Asbestos Waste

A registered waste transporter, hired by the Contractor, is responsible for transporting asbestos waste from the project site to a disposal facility permitted for asbestos waste. The landfill has to be approved by UCDMC EH&S, who requires seven (7) days notice to review and approve the landfill. The transporter must make pick-ups during normal working hours (8:00 AM to 5:00 PM Monday through Friday). The transporter's vehicle must be clearly marked with warning signs. To avoid illegal transport of asbestos waste, Contractor is responsible for knowing if the job site is contiguous with the main University campus. If Contractor must cross public streets to load asbestos waste in the container, the Contractor must comply with Sacramento Metropolitan Air Quality Management District (SMAQMD) requirements.

There will be different regulatory requirements for transport of the waste based on the type of asbestos waste.

K. Record Keeping

The University's Representative is responsible for assisting EH&S with collecting all documents related to waste disposal operations.

L. Fees

Contractor is responsible for all fees and charges related to waste disposal operations; including, waste stream profiles. Refer to SW-846-1311 (TCLP) and CCR, Title 22 Section 66261 (STLC) for identification requirements for non-RCRA hazardous waste.

3.14 CLEARANCE PROTOCOL

A. Project Specific

1. The clearance protocol to be used shall be clearly stated and communicated in advance of the UCDMC Hazardous Materials Representative beginning the clearance procedure.

a. All containment areas of asbestos abatement will have clearance air samples analyzed by TEM per the AHERA analytical method. The exception to this is when very small amounts of asbestos are removed, or for example when spot asbestos removal of fireproofing materials is conducted in the attic space. In these cases, clearance air sampling might not be conducted.

- B. PCM Clearance Method
1. PCM analysis for clearance air samples will not be used on UCDCM projects.
- C. TEM Clearance Method (Where Used or Required)
1. The TEM analytical method is the primary method that will be used on UCDCM asbestos abatement projects. Clearance protocol for TEM Method shall conform to EPA AHERA standard pursuant to 40 CFR Part 763, Appendix A to Subpart E TEM analytical methods, with the exception that fewer number of air samples may be collected and analyzed.
 2. Air samples shall be collected on MCE cassettes with a 0.45 micron pore size.
 3. The Contractor may elect to sample first with PCM to get an indication of the level of cleanliness.
 4. After the lock down/encapsulant is settled and dry, a leaf blower will be used to agitate all surfaces within the negative pressure enclosure (referred to as the aggressive air sampling method). One or more free standing 24" fans will be placed inside of the work area to facilitate additional air movement inside the containment for the duration of the air sampling period.
 5. The clearance criteria shall be the AHERA standard. The average of all air samples collected inside of the work area shall be ≤ 70 asbestos structures per millimeter squared. If the clearance criteria is not met, the Contractor is responsible to re-clean the entire containment area, and the UCDCM Representative shall collect clearance air samples again. Air sampling shall continue until the sample results meet the clearance criteria. All additional cleaning of the containment by the contractor and additional costs for the collection and analysis of the air samples will be at the expense of the contractor.

3.15 PROJECT CLOSE OUT

- A. Before the final certificate for payment is issued to the Contractor the following information shall be provided to the University's Representative:
1. Provide post job submittals to include:
 - a. Contractor's name, address, CSLB certification number, DOSH registration number, and tax identification number.
 - b. Name of hazardous transporter, address, phone number and registration number.
 - c. A copy of the asbestos waste record showing dates, times, manifest numbers, quantities of wastes, types of containers removed from the work area, the hauler, and the signature of the recorder.
 - d. Name, address, phone number and EPA registration number of waste disposal site.
 - e. Copies of all laboratory analysis of air samples.
 - f. Building name and address.
 - g. Project name and contract number.
 - h. Describe scope of work; including, location (room numbers, approximate square footage, building system types).

- i. Provide an inventory of the ACM/PACM removed from the job site. Include, building system, classes of asbestos related work, quantity, note whether the project was abatement or managed in-place, note whether the building system(s) was replaced.
- j. A copy of the worker/visitor logs showing the following for all persons entering the work area: date, name, entry time, exit time, company or agency represented, and reason for entry. The Contractor's time records will not be accepted in lieu of a worker/visitor log.
- k. Date on-site work began.
- l. Date on-site work was completed.
- m. Copies of DOP Testing Performed on HEPA Equipment not Previously Submitted
- n. Manometer graphs identifying project name, date, and location.
- o. Copies of all accident reports submitted during the course of work. If no accidents occur during the project this should be stated in writing by the Contractor.
- p. Copies of revised notifications to all regulatory agencies.
- q. Other Documents as Requested

Manifest Verification

Project Name: _____ Project #: _____
 Contractor: _____ Owner's Rep: _____

Manifest Type: Hazardous Non-hazardous

* Manifest Document #: _____
 * Generator: _____
 * Waster Transporter #1: _____
 * Waster Transporter #2: _____
 * Disposal Facility (landfill): _____

* Description of Waste: _____
 * Generator Label Required? Yes No
 * Warning Labels on Bags in Accordance with Specification? Yes No
 * Is Profile Required? Yes No
 * If Yes, has copy been submitted? Yes No
 * Quantity of Waste: _____
 * Weight Ticket Required: Yes No
 Additional Information: _____

Certification: I hereby declare that the contents of the above described manifest are fully and accurately described by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable federal, state and international laws.

	Printed Name	Signature	Date
Generator:			
Contractor:			
FD&C:			
Consultant (optional):			

A/C 9558960 Sub 07
East Wing Tower & Radiology SPC 4D

END OF SECTION 13280

SECTION 132810
HAZARDOUS MATERIALS MANAGEMENT – LEAD & OTHER HAZARDOUS MATERIALS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. WORK INCLUDED - GENERAL

1. The Contractor shall furnish all labor, material, equipment, services, testing, employee training, fit testing, medical exams, transportation, and daily expense to meet the requirements of this Specification.
2. The Contractor shall obtain all required permits, licenses, registrations, notifications, and regulatory approvals required by law (federal, state and local) and University of California Davis Medical Center (UCDMC) policy.
3. All lead-related activities associated with this Contract shall be performed during the work period specified in each contract.
4. The Contractor shall guard against unnecessary disturbances or damage to sensitive finishes on buildings, building systems, and equipment.

B. WORK INCLUDED – SPECIFIC

1. The Contractor is responsible for identifying the exact locations and number of work areas listed below by referring to University supplied Project Drawings and by working with the University's Representative or University's Hazardous Materials Consultant.
2. This project does not include lead abatement or lead remediation. This project includes work on building components that have been tested where lead is present in the paint in low concentrations which would indicate there is some "lead containing material" (LCM), and some materials above 1.0 milligram per square centimeter (mg/cm²), which is considered "lead-based paint" (LBP). This project is a renovation project and not considered a lead abatement project with regards to the requirements of Title 17.
3. A limited lead in paint testing in the East Wing using XRF technology was conducted in the East Wing on multiple floors in 2005 by MACTEC. The results of testing by XRF found low levels of lead (<1.0 mg/cm²) in the painted gypsum walls, painted metal components, and door frames. Some building components in the East Wing were found to have high levels of lead greater than 1.0 mg/cm², which include window sills, clear leaded glass in x-ray rooms, lead-lined walls and door frames in x-ray rooms, ceramic tiles and window frames. As a result of the high variability of possible low levels of paint in the painted components, it is assumed some lead painted components may be impacted during this project and work practices for lead dust control is important.
4. An asbestos and lead inspection was conducted by the University's Representative's Hazardous Materials Consultant who is a California Certified Asbestos Consultant and CDPH Lead Inspector/Assessor. Please refer to the Hazardous Materials Survey Report by Entek Consulting Group, Inc., October 14, 2025 for a compilation of all sampling data, summary tables of lead and asbestos containing materials and non-asbestos containing materials, laboratory reports, chain of custodies and summary of findings.

5. Lead testing of paint chips was also included in the project area with results included in Table 3.

1.2 SITE CHARACTERIZATION

Table 3 Lead Containing Materials in Project Area Paint Chip Samples by Atomic Absorption Spectroscopy (AAS)			
Building System Type	Lead Content (PPM)	Quantity (Approx.)	Location
Beige Colored Paint – Drywall Walls	<LOD	N/A	East Wing
Beige Colored Paint – Plaster Walls	<LOD	N/A	East Wing
White Colored Paint – Rough Plaster Walls	<LOD	N/A	East Wing
White Colored Paint – Concrete Walls	<LOD	N/A	East Wing
White Colored Paint – Metal Mechanical Systems	<LOD	N/A	East Wing
Yellow Colored Paint – Plaster Wall Systems	673 ppm	N/A	East Wing – Ground Level
Blue Colored Paint – Plaster Wall Systems	2,073 ppm	N/A	East Wing – Ground Level

- A. Hazardous materials, other than lead containing paints and Presumed Lead Containing Material (PLCM) that have the potential to be disturbed at this Project site are listed in Table 4 below:

<i>Material Description</i>	<i>Type of Hazard</i>	Location
Fluorescent Light Bulbs	Mercury	See Drawings
Light Ballasts	PCB's	See Drawings
Light Ballasts	Universal Waste	See Drawings
Mold Contamination	Mold	Undetermined
Caulking	PCB's	See Drawings
Thermostat Switches	Mercury	See Drawings
(Materials)	Asbestos	See Section 13280
Exit Signs	Radioactive Gas Tritium	See Drawings

- B. Where light fixtures are required to be removed, the Contractor shall recycle all fluorescent light tubes and non-PCB containing ballasts as Universal Wastes as required in Title 22. All PCB containing light ballasts or caulking (if present) shall be sent to a hazardous waste site as a separate waste stream. Determination of potential PCBs for each light ballast shall be made when the light fixture is removed from the building component. Packaging of light tubes and light ballasts shall be in accordance with regulatory standards for safe storage and transport by a hazardous waste hauler.
- C. Prior to handling other hazardous materials at the Project site, the Contractor shall review University's protocols with a UCDHS EH&S Representative.

1.3 ABBREVIATIONS AND DEFINITIONS

A. Abbreviation

AA	Atomic Absorption – Flame (EPA SW-846)
ABATEMENT	Removal of all Lead in the Building/Location or Specific Component
AIHA	American Industrial Hygiene Association
AL	Action Level (30 µg/M ³ per 8 hour TWA)
BLL	Blood Lead Level
CCR	California Code of Regulations
CDPH	California Department of Public Health
CEPA	California Environmental Protection Agency
CFR	Code of Federal Regulations
CSLB	Contractor's State Licensing Board
DIR	Division of Industrial Relations
dL	Deciliter
DOSH	Division of Occupational Safety and Health
DOT	Federal Department of Transportation
DTSC	California Department of Toxic Substances Control
EH&S	Environmental Health and Safety - UCDHS
ELLAP	Environmental Lead Laboratory Accreditation Program
ELPAT	Environmental Lead Proficiency Analytical Testing Program
EPA	U.S. Environmental Protection Agency
FVC	Forced Vital Capacity
FEV	Forced Expiratory Volume
GFCI	Ground Fault Circuit Interrupter
HEPA	High Efficiency Particulate Air
HUD	U.S. Department of Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
ICRA	Infection Control Risk Assessment
INTERIM CONTROLS	Removal at specific locations to accommodate remodel < 20 years
LBP	Lead Based Paint (paints, varnish, shellac, etc. >0.5% lead by weight, >5,000 ppm, or > 1.0 mg/cm ²)
LCM	Lead Containing Material – materials tested to contain any measurable levels of lead
µg	Microgram = part per billion (ppb)
SDS	Safety Data Sheet
NAAQS	National Ambient Air Quality Standards
NAM	Negative Air Machine
NESHAP	National Emissions Standard for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NPE	Negative Pressure Enclosure
NVLAP	National Voluntary Laboratory Accreditation Program
O&M	Operations and Maintenance
OSHA	Federal Occupational Safety and Health Administration
PEL	Permissible Exposure Limit (50 µg/M ³ 8 hr. TWA)
PLCM	Presumed Lead Containing Material
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act
TCLP	Toxicity Characteristic Leaching Procedure (mg/L)
TTLC	Total Threshold Limit Concentration (wet-weight mg/kg)
TSP	Trisodium Phosphate
TWA	Time Weighted Average
STLC	Soluble Threshold Limit Concentration (mg/L)
UCDHS	UC Davis Health System

ULPA	Ultra Low Penetrating Air
XRF	X-ray Fluorescence
ZPP	Zinc Protoporphyrin

- B. Definitions: The following definitions are provided for additional clarification and may exceed Federal, State or local regulatory requirements.
1. Lead Abatement - "Abatement" means any set of measures designed to reduce or eliminate lead hazards or lead-based paint for public and residential buildings, but does not include containment or cleaning.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23 Shop Drawings, Product Data and Samples, and Section 01 77 00 Closeout Procedures.
- B. Submit proposed material substitutions complying with requirements listed in Section 01 60 00 Product Requirements.
- C. References: Submit names, addresses and telephone numbers of at least 3 Project Managers or Owners (not employed by Contractor) for whom Contractor has performed jobs of similar size and character to the work specified in this Contract.
- D. General: Submittal requirements listed below shall be completed and accepted by University's Representative prior to scheduling the start of project site work. Submit the number of copies Contractor requires, plus 4 copies that will be retained by the University. Work shall not begin until such approval has been given, and a bound copy of project submittal is placed at an easily accessible location at the project site.
- E. Notifications and Permits: Submit copies of all regulatory agency notifications and permits.
1. Contractor is required to submit a "Lead-Work Pre-Job Notification" (8 CCR 1532.1(p)) for all projects, if there is greater than 100 square feet or greater than 100 linear feet of materials containing lead greater than 5,000 ppm, 0.5% by weight, or 1.0 mg/cm² to be removed. If these quantities are exceeded, a copy of the notification to Cal/OSHA shall be provided to the UCDHS EH&S Representative.
- F. Worker Training and Safety Programs
1. Training Certificates: For each employee who will be employed on the Project, submit a copy of employee's lead training that meets Cal/OSHA training requirements under Title 8 Section 1532.1 Lead in Construction. UCDHS requires all contractor and subcontractor personnel directly involved with lead abatement to have current CDPH lead training certificates at a level appropriate for the project task (e.g., Project Designer, Project Monitor, Supervisor, Worker, Inspector/Assessor), in the unlikely event that lead abatement is required for the project.
 2. Qualifications of person taking Personal Air Samples: Submit information regarding training and qualifications of the field technician who will be collecting personal air samples.
- G. Safety Programs: On company letterhead, submit confirmation that the Contractor has written safety programs for:

1. Injury Illness Prevention (T8 CCR 3203) (mandatory for all projects),
 2. Hazard Communication (T8 CCR 5194) (mandatory for all projects),
 3. Fall Protection (T8 CCR 1620 – 1621, 1632 – 1633, 1635.1 – 1637, 1640 – 1655, 1669 – 1672, 3209 - 3239) (when applicable),
 4. Lock Out Tag Out (T8 CCR 3314) (when applicable),
 5. Confined Space (T8 CCR 5156) (when applicable).
 6. Respiratory Protection (8 CCR 5144) (when applicable)
 7. Medical Surveillance (8 CCR 1532.1(i)) (when applicable)
 8. Lead Compliance (8 CCR 1532.1(e)(2)) (when applicable)
- H. Work Plan and Schedule: Submit proposed Work Plan and schedule. The Work Plan shall be project specific and address project site preparation, site and engineering controls, worker protection and exposure monitoring, and protection of building occupants from exposure to lead. Schedule of work must be submitted and approved before work begins. University's Representative will forward a copy to the Hazardous Material Consultant for review prior to commencement of work.
- I. Product Data Sheets and Safety Data Sheets (SDS): For all products proposed for use on the project, submit copies of the manufacturers' safety data sheets to the UCDHS EH&S Representative for review, and copies of the Product Data Sheets to the University Representative for review.
- J. Laboratory Qualifications: For any laboratory performing lead analysis the Contractor shall submit evidence of ELLAP and ELPAT certification and accreditation. Laboratories performing worker exposure sample analysis must submit evidence of AIHA IHLAP certification for metals if they do not have ELLAP or ELPAT certification.
- K. HEPA/ULPA Equipment Test: Submit copies of leak test results to the University's Representative prior to starting project site work. Leak testing shall be performed at the project site and shall be witnessed by the UCDHS EH&S Representative or the Hazardous Materials Consultant. The leak test results shall identify equipment by make, model and serial number. No equipment which fails the leak testing may be used at UCDHS, unless it is exclusively exhausts outdoors. Vacuums which fail may be used within full negative pressure enclosures at the discretion of UCDHS EH&S.
- L. Emergency Contact List: Submit an emergency contact list; include name, phone number, fax number and pager number for Contractor's supervisor or competent person and subcontractor's telephone numbers who can be reached on a 24-hour basis.
- M. Hazardous Waste Disposal Plan: Submit a Waste Disposal Plan that includes estimated number of containers), size of container(s), hazardous material transporter name and proposed disposal site before start of project. The disposal facility must be approved by the UCDHS EH&S representative prior to off-haul.
- N. Lead As-Built Summary: Submit a Lead As-Built Summary within 14 calendar days of the last day of field Work and prior to a request for final application for payment. The summary shall include a description of lead containing materials that were removed and a description of lead containing materials that remain in the project area.

1.5 CONTRACTOR QUALIFICATIONS

- A. Contractor licensing for this work will require a B, C33, or C61/D-38 and appropriate lead training for employees to perform lead related work.

1.6 RULES AND REGULATIONS

- A. The Contractor shall comply with the most recent edition of applicable Federal, State, local, and University standards, laws, codes and regulations. If a conflict exists between referenced regulatory requirements and Contract Documents, the Contractor shall notify the University's Representative in writing and request the conflict be resolved. Contractor performing work contrary to mandated laws shall bear full legal and financial responsibility for the violations.

- B. The list of regulators and regulations, cited below, serve as a reference for the most commonly used standards governing the lead industry:

1. FEDERAL REGULATORS AND REGULATIONS

- a. EPA - Environmental Protection Agency
 - (1) 40 CFR Part 261 et al. - Resource Conservation and Recovery Act
 - (2) Title X - Residential Lead Poisoning Prevention Act
 - (3) National Ambient Air Quality Standards (40 CFR 50)
- b. OSHA - Occupational Safety and Health Administration
 - (1) 29 CFR 1926.62 - Construction Lead Standard
 - (2) 29 CFR 1910.1025 - General Industry Lead Standard
 - (3) 29 CFR 1910.147 - Lock Out - Tag Out
- c. DOT - Department of Transportation
 - (1) 49 CFR Parts 173, 178 and 179

2. STATE REGULATORS, LAWS AND REGULATIONS

- a. Cal/OSHA - California Division of Occupational Safety and Health
 - (1) 8 CCR 1532.1 - Construction Lead Standard
 - (2) 8 CCR 5216 - General Industry Lead Standard
 - (3) 8 CCR 5194 - Hazard Communication
 - (4) 8 CCR 5157 - Confined Space
 - (5) 8 CCR 5144 - Respiratory Protection
 - (6) 8 CCR 3203 - Injury and Illness Prevention
- b. DTSC - Department of Toxic Substances Control
 - (1) (Health and Safety Code Chapter 6.5 Hazardous Waste Control, Article 6 Transportation and Article 6.5 Hazardous Waste Haulers
 - (2) CCR, Title 22, Division 4, Sections 66000, et al.
- c. CIWMB - California Integrated Waste Management Board
- d. California Department of Public Health (CDPH)
 - (1) CCR, Title 17, Division 1, Chapter 8
- e. SWRCB - State Water Resources Control Board - CCR, Title 23
- f. CSLB - California Contractors State License Board
- g. Health and Safety Code 25157.8 (AB 2784 Natural Resources)

1.7 NOTIFICATION AND PERMITS

- A. The Contractor is responsible for notifying Federal, State and local agencies, obtaining all required permits/extensions and paying all related fees, as required.
- B. UC Davis Health System

1. To obtain a Hot Work Permit from the UCDHS Fire Protection Office, call 916-734-3036 for instructions.
 2. A Uniform Hazardous Waste Manifest shall be prepared by the Contractor or the transporter and approved by UCDHS EH&S for each load of hazardous waste transported from the work site. EH&S must be notified at least 24 hours prior to the anticipated time of shipment.
 3. Copies of records of non-hazardous waste removed from the project shall be provided to UCDHS EH&S, which may include Bill of Lading, non-hazardous waste receipts, etc.
- C. Sacramento Metropolitan Air Quality Management District (SMAQMD) has no notification requirements for lead related work. SMAQMD and Cal/OSHA do have notification requirements for asbestos related work. See Section 13280.
- D. Contractor is to submit a Lead-Work Pre-Job Notification to CAL/OSHA as required by 8 CCR 1532.1.

1.8 UNIVERSITY CONTACTS

A. **University's Representative: Casey Lubawy**

1. **Phone: 916-612-3617**
2. **Fax: N/A**

B. **UCDHS EH&S Representative: Kaila Benton-Vitz**

1. **Phone: 916-734-2740**
2. **Fax: 916-734-7309**

C. **University Hazardous Material Consultant: Ryan Metzen**

1. **Phone: 916-517-3082**
2. **Fax: 916-632-6812**

PART 2 - PRODUCTS

2.1 MATERIALS

A. Safety Data Sheets (SDS)

1. The Contractor shall provide SDS for all products used on UCDHS job sites. The SDS files shall be located near the Project site entrance at all times the product is used or stored onsite.
2. One complete set of Safety Data Sheets is to be provided to UCDHS EH&S for review prior to the start of work. (see 1.41)

B. Encapsulants

1. It is not anticipated encapsulants will be required for this project. If used, the choice of the correct encapsulant for a project is determined by agreement between the Contractor and the University's Representative. Two factors to consider in the choice are wear life (aim for 20 years) and usage patterns. Products shall be applied using a brush, roller or an airless sprayer. The

Contractor shall follow strict manufacturer's instructions regarding surface preparation, ambient air conditions, depth of material penetration, recommended thickness of a dry application, and curing time.

- a) For penetrating and lockdown purposes Foster 32-60, Certane 909, or equal is recommended.
 - b) For bridging purposes Foster 32-32, Certane 2000, or equal is recommended.
 - c) For high temperature applications, e.g., steam pipes, Foster 84-18, Certane 1000, or equal is recommended.
2. Any proposed equal to the products listed above must meet the following criteria: submit product information prior to the start of the Project and must receive approval by the University Representative and UCDHS EH&S Representative; non-toxic and non-irritating as defined by the Hazardous Substance Control Act; sufficiently tinted to provide contrast with the material being coated; and have a minimum 60 psi Batelle Standard impact rating.
 3. All products shall be rated UL Class A and have a flame resistance/spread rate less than or equal to 25 as designated by the ASTM code E 162. Any exceptions must be pre-approved by UCDHS Fire Prevention Office (916-734-3036).

C. Polyethylene Products

1. Floor and wall sheeting used for lead containments or critical barriers are required to have a minimum thickness of: a) 6-mil (floor) and 4-mil (walls); and, b) meet the following standards -- ASTM E-84, with a flame resistance/spread rate less than or equal to 25 ASTM (E-162).
2. The polyethylene sheeting used for containment or critical barriers shall be frosted or black. Polyethylene bags or sheeting used for waste may be clear.

D. Paint Removers

1. All paint removers shall be pre-approved by UCDHS EH&S. Methylene chloride based paint removers are not permitted on this project.
2. The use of paint removers on the project must strictly comply with manufacturer application instructions and safety warnings.

2.2 EQUIPMENT

- A. HEPA/ULPA vacuums and negative air machines must be leak tested on-site by a firm independent of the Contractor, who are trained and qualified to perform the challenge testing of portable HEPA filtered equipment, shall follow the manufacturers recommended test procedure, and shall use the recommended test challenge agent.
- B. Tools and equipment shall arrive at the project site free of lead debris and dust.
- C. HEPA/ULPA vacuum exteriors must be clean when they arrive on project site. All openings on the vacuum, hoses, and negative air units shall be taped shut when they are brought onto the project site and when they are taken from the project site..
- D. All electric tools and equipment shall be connected to a GFCI.
- E. Power tools used to prepare surfaces containing lead must be connected to a HEPA/ULPA vacuum.
- F. Heat guns with a working temperature less than or equal to 1100° F are permitted.

PART 3 - EXECUTION

3.1 SAFETY

- A. In accordance with State and Federal laws, Contractor shall be responsible for conditions of the project site; including the safety of all persons and property during the performance of work. To ensure effective communication in safety matters the Contractor shall participate and conduct the following meetings:
1. A pre-construction safety meeting is required to be held with the University's Representative, University Hazardous Material Consultant, and the UCDHS EH&S Representative prior to the start of the project. The following subjects shall be discussed: Division 13 Specifications; impact to building occupants; waste disposal, and work related safety programs.
 2. On the first day of lead related work, the Contractor shall conduct a safety meeting (tailgate) for its employees and subcontractor employees that alert them to the specific hazards of the project. The Contractor must conduct the safety meeting in the primary language of its employees. If needed, more than one primary language presentation must occur. This same initial safety meeting must be provided to all personnel new to the project before they are permitted to start work.
 3. On a weekly basis, the Contractor shall conduct a safety meeting with its employees.

3.2 WORK SITE PREPARATION

- A. Prior to beginning any on-site work preparation, the Contractor shall walk the project area with the University Hazardous Material Consultant and UCDHS EH&S Representative to discuss site characterization, regulated area set-up, access controls, background samples, security, and safety issues.
- B. Post all regulatory notices, permits, sign-in-out roster, at the primary entrance to the project site.
- C. The Contractor, in coordination with the University Hazardous Material Consultant and UCDHS EH&S Representative shall ensure all electrical and HVAC equipment servicing the work area is disconnected and locked out. Electrical tools in the work zone must be connected to a GFCI.
- D. The Contractor shall seal existing critical barriers, including HVAC openings, windows, vents, open pipes, skylights, ducts, doorways, corridors, and diffusers with double layers of plastic and cardboard or plywood inserts as necessary.
- E. The Contractor shall install approved backflow prevention devices before connecting to the University's domestic water system, if necessary. Contact the University's Representative for a list of approved devices.
- F. The Contractor is obligated to coordinate inspection schedules with the University's Representative and the University Hazardous Material Consultant.
- G. The Contractor shall establish project site control barriers.

3.3 WORK SITE CONTROL

- A. The Contractor shall restrict the work areas to authorized personnel; including, the Contractor's employees, University's Representatives, UCDHS EH&S Representative, University Hazardous Material Consultant and regulatory agency representatives.
- B. At regulated project sites, the Contractor shall use caution tape to demarcate the boundary of the work zone and post lead warning signs.
 - 1. The following sign is required by Title 8, CCR 1532.1

**DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS AREA**

- C. All unauthorized personnel are to remain outside the regulated area. The Contractor shall call the University's Representative, EH&S Representative or the University Hazardous Material Consultant if unauthorized UCDHS staff or the public enters the containment area.
- D. If inclement weather threatens the project site, the Contractor shall take all necessary measures to ensure lead-contaminated debris does not migrate from regulated areas. Steps shall also be taken to prevent water intrusion/water damage to the work site and adjacent areas.
- E. If wind speed threatens the project site, the Contractor shall erect a wind barrier or suspend operations until the wind is below 15 mph.

3.4 RECORDKEEPING

- A. The Contractor shall maintain the following records at the regulated work area:
 - 1. Site Log (sign-in/sign-out).
 - 2. Incident Log and Emergency Action Plan.
 - 3. Personal air sampling results.
 - 4. Area sample results from inside and outside the regulated area.
 - 5. Lead Supervisor (Contractor) and Lead Worker training certificates, respirator fit tests, and medical clearance certificates.
 - 6. Federal, state or local notifications.
- B. All Items 1 through 6 shall be submitted with the "As-Built" summary Identified in "Project Close-Out".
- C. The University Hazardous Material Consultant shall retain all sample records (wipe, bulk, initial, area (perimeter), and clearance samples). Results are reported on a daily basis to UCDHS EH&S and to the Project Manager. At the end of the project, all sampling records are submitted as a complete package in the project close out to the Project Manager.

3.5 ADMINISTRATIVE CONTROLS

- A. Any remediation project performed in high heat environments requires the Contractor to comply with T8 CCR 3395, including providing sufficient breaks to maintain a safe environment for their workers.

3.6 ENGINEERING CONTROLS

- A. Negative Pressure Enclosure (NPE)
1. Containment protocols shall follow the ICRA requirements when building materials will be disturbed, or removed creating potential dust release.
 2. Mini-containments: The construction of a mini-containment requires a minimum of one layer of 6-mil polyethylene and a HEPA/ULPA vacuum or HEPA filtered negative air unit exhausting from the containment.
 3. HEPA vacuumed assisted tools shall be used for drilling, cutting, sawing, or removing lead containing paint from surfaces, unless a paste type stripper product is used.
- B. Lead Shielding
1. Where lead shielding is to be removed, the contractor shall install 6-mil plastic on the floor immediately surrounding the wall being removed that contains the lead shielding, extending out at least the height of the wall being removed. If ceilings containing lead shielding are removed, the entire floor area shall be sealed with plastic.
 2. The lead shielding shall be removed using manual tools such as screw drivers, razor knives, shears, and pry bars. Power tools, heat guns, cutting torches, and other high temperature generating processes are prohibited due to rapid friction and heat increasing the potential to create lead fumes or dust.
 3. Contractor shall use methods to minimize airborne lead to the greatest extent possible (e.g., removing an entire wall instead of removing sheetrock from lead shielding prior to removal).
- C. HEPA/ULPA Equipment
1. The Contractor shall ensure all HEPA/ULPA filtration units are leak tested on project site by an independent testing contractor. Each piece of equipment shall be tested in compliance with the ANSI Z9.2 Standard (trapping and retaining 99.97% of all test particles of 0.3 microns). Documentation of testing is to be maintained at the work site. The UCDHS EH&S representative or Hazardous Materials Consultant shall be present to observe the challenge testing of all HEPA systems brought onsite.
 2. The Contractor shall HEPA/ULPA vacuum visible debris prior to set-up, during the removal process and at the conclusion of each shift.
 3. HEPA/ULPA equipment used to establish negative air pressure within a space must run continuously (24-hours a day) until the project is complete.
 4. The Contractor shall ensure make-up air is drawn through an inlet that can be easily sealed in the event of a negative air failure. The inlet sealing method must also be effective when there is a failure in the system after normal work hours.
 5. All HEPA/ULPA filters must be disposed as hazardous waste.
 6. Any HEPA system that has been removed from the project site and brought back to the project site shall be challenge tested again before being placed in use.
- D. Wet Methods
1. Prior to removing LCM/PLCM, the Contractor shall adequately wet the material with water. The waste must remain wet until properly packaged for disposal.
- E. Removal Operations

1. If there is lead abatement work, as defined in these requirements, the Contractor must use a CDPH-Certified Lead Supervisor and CDPH-Certified Lead Workers. The Lead Supervisor must be present onsite at all times.
2. Ensure all accumulated debris is completely sealed by the end of the shift. After gross debris is bagged, use wet wipe methods and HEPA/ULPA vacuums to clean the polyethylene sheeting.

F. Infection Control

1. An Infection Control Risk Assessment (ICRA) will be developed for this project by the University's Representative and approved by the UCDMC Infection Prevention. Depending upon the location of the work and the potential for dust generation that could impact patient care, the ICRA may require more stringent controls than those described under this specification. Adequacy of controls may be verified by periodic airborne particle counting, conducted by EH&S or a designee. Contractor understands that any operations generating excess particles in uncontained locations will cause Contractor to modify site controls. Contractor is responsible for maintaining controls to avoid pollution of patient care spaces.

3.7 WORKER PROTECTION

A. The following protective measures are required for lead-related work associated with this project. These measures are not intended to be all-inclusive:

1. Employee Training/Supervision
 - a. The Contractor shall provide information to its employees about lead and other hazards per the Hazard Communication standard (8 CCR, 5194) and other Cal/OSHA standards (e.g., asbestos, fall protection, etc.) as appropriate for the project.
 - b. All contractor and subcontractor personnel are to be trained to the level of their project assignment in accordance with 8 CCR 1532.1, which at a minimum will require lead awareness training (1-2 hours in length).
2. Respiratory Protection
 - a. The Contractor shall provide respiratory protection to all employees where there is the potential for exposure to lead dust at or above the permissible exposure limit per Title 8 5144 Respiratory Protection.
 - b. The Contractor's employees who wear a respirator must have passed a fit test within the previous 12 months to perform contract work at the University.
3. Protective Clothing
 - a. The Contractor shall provide workers with sufficient sets of protective clothing. Tyvek™, Kleenguard™ or equivalent, coveralls (with hood and feet protection) or equal are acceptable. The Contractor shall also provide coveralls to qualified UCDMC personnel, University Hazardous Material Consultant, State and local officials.
 - b. Note that work in sterile areas may require multiple sets of clothing or staging of additional protective clothing to ensure sanitary conditions are maintained.
 - c. The Contractor shall provide rubber, latex or Nitrile gloves, rubber boots, eye protection, earplugs and hard hats as needed per the 8 CCR, Hazard Communication and Personal Protective Equipment standards.
4. Medical Surveillance
 - a. As required by 8 CCR 1532.1, the Contractor shall establish a medical surveillance program for all employees performing lead work if work is expected to exceed the Action Level for more than 30 days per year. In

addition, all personnel required to wear a respirator shall have an medical evaluation to assure they are capable of wearing a respirator per T8 CCR 5144.

- b. The Contractor shall demonstrate all project personnel are participating in the medical surveillance program with evidence supported in the pre-job submittal.

3.8 PERSONAL HYGIENE

- A. The Contractor shall require that no employee be allowed to apply cosmetics, or consume food, tobacco products, or beverages in the regulated work area.
- B. The Contractor shall establish a location outside the work area, which shall be designated for employee eating and drinking. Employees must utilize the on-site decontamination facilities for clean-up prior to entering the designated eating/drinking location. The eating area shall be kept clean of dust on all horizontal surfaces. Cleaning stations shall include clean water, soap, and towels. All workers shall clean face, hands and lower arms before leaving the work area for break periods, and at the end of the work shift.

3.9 AIR MONITORING PROGRAM

- A. Personal Air Samples - Contractor Responsibility
 1. The Contractor shall presume remediation activities will exceed the PEL and conduct initial and daily exposure assessments in accordance with T8 1532.1.
 2. Exposure assessments are to be conducted in accordance with 8 CCR 1532.1(d).
- B. Area Sampling
 1. Daily Perimeter Monitoring – University Hazardous Material Consultant Responsibilities
 - a. The University Hazardous Material Consultant is responsible for monitoring the perimeter of the work zone. Air samples that exceed 30 ug/m³ per 8 hr. TWA require the University Hazardous Material Consultant to halt work and notify the UCDHS EH&S Representative. Work may resume after the Contractor has identified and corrected the work practice that led to the high airborne lead levels.
 2. Daily Monitoring – University Hazardous Material Consultant Responsibilities
 - a. The University Hazardous Material Consultant is responsible for monitoring air quality within the regulated area, including the clean room. Any sample at or above 30 µg/M³ TWA in the clean room requires a cessation of work until the area is cleaned and the cause of the problem has been determined and solved. The UCDHS EH&S Representative is to be notified immediately of any such actions. The Contractor shall thoroughly clean the spaces using the HEPA vacuum and wet wiping techniques. Air samples in the work zone that exceed the protection level of a respirator require a cessation of activity. The Contractor's competent person and the University Hazardous Material Consultant shall review work practices with the UCDHS EH&S.

3.10 SPECIFIC WORK PROTOCOLS

- A. Specific work protocols, cited below, provide minimum guidance for the performance of site work.
 - 1. Initial Site Clean-Up
 - a. No pre-cleaning is required for this project.
 - b. LBP/LCM contaminated chips or debris, etc. generated during the project shall be collected while workers are wearing proper respirators and disposable coveralls, and using HEPA vacuums, wet methods, polyethylene bags, lead warning labels and proper disposal protocols.
 - 2. Interim Controls (In-Place-Management)
 - a. This is a control measure to reduce or eliminate lead exposure for less than 20 years. It is not considered abatement. Several strategies are used to control potential exposure to LCM left in place; including, dust removal, paint stabilization, treatment of impact/friction surfaces, and soil coverings. No Interim Controls for lead are included in this project.
 - b. Dry blasting LCM is not permitted except by special circumstances pre-approved by the UCDHS EH&S Representative.
 - c. Water blasting LCM surfaces will not be allowed.
 - 3. Abatement
 - a. Lead abatement is not planned for this project. Abatement is meant to permanently control LCM products for a period of time greater than 20 years.
 - b. The renovation project may impact lead in building components, but any disturbance to lead in paint must follow the Lead in Construction requirements of 8 CCR 1532.1.
 - c. If the contractor needs to remove paint from surfaces, there are many options to consider including use of paint removal paste (such as Peel Away or equivalent), wet sanding, and HEPA equipped shrouded tools when disturbing LCM surfaces.
 - d. Dry blasting LCM is not permitted except by special circumstances pre-approved by the UCDHS EH&S Representative.
 - e. Water blasting LCM surfaces will not be allowed.

3.11 INSPECTIONS

- A. Inspection Responsibilities - Contractor
 - 1. Prior to beginning any lead-related work, the Contractor's lead supervisor shall inspect the regulated work areas for any building damage, hazardous conditions and/or irregularities that may contribute to an unsafe work environment. Any condition that poses a hazard or potential hazard to the Contractor's employees or the University's employees, patients and visitors must be immediately reported to the University's Representative.
 - 2. The Contractor is responsible for notifying and allowing sufficient time for the University Hazardous Material Consultant to conduct inspections at all phases of the project.
 - 3. The Contractor shall establish emergency response protocols for a manometer alarm sounding after they have left the project site. Under no circumstances shall the Contractor shut off negative air machines, unless the project has received final clearance. Dust control requirements under the ICRA Permit will require the work space to be placed under negative pressure for the duration of the demolition phase and new construction phase.
 - 4. All waste shall be characterized and separated by the Contractor. Wastes will be sampled individually as directed by the University Hazardous Materials Consultant to determine levels of lead before containerizing for shipment.

B. Inspection Responsibilities – University Hazardous Material Consultant

1. The University Hazardous Material Consultant shall walk the project site with the Contractor and the UCDHS EH&S Representative to review scope of work, pre-cleaning operations and any safety or security issues. The University Hazardous Material Consultant may attend the Contractor's safety meetings.
2. If minor lead related work requires removal of paint from surfaces using a paste, or work practices using HEPA filtered equipment, the hazard control measures shall be evaluated by the University Hazardous Material Consultant or University EH&S.
3. Prior to lead related work activities beginning, the University Hazardous Material Consultant shall match on-site personnel with lead training certificates, fit tests and medical exam records. Workers without on-site documentation shall not be allowed in the regulated area.
4. The University Hazardous Material Consultant is responsible for:
 - a. Reviewing all sampling data and all waste stream profiles.
 - b. Alerting the UCDHS EH&S Representative of any sample result exceeding $30 \mu\text{g}/\text{m}^3$ per 8 hr. TWA.
 - c. Review Contractor's performance and non-compliance report to the Project Manager.
5. The University Hazardous Material Consultant shall file a report of activities with the University's Representative and the UCDHS EH&S Representative on an agreed upon schedule.
6. After abatement or interim control activities are complete, the University Hazardous Material Consultant shall verify completeness of all visible debris is removed.
7. University Hazardous Material Consultant shall review contractor's waste characterization for the most efficient disposal for the University; all recommended disposal processes must be reviewed and approved by the UCDHS EH&S Representative.

3.12 ENCAPSULATION, FINAL CLEAN-UP AND RESTORATION

A. Encapsulation

1. Encapsulation for lead painted components is not anticipated for this project.

B. Final Clean-Up

1. Contractor shall clean entire project area of dust from all surfaces within the construction work area.

C. Restoration

1. Fixtures, equipment or objects relocated to storage areas designated by the University's Representative shall be restored to their exact position. The Contractor assumes full financial responsibility for damage to these objects.

3.13 WASTE DISPOSAL

A. Packaging Lead Waste

1. All lead containing waste material must be packaged and labeled in accordance with U.S. DOT, DTSC and EPA requirements.

B. Storing Lead Waste

1. At the end of each shift, all lead waste shall be stored in a lockable container or shipped off site. Accumulated waste shall not be allowed to remain in the

regulated work area overnight. No container shall be allowed to remain at the project site for greater than 90 continuous days from date the first waste container was generated.

- C. Uniform Hazardous Waste Manifest Procedures
 - 1. The Contractor or transporter is responsible for providing appropriate Uniform Hazardous Waste Manifests for the transport of hazardous waste materials. Only authorized EH&S personnel can sign on behalf of the UC Davis Medical Center (generator).
- D. Transporting Lead Waste to Class 1 Landfill
 - 1. A DTSC registered waste transporter, hired by the Contractor, is responsible for transporting hazardous lead waste from the Medical Center to (Chemical Waste Management, 35251 Old Skyline Road, Kettleman City, CA 93239), an EPA permitted disposal facility. Under certain conditions, UCDHS EH&S will permit hazardous lead waste to be transported to an alternative facility.
 - 2. The transporter shall make pick-ups during normal Working hours - 8:00 AM to 5:00 PM, Monday through Friday. The Contractor must comply with DOT label requirements for their vehicles.
 - 3. The Contractor must make shipments of lead waste containing less than 1,000 mg/kg lead but greater than 350 mg/kg of lead to a Class 1 landfill. This shipment does not require a registered waste hauler.
- E. Disposal
 - 1. The selection of a Treatment, Storage and Disposal Facility as an alternative to a landfill for disposal of lead waste must be reviewed and approved by the EH&S representative prior to arranging for the shipment of the waste.
 - 2. The Contractor shall provide waste documents from the Waste Disposal site as verification of the weight and proper disposal site, to the UCDHS EH&S Representative within 15 days of each container disposal.
 - 3. Lead waste that has been contaminated with another hazardous waste (e.g. solvents) must be tested and disposed according to all applicable standards.
 - 4. All lead waste will be sampled for Characterization before determination of Hazardous or Non-Hazardous material is made. Sequence of testing is as follows:
 - a. A TTLC result of $\geq 1,000$ mg/kg is considered a hazardous waste.
 - b. TTLC with a result of ≥ 50 mg/kg of lead must be retested using STLC method.
 - c. A STLC result of ≥ 5.0 mg/l must be retested using TCLP.
 - d. A TCLP result of ≥ 5.0 mg/l deems the waste Federal RCRA.
 - e. A STLC of ≥ 5 mg/l is categorized as State Hazardous Waste (Class 1).
 - f. A TTLC with a result of >350 mg/kg but <5.0 mg/l (STLC and TCLP) must go to landfill permitted to accept this level of lead although it is not hazardous. (See Item 6 below)
 - 5. Contractor shall provide a waste stream report to the University Hazardous Material Consultant identifying the number of containers and an explanation of how the samples were taken (composite or individual container sampling). A waste stream profile must be conducted on each unique waste stream. Confirmation will be provided by the Consultant, indicating all waste streams have been sampled per project specifications.
 - 6. All waste with total lead >350 ppm (mg/kg) disposed of in California, must be disposed of at a permitted Class 1 Hazardous waste landfill, or at other landfills that have specific permits to accept these wastes. However, the wastes are not classed as hazardous wastes unless for a reason other than lead content. The California hazardous waste threshold for total lead is $\geq 1,000$ mg/kg and the soluble threshold concentration (STLC) for lead is ≥ 5 mg/l.
- F. Recordkeeping

1. The Contractor shall provide the UCDHS Project Manager with copies of all waste disposal documents.

G. Fees

1. The Contractor is responsible for all fees and charges related to lead waste transport and disposal operations; including, waste stream profiles. Refer to SW-846-1311 (TCLP) and CCR, Title 22 Section 66261 (STLC) for waste stream identification requirements

H. Non-Hazardous Waste Manifest

1. The UCDHS EH&S Representative or Hazardous Materials Consultant (if authorization is provided by UCDHS) is responsible for reviewing and signing non-hazardous waste manifests. Prior to the Representative signing the manifest, the University Hazardous Material Consultant shall inspect the load and confirm its non-hazardous status.

I. Recycled Metals

1. Recycling ferrous or non-ferrous metals with adhered lead paint is encouraged by the UCDHS. The UCDHS expects that lead shielding will be recycled. This section defines "Hazardous Waste" for the purpose of defining waste stream as material that is placed in a land fill. Employee protection regulations remain the same during disturbance of lead. The Contractor is required to remove all loose and flaking paint. The Contractor is responsible for removing all other hazardous material that is unacceptable by the recycling firm. The Contractor is required to recycle where possible. The contractor will obtain a letter from the recycler acknowledging that the recycler is aware of the lead paint and has an Injury Illness Prevention Program (IIPP) that addresses the handling of this material that meets OSHA and EPA regulations. There is no UCDHS requirement for testing (TTLC, STLC, or TCLP) the recycle material stream.

3.14 CLEARANCE PROTOCOL

A. Abatement and Interim Control Projects

1. Lead abatement is not planned for this project; therefore, clearance wipe sampling is not currently planned. If however, there is lead abatement due to an identified lead hazard, the following will be conducted;
2. Prior to any clearance sampling, the regulated areas shall be visually inspected by the University Hazardous Material Consultant for the presence of LBP chips, visible settled dust or debris. Final clearance sampling shall not take place until the area has successfully passed this visual clearance. The Consultant shall follow the U.S. Housing and Urban Development (HUD) clearance wipe sampling protocol, which includes wiping one square foot of the surface being tested using an "S" pattern with an approved commercial lead sampling wipe. Clearance wipe sampling shall be conducted in locations most likely to be contaminated.
2. The University Hazardous Material Consultant and University's Representative following HUD guidelines and CDPH Title 17 requirements, shall select the total number of clearance samples for each job site and shall use the Title 17 criteria for clearance purposes.

3.15 PROJECT CLOSE OUT

- A. Before the final certificate for payment is issued to the Contractor the following information shall be provided to the University's Representative:
1. Using Exhibit 25 Lead Remediation-As-Built Summary (located in the Exhibits section of the Contract Documents) provide "As-Built" summary to include:
 - a. Contractor's name, addresses, CSLB certification number, DOSH registration number, and tax identification number.
 - b. Name of hazardous transporter, address, phone number and registration number.
 - c. ELAP laboratory name(s), addresses, and phone number(s) used to perform AA (flame), TCLP, TTLC or STLC analysis.
 - d. Building name and campus address.
 - e. Project name and contract number.
 - f. Describe scope of Work; Interim Controls or Abatement and location (room number[s]); provide drawings detailing the areas in which lead work that were accomplished.
 - g. Provide an inventory of the LCM/PLCM removed from the project site. Include: building system, quantity, note whether the project was Abatement or Interim Controls, the percentage of the total lead job for each building system type and cost.
 - h. Total dollar amount paid by the University for lead-related work including invoice date(s) and date(s) payment received.
 - i. Number of employees who worked on the project
 - j. Date on-site work began
 - k. Date on-site work was completed
 - l. Work methods
 - m. Did the University provide specification (answer yes or no).
 - n. Name, address, phone number and EPA registration number of waste disposal site.
 - o. Note that all copies of waste documents from the Waste Disposal site for hazardous material must be received by the University's Representative as part of this section.
 - p. The Contractor shall provide copies of all laboratory reports lead work protocols, and disposal documents requested by the University's Representative.
 - q. All documents relating to actual employees used for remediation purposes (see Section 3.4, A).

END OF SECTION 13281