



# **UC DAVIS MEDICAL CENTER**

**A/C 9557760**

## **MAIN HOSP IT HUGS UPGRADE**

**FACILITIES DESIGN AND CONSTRUCTION**

**4800 2<sup>ND</sup> AVENUE, SUITE 3010**

**SACRAMENTO, CA 95817**

**916-734-7024**

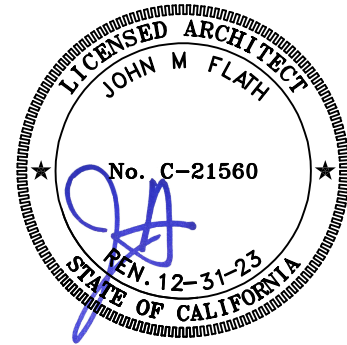
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**100% CONSTRUCTION DOCUMENTS**

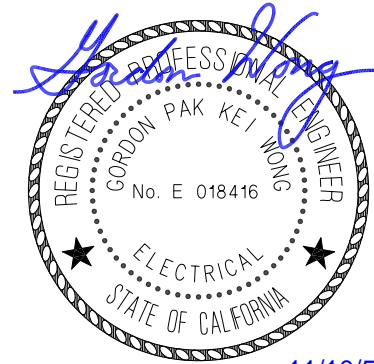
HCAI PROJECT # S231818-34-00

**ARCHITECT**

John Flath, AIA  
Nacht and Lewis Architects  
600 Q Street, Suite 100  
Sacramento, CA 95818  
916.329.4000



**ELECTRICAL ENGINEER**  
Gordon Pak Kei Wong, PE  
EDGE Electrical Consulting.  
400 R Street, Suite 333  
Sacramento, CA 95811  
916.256.2460



11/10/53

**OSHPD APPROVAL**



OSHPD PROJECT NO.: S231818-34-00

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NOT USED

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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: MAIN HOSPITAL IT HUGS UPGRADE
- B. University Project No.: 955776
- C. Project is located at 2315 Stockton Blvd., UC Davis Health, Sacramento, California, as shown on the vicinity map.
- D. Project is Design Bid Build, Project consists of:  
  
Modernization of the existing elopement prevention security system (HUGS) at UCDH Medical Center. Work is located in the University Tower (3<sup>rd</sup> floor) and Davis Tower (3<sup>rd</sup>, 5<sup>th</sup> 7<sup>th</sup> and 10<sup>th</sup> floors) consisting of installation of low voltage cabling, ceiling and wall mounted devices and electrical connections.
- E. A description of areas, types of construction and general nature of the Work are described on drawing G000.

Legacy HUGS system is to remain fully operational while new HUGS system is installed during normal business hours. Once the new system is installed, received HCAI final sign-off, commissioning occurs and HUGS tags activated, validated, provided to patients, and sign-off is received from UCDH, the new HUGS systems will be operationalized and the legacy HUGS system will be turned off and removed in its entirety.

Build-out as shown and herein specified, complete and ready for occupancy, the following HUGS UPGRADE project to the MAIN HOSPITAL facility shown on the Contract Documents.

- F. 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]** 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

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

NOT USED

#### 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

- A. The following portions of the Work are designated for occupancy by University as indicated.
  - 1. University Tower (3<sup>rd</sup> floor) and Davis Tower (3<sup>rd</sup>, 5<sup>th</sup> 7<sup>th</sup> and 10<sup>th</sup> floors)

#### 1.11 PROJECT PHASING

- A. The WORK OF THIS contract is divided into TWO (2) Phases.
  - 1. The Work of Phase I consists of the installation of the new HUGS SYSTEM.

Coordinate Phasing with Section 013200 – CONTRACT SCHEDULES.

2. The Work of Phase II consists of the demolition of the legacy HUGS SYSTEM.

Coordinate Phasing with Section 013200 – CONTRACT SCHEDULES.

**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 6:00 a.m. to 6:00 p.m. working hours, on holidays or weekends unless prior written approval has been retained from the University's Representative.

1.02 PROJECT PHASING

- A. Installation, validation and commissioning of new Stanley HUGS System including tags.
- B. Demolition of existing legacy HUGS System.

1.03 WORK SEQUENCE and WORK RESTRICTIONS

- A. Existing HUGS system to stay in operation independent of the new HUGS system installation. No work sequencing required for this project.
- B. Notification of work schedule must be received at least two weeks ahead of projected start date.
- C. Work to take place in the University Tower 3<sup>rd</sup> Floor, and Davis Tower 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup> and 10<sup>th</sup> Floors. All paths of travel, building exits, fire and life safety signage and equipment shall not be obstructed while working in these areas.

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

- A. University Tower 3rd Floor, and Davis Tower 3rd, 5th, 7th and 10th Floors, all of which are occupied.

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, sub **[CONTRACTOR]**'s, 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 **[CONTRACTOR]**'s 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 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 RFI's

- 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 interpretation, clarification, instruction or decision is subject to removal and replacement at **[Contractor]** 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 <sup>nd</sup> Avenue, Suite 3010, Sacramento, CA 95817 <b>Attn.: Ken Pickett</b> P: 916-396.0511 C: 916.934.8408 Email: kpickett@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.

**COPIES:**     University     CONSULTANTS     \_\_\_\_\_     \_\_\_\_\_     \_\_\_\_\_     FILE



## 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 2<sup>nd</sup> 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 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. Administration: University's Representative shall make physical arrangements for meetings and prepare agenda with copies for participants, preside at meetings, record minutes and distribute an electronic file within four (4) workdays to **[Contractor]** University's Consultants, and other participants affected by decisions made at meetings.



2. 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. Fire Protection Drawings: Refer to Division 21
    - b. Fire Alarm System: Refer to Division 28
    - c. Additional HCAI Deferred Approvals: Refer to list of deferred approvals as shown on the Contract Documents.
- 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]****[CM/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 [enter specific number of calendar days] to move University equipment and/or provide furnishings in University Tower (3<sup>rd</sup> floor), Davis Tower (3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup> and 10<sup>th</sup> floors). **[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.
    - University Tower (3<sup>rd</sup> floor)
    - Davis Tower (3<sup>rd</sup> floor)
    - Davis Tower (5<sup>th</sup> floor)
    - Davis Tower (7<sup>th</sup> floor)
    - Davis Tower (10<sup>th</sup> floor)
- 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 **[Contractor][CM/Contractor]** shall be prepared, at University written request, to perform certain shutdown and asbestos related work during non-normal time periods.

[Add additional specific work which is to be performed 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]** 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**

PROJECT NAME: \_\_\_\_\_

UNIVERSITY RFS# \_\_\_\_\_

PROJECT #: \_\_\_\_\_ HCAI #: \_\_\_\_\_ CONTRACTOR RFS #: \_\_\_\_\_

TODAY'S DATE: \_\_\_\_\_ SHUTDOWN DATE: \_\_\_\_\_ SUSPEND DATE: \_\_\_\_\_

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

Request Date: \_\_\_\_\_ Shutdown Target Date: \_\_\_\_\_

Requested By: \_\_\_\_\_ Requestor's Phone #: \_\_\_\_\_

Shutdown Work (Utility Specific): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Scope (Brief Description of Work): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Impact (Areas & Users): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Additional Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DIG NOTIFICATION FORM**

PROJECT #: \_\_\_\_\_ HCAI#: \_\_\_\_\_ DATE: \_\_\_\_\_

<b>TO: UC DAVIS HEALTH</b> Facilities Design & Construction 4800 2 <sup>nd</sup> Avenue, Suite 3010 Sacramento, CA 95817 P: 916-734-7024	<b>FROM:</b> _____ _____ _____ _____ _____
<b><u>Ken Pickett's email address:</u></b> <b><u>kpickett@ucdavis.edu</u></b>	_____

- Has USA been notified? YES \_\_\_ NO \_\_\_  
When? \_\_\_\_\_
  - Are all known utilities marked? YES \_\_\_ NO \_\_\_
  - Location of dig shown on attached site plan? YES \_\_\_ NO \_\_\_  
Purpose \_\_\_\_\_
  - Dates digging will take place \_\_\_\_\_  
Place \_\_\_\_\_
- Signed: \_\_\_\_\_

<b>UNIVERSITY USE ONLY</b>		
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.)		
_____		
_____		
_____		
_____		
<b>Copies:</b>	<b>University</b> _____	<b>Consultants</b> _____ <b>File</b> _____

## 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]****[CM/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][CM/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][CM/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, and/or 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-UPS NOT USED

#### 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 situation 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 35 00**  
**SPECIAL PROCEDURES**

**PART I - GENERAL**

1.01 SECTION INCLUDES

- A. Interim Life Safety Measures (ILSM)
- B. Security Procedures
- C. Hazardous Materials Procedures

1.02 RELATED SECTIONS

- A. General Conditions of the Contract
- B. Section 011100 – SUMMARY OF THE WORK
- C. Section 013100 – COORDINATION
- D. Section 013200 – CONTRACT SCHEDULES
- E. Section 015600 – TEMPORARY BARRIERS, ENCLOSURES AND CONTROLS
- F. Section 015610 – AIRBORNE CONTAMINANTS CONTROL
- G. Section 017300 – CUTTING AND PATCHING
- H. Section 017400 – CLEANING

1.03 INTERIM LIFE SAFETY MEASURES (ILSM)

- A. ILSM Definition: Interim Life Safety Measures are those activities that are undertaken during construction, repair, and improvement operations that are established to temporarily compensate for the deficiencies caused in fire safety and protection that may be associated with such projects.
- B. Quality Assurance: Interim Life Safety Measures (ILSM) program shall comply with The Joint Commission Standards, Life Safety (LS) Section, LS.01.02.01.
  - 1. **[Contractor]** shall be responsible for setting up control procedures to adhere to ILSM Criteria Implementation Matrix and/or the ILSM Inclusion Criteria. Contractors shall notify University's Representative of anticipated and actual problems complying with ILSM.

2. **[Contractor]** shall submit proposed Fire and Life safety impairments (21) calendar days prior to implementation. Submittal of ILSM does not infer or guarantee acceptance by University. All submitted measures shall be reviewed and returned to **[Contractor]** indicating approval, approval as noted, or rejection, revision, or re-submittal requirement by University in writing no less than fourteen (15) calendar days prior to proposed implementation. If re-submittal is required, twenty-one (21) day review period from date of re-submittal will be required.
- C. Project ILSM Procedures: If a life safety code deficiency occurs, or is identified by any source, or the requirements of the current Life Safety Code are not being met; Interim Life Safety Measures must be implemented to the extent necessary to compensate for any deficient element(s) predicated on magnitude, severity, extent and duration before corrective actions are completed.

Any minor life safety code deficiency that could be corrected within 45 calendar days that is confined to a single smoke compartment or fire zone will not merit for declaring a hospital-wide ILSM(s) but would require reduction in flammable and combustible loads in the affected smoke compartment or zone as well as issuing a work order to complete the Plan For Improvement (PFI) within 45 calendar days of discovery.

The ILSM Criteria Implementation Matrix and/or the ILSM Inclusion Criteria forms completed by a University Representative are used to determine when and to what extent applicable ILSM measures as it pertains to each condition is required to be implemented. Based on the ILSM Inclusion Criteria assessment form, it may not be necessary to declare the need to implement ILSM measures under certain conditions as delineated in the form. When ILSMs are determined to be required, an ILSM Implementation Matrix shall be utilized by the contractor.

ILSMs must be implemented upon project development and must be continuously enforced through project completion. A comprehensive plan of correction is to be developed by the Project Representative, or designee using the ILSM Evaluation Form.

- D. Any impairment or shutdown of a passive or active fire and life safety device/system for a period of 4 hours or longer in a 24 hour period will require implementation of an ILSM. Some of the most common impairments are outlined below. The listing of these ILSM examples is not intended to limit or preclude preventative actions that may be required to temporarily compensate for other life safety deficiencies that may arise during construction activities due to unforeseen conditions, the contractor's changing work plan, or required continuing activities of University. Comments following each ILSM are known ILSM requirements at time of bid. These comments are made to assist **[Contractor]** in bid preparation and later preparation of ILSM plan for the Project. University makes no guarantee these comments address all conditions requiring action by **[Contractor]**.
1. ILSM example #1: Ensure exits provide free and unobstructed egress. Maintain free and unobstructed access and exits from all buildings to public ways. Maintain

escape facilities for construction workers at all times. Inspect means of egress in construction areas daily.

2. ILSM example #2: Maintain free and unobstructed access to emergency departments/services.
3. ILSM example #3: Ensure fire alarm, detection, and suppression systems are not impaired.
4. ILSM example #4: Ensure temporary construction partitions are smoke tight and built of noncombustible or limit combustible material that will not contribute to the
5. ILSM example #5: Provide additional firefighting equipment and use training for construction workers.
6. ILSM example #6: No smoking. **[Contractor]** shall follow the Universities smoking policy.
7. ILSM example #7: Develop and enforce storage, housekeeping, and debris removal practices that reduce the flammable and combustible fire load of the building to the lowest level necessary for daily operations.
8. ILSM example #8: Conduct a minimum of two (2) fire drills per shift per quarter.
9. ILSM example #9: Conduct regular hazard surveillance of buildings, grounds, and equipment with special attention to excavations, construction areas, construction storage, and field office.
10. ILSM example #10: Train personnel when structural or compartmentalization features compromise fire safety measures.
11. ILSM example #11: Conduct organization-wide safety education programs to ensure awareness of any LSC (Life Safety Control) deficiencies, construction hazards, and ILSM.

#### 1.04 SECURITY PROCEDURES

- A. Security Program: Protect Work, existing premises, and University operations from theft, vandalism, and unauthorized entry.
  1. Security of the area shall be strictly maintained. **[Contractor]** shall control entrance of persons and vehicles related to University operations.
- B. Entry Control: Restrict entry of persons and vehicles into Project site and existing facilities. Allow entrance only to authorized persons with proper identification. Maintain log of workers and visitors, make available to University's Representative.
  1. **[Contractor]** shall control entrance of persons and vehicles related to University operations.
- C. Personnel Identification: Provide identification card to each person authorized to enter premises, showing: Personal photograph, name and assigned number, expiration date,

and employer. Maintain a list of accredited persons; submit copy to University's Representative on request.

- D. Miscellaneous Restrictions: Do not allow cameras on site; do not allow photographs except with written approval of University.

#### 1.05 HAZARDOUS MATERIALS PROCEDURES

- A. Except as otherwise specified, should **[Contractor]** encounter site materials, reasonably believed to be asbestos, polychlorinated biphenyl (PCB), radioactive material, lead in paint, lead lining in walls or glass windows, lead in ceramic products, mold, water leaks or other hazardous materials or conditions, the **[Contractor]** shall immediately stop work in the affected area and report the condition to University's Representative in writing. The work in the affected area shall not thereafter be resumed except by written agreement of University and **[Contractor]** if in fact the material is identified as hazardous and has not been rendered harmless. The work in the affected area shall be resumed in the absence of hazardous materials, or when such materials have been rendered harmless.
  
- A. Spills, discharges, overruns, or similar occurrences involving hazardous materials on site shall be promptly reported in writing to University's Representative. If **[Contractor]** fails to notify University in a prompt and timely manner of an occurrence, University will contract with licensed hazardous materials abatement contractor to clean up the hazardous material. **[Contractor]** shall pay all costs of removal, including financial penalties incurred, the result of the **[Contractor]**'s failure to act promptly in response to the product emergency.
  
- C. **[Contractor]** shall provide means and personnel to contain and control product emergencies or shall provide means and methods to render hazardous materials harmless.

**PART II - PRODUCTS – Not Applicable to this Section**

**PART III - EXECUTION – Not Applicable to this Section**

**END OF SECTION 01 35 00**

**Fire Marshal's Office**

4800 2<sup>nd</sup> Ave. #1200  
 Phone: (916) 734-3036  
 Fax: (916) 451-7754  
 hs-fireprevention@ucdavis.edu

**Interim Life Safety (ILSM)**

Based upon documentation received (ILSM Impact worksheet) a risk analysis of this project has been made. The impairments to life safety systems have been identified and interim measure provided as set forth below.

PROJECT TITLE:		OSHPD #		A/C#	
ILSM START DATE:		END DATE:			
FIRE LIFE SAFETY DEFICENCY(IES):					
INTERIM MEASURE(S):					

Unless otherwise noted below, these requirements apply to impairments of a duration extending beyond the current shift (greater than 8 hours) <b>Check all impairments that apply.</b>	ILSM1	ILSM2	ILSM3	ILSM4	ILSM5	ILSM6	ILSM7	ILSM8	ILSM9	ILSM10	ILSM11	ILSM12	ILSM13	ILSM14	ILSM15
	Construction activity or repair														
Any impairment of a required egress															
Fire detection ALARM system impairment <b>greater than 4 hours ***</b>															
Fire SUPPRESSION system impairment <b>greater than 10 hours</b>															
Fire &/or smoke door hardware impaired															
Fire or smoke barriers with impairment															
Missing or incomplete fire or smoke barriers															
OTHER: <i>See below</i>															

**\*\* Requires inspection by The Fire Marshal's Office prior to ILSM commencement.**

**\*\*\* Fire Watch shall be documented and log provided to the Fire Marshal's Office at the end of each fire watch shift\*\*\***  
 Daily Inspection Log shall be completed by construction team daily & Fire Prevention staff weekly

INTERIM LIFE SAFETY IMPLEMENTATION MEASURES	
ILSM 1	Life safety deficiencies have been evaluated per UCDH Policy 1635 based upon the submitted ILSM Impact Worksheet
ILSM 2	Policy for deficiencies is followed for a sprinkler system out of service more than 10 hours in a 24 hour period & fire alarm out of service for more than 4 hours in a 24 hour period.
ILSM 3	Post signage identifying the location of alternative exits to everyone affected
ILSM 4	Inspect exits in affected area on a daily basis
ILSM 5	Provide temporary but equivalent fire alarm & detection system for alarm impairment
ILSM 6	Provide additional fire fighting equipment (i.e. fire extinguishers)
ILSM 7	Temporary construction barrier smoke-tight, will not contribute to the development of fire & of solid construction (see UCDH Policy 1635 & OSHPD 9-3301 )
ILSM 8	Increase surveillance of building, special attention to construction area & storage
ILSM 9	Enforce storage, housekeeping & debris removal practices to reduce fire load
ILSM 10	Provide additional training to those who work in the hospital on the use of firefighting equipment
ILSM 11	Conduct one additional fire drill per shift per quart.
ILSM 12	Inspect & test <i>temporary</i> systems monthly. -Document testing
ILSM 13	Conduct education to promote awareness of building deficiencies, hazards & temporary measures
ILSM 14	Train those who work in the hospital to compensate for impaired structural or compartmental fire safety features
ILSM 15	OTHER:

Responsible Individual Signature:
Date:

Fire Marshal's Office Signature:
Date:



UC Davis Health  
 Fire Marshal's Office  
 4800 2<sup>nd</sup> Ave., Suite 1200  
 Sacramento, Ca 95817  
 916-734-3036  
 hs-fireprevention@ucdavis.edu  
 www.ucdmc.ucdavis.edu/fire/



## Interim Life Safety Measure (ILSM) Impact Worksheet

This form is completed by the Project Manager or Contractor or Contractor's Representative. Complete the form and submit to the Fire Marshal's Office for an evaluation of the need for an ILSM, Fire Watch, or other safety measure.

Project Title:			
Date of Project(s):		Time of Project(s):	
A/C#		OSHPD #	
Project Description:			

	Yes	No
Project alters or significantly compromises exit access, exiting, or exit discharge building elements? If yes, provide a floor plan showing how exiting is affected. Temporary exit and/or evacuation signs may be required.	<input type="checkbox"/>	<input type="checkbox"/>
Compromise of building compartmentation including fire or smoke walls, floor / ceiling assemblies, corridor walls, use area doors, or other defend in place elements? If yes, describe in information.	<input type="checkbox"/>	<input type="checkbox"/>
The issue impairs the building fire alarms or sprinkler systems?	<input type="checkbox"/>	<input type="checkbox"/>
The activity includes significant ignition sources such as cutting, welding, or other operations using flame or producing sparks?	<input type="checkbox"/>	<input type="checkbox"/>
The activity includes large quantities of combustible materials, flammable materials, or generation of large amounts of dust and debris?	<input type="checkbox"/>	<input type="checkbox"/>
Access to fire or life safety equipment affected? If yes, what systems or equipment? (i.e.: fire watch, Fire Inspector, extinguisher, etc.)	<input type="checkbox"/>	<input type="checkbox"/>
Are construction barriers present / required?	<input type="checkbox"/>	<input type="checkbox"/>



UC Davis Health  
Fire Marshal's Office  
4800 2<sup>nd</sup> Ave., Suite 1200  
Sacramento, Ca 95817  
916-734-3036  
hs-fireprevention@ucdavis.edu  
www.ucdmc.ucdavis.edu/fire/



Documentation – When ILSMs are required, the following documentation must be maintained:

- a. Training rosters
- b. Fire drill reports
- c. Monthly inspection and testing of temporary fire alarm, detection, and suppression systems
- d. Daily inspection of construction area
- e. Weekly inspection of buildings, grounds, and equipment with special attention to excavations, construction areas, construction storage, and field offices
- f. Completed ILSM form at the job site

**Note\*** Contractor activities that pose an immediate threat to the health and safety or patients, visitors, hospital employees or construction personnel shall be discontinued immediately until the hazards are abated and corrected and the appropriate ILSM(s) are developed.

\_\_\_\_\_  
Requestor's Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
UCDH Fire Marshal's Office Representative

\_\_\_\_\_  
Date

Information:





**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 UTILITIES

### 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][CM/Contractor][Design-Builder]** 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][CM/Contractor][Design-Builder]**.
  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][CM/Contractor][Design-Builder]** Commissioning Responsibilities
1. Designate a Commissioning Coordinator to organize, schedule, and coordinate the execution of **[Contractor][CM/Contractor][Design-Builder]** 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.

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][CM/Contractor][Design-Builder]** and approved by the University.

- G. The following may be suitable for diversion from landfill, though the **[Contractor][CM/Contractor][Design-Builder]** and **[Contractor][CM/Contractor][Design-Builder]** 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.
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

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**

**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
<b>TOTALS</b>					

**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

- 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; 4<sup>th</sup> 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] [CM/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]** 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.

#### 1.12 University will distribute one (1) PDF electronic copy of the reports to University's Consultants and **[Contractor].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

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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. IOR's hourly rates are \$153.00 per hour during normal work hours and \$229.50 per hour for all off-hour inspections. 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][CM/Contractor][Design-Builder] 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] [CM/ Contractor] [Design Builder] 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)

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][CM/Contractor][Design-Builder] IR #: \_\_\_\_\_ Date: \_\_\_\_\_  
 Project Name: \_\_\_\_\_ Spec Section (s): \_\_\_\_\_

To: UC Davis Health	From: _____
Facilities Design & Construction – Inspection Trailer	_____
4430 V Street, Building 35	_____
Sacramento, CA 95817	_____
P: 916-734-5060	P: _____
Email: <a href="mailto:lfuka@ucdavis.edu">lfuka@ucdavis.edu</a> & Project IOR	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][CM/Contractor][Design-Builder]'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)**

Project Phase (Building Foundation, Structural, Wall Framing, Electrical Rough-In, Sprinkler Rough-In, etc.)  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Project Phase Percentage Complete (% of the phase completed): \_\_\_\_\_ Overall Project Percentage Complete: \_\_\_\_\_

PROJECT NO. 9557760  
MAIN HOSP IT HUGS Upgrade

**NON-CONFORMING WORK NOTICE**

PROJECT #: \_\_\_\_\_ HCAI #: \_\_\_\_\_ Notice #: \_\_\_\_\_ Date: \_\_\_\_\_

To: <a href="mailto:KPICKETT@UCDAVIS.EDU">KPICKETT@UCDAVIS.EDU</a>	From: UC Davis Health IOR
<a href="mailto:SLANKFORD@NACHTLEWIS.COM">SLANKFORD@NACHTLEWIS.COM</a>	Facilities Design & Construction – Inspection Trailer
<a href="mailto:LFUKA@UCDAVIS.EDU">LFUKA@UCDAVIS.EDU</a>	4430 V Street, Building 35-A
_____	Sacramento, CA 95817
_____	P: 916-734-5060

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 **[Contractor]**'s 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][CM/Contractor][Design-Builder]** 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][CM/Contractor][Design-Builder]** shall provide secondary source (i.e., generator) as approved by University.

1. It is expressly understood and agreed by **[Contractor][CM/Contractor][Design-Builder]** 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][CM/Contractor][Design-Builder]** should expect power and lighting interruptions during course of Work. **[Contractor][CM/Contractor][Design-Builder]** 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][CM/Contractor][Design-Builder]** 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][CM/Contractor][Design-Builder]** 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 than 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.

- b. University shall provide conduit and cabling to **[Contractor]** 's location(s). **[Contractor]** shall receive dial tone from local utility. **[Contractor]** shall pay University for cabling, conduit installation, maintenance of same and later removal of same. **[Contractor]** shall pay local utility for monthly telephone, data, internet and WIFI service.
  3. **[Contractor]** shall select number of lines, instruments and other features.
  4. **[Contractor]** shall prepare and submit to University an itemized request for telephone lines (according to option 2a or 2b above) and internet service. Project Manager will submit a service request to the IT department.
- B. Use of Existing System: Existing University telephone system shall not be used for temporary telephone service.
- C. **[Contractor]** Phone:
  1. **[Contractor]** shall have telephone emergency number or other facility available at **[Contractor]**'s business office for duration of contract where contractor and superintendent may be contacted within twenty-four (24) hours. Provide emergency numbers to University.
- D. Telephones:
  1. **[Contractor]** shall use, and only permit to be used, FCC approved communication devices on frequencies approved by FCC and University.
  2. **[Contractor]** shall not use, or permit to be used, communication devices which interfere with existing University communication systems, including, but not limited to:
    - a. Life Flight or CHP helicopters.
    - b. Emergency Service vehicle communications.
    - c. Plant Operations & Maintenance communication devices.
    - d. Microwave transmission stations.
    - e. UC Davis Health closed-circuit television or radio signals.
    - f. Cellular or other mobile phone systems in main hospital.
    - g. UC Davis Health voice or digital paging systems.

- 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**][**CM/Contractor**][**Design-Builder**] 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

1.03 FIELD OFFICES AND SHEDS

- A. Field Office: **[Contractor]** shall provide a job office that will conform to the following minimum requirements:
  - 1. Suitable space for Work Stations, drawings, specifications, samples and other project records.
  - 2. Conference space for eight (8) persons, including layout tables.
  - 3. Heating and cooling to maintain a reasonable working environment.
  - 4. Telephone, Data and WIFI service as specified in Section 015100 – TEMPORARY UTILITIES
  - 5. Furnishings required: Conference table and chairs; racks and files for Contract Documents, submittals, and project record documents. Other furnishings are at **[Contractor]**'s option.
- B. Installation: Install office spaces for occupancy fifteen (15) calendar days after date of University/**[Contractor]** agreement.
- C. Preparation: Fill and grade sites for temporary structures to provide drainage away from buildings.

- D. 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.
- E. 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.
- F. Storage Sheds and Containers for Materials, Tools and Equipment: If requested, University will provide space outside construction site where **[Contractor]** may provide and locate weather-tight sheds or containers for storage of construction materials, tools and equipment. **[Contractor]** shall be solely responsible for security of such sheds and containers. Size storage requirements to allow access, orderly provision of maintenance and inspection of products.
- G. Cleaning: Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas. **[Contractor]** keep construction loading and parking areas clear of construction debris, especially debris that may cause slipping or tripping hazard that may injure vehicle tires, that may stain surfaces, and that may be tracked into existing buildings. Maintain approach walks free of mud and water.
- H. 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.

#### 1.04 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.

#### 1.05 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 SIGNS (NOT USED)

- A. Project Identification Sign: **[Contractor]** shall provide one (1) project sign. Sign will consist of one (1) 8' x 4' x 3/4" exterior grade plywood with medium or high-density phenolic sheet overlay, painted plywood sign on fence area at construction field office or yard.
  - 1. Information on sign shall include PROJECT NAME, University of California, Davis Health, University's consultants, etc. Copy will be provided by the University.
- B. Painted Informational Signs: Provide at each field office, storage shed and yard, directional signs to direct traffic into and within site. Relocate as Work progress requires.
- C. Maintain signs and supports: Clean, repair deterioration and damages.
- D. Remove signs, framing, supports and foundations at completion of Project and restore the area.

**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]**'s 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**

<b>Enclosure Types [check all that apply]</b>	
<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	
Other:	
<b>Negative Pressure Requirements [check all that apply]</b>	
<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)	
Other:	
<b>Negative Pressure Equipment [check all that apply]</b>	
<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	
Other:	
<b>Additional Containment Requirements [check all that apply]</b>	
<input type="checkbox"/> Ante Room	<input type="checkbox"/> Masonite Floor Protection <input type="checkbox"/> Protective Clothing
<input type="checkbox"/> Walk off mats	<input type="checkbox"/> Shoe Covers <input type="checkbox"/> Air Scrubber
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

ENTRY WARNING SIGN WITH PROJECT MANAGER CONTACT INFORMATION – APPENDIX C

**CAUTION**

**CONSTRUCTION DUST PRECAUTIONS IN USE  
DO NOT ENTER**

**For More Information Contact the Project Manager**

---

**(Name)**

---

**Phone Number**

**(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 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 **[Contractor][CM/Contractor]**'s. 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 in 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: 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)

- A. ATTACH ICRA PERMITS, EH&S WORKSHEETS, OR ANY OTHER APPLICABLE DOCUMENTATION
- B. 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][CM/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.

C.

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 exiting 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: 1 Page.
- D. ICRA Permit Extension Request and Instructions: 2 Pages.

- E. 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**

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 that was included in the review of this packet and agree with the requirements identified within the packet.

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).

<b>Type A</b> <input type="checkbox"/>	<p><b>Inspection and non-invasive activities.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Removal of ceiling tile for visual inspection-limited to 1 tile per 50 square feet with limited exposure time.</li> <li>• 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.</li> <li>• Clean plumbing activity limited in nature.</li> </ul>
<b>Type B</b> <input type="checkbox"/>	<p><b>Small-scale, short duration activities that create minimal dust and debris.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Fan shutdown/startup.</li> <li>• Installation of electrical devices or new flooring that produces minimal dust and debris.</li> <li>• The removal of drywall where minimal dust and debris is created.</li> <li>• Controlled sanding activities (e.g., wet or dry sanding) that produce minimal dust and debris.</li> </ul>
<b>Type C</b> <input type="checkbox"/>	<p><b>Large-scale, longer duration activities that create a moderate amount of dust and debris.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Removal of preexisting floor covering, walls, casework or other building components.</li> <li>• New drywall placement.</li> <li>• Renovation work in a single room.</li> <li>• Nonexistent cable pathway or invasive electrical work above ceilings.</li> <li>• The removal of drywall where a moderate amount of dust and debris is created.</li> <li>• Dry sanding where a moderate amount of dust and debris is created.</li> <li>• Work creating significant vibration and/or noise.</li> <li>• Any activity that cannot be completed in a single work shift.</li> </ul>
<b>Type D</b> <input type="checkbox"/>	<p><b>Major demolition and construction activities.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Removal or replacement of building system component(s).</li> <li>• Removal/installation of drywall partitions.</li> <li>• Invasive large-scale new building construction.</li> <li>• Renovation work in two or more rooms.</li> </ul>
<b>Type E</b> <input type="checkbox"/>	<p><b>Exterior Construction typical activities.</b> include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Excavation, Trenching, Grading, Boring, Pile Driving, Demolition</li> <li>• Asphalt, Concrete, Stucco, Scaffolding</li> <li>• Roofing</li> <li>• Window washing, Caulking, Tuckpointing, Cleaning, Painting</li> <li>• Landscaping, Planting</li> </ul>

**Explain this Reasoning for this Assessment:**

**Step Two: Using the table below, identify the Patient Risk Group(s) that will be affected. If more than one risk group will be affected, 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
<p><b>Describe key patient risks:</b></p>			

**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	<input type="checkbox"/> I	<input type="checkbox"/> II	<input type="checkbox"/> II	<input type="checkbox"/> III*	<input type="checkbox"/> Exterior
MEDIUM Risk	<input type="checkbox"/> I	<input type="checkbox"/> II	<input type="checkbox"/> III*	<input type="checkbox"/> IV	
HIGH Risk	<input type="checkbox"/> I	<input type="checkbox"/> III	<input type="checkbox"/> IV	<input type="checkbox"/> V	
HIGHEST Risk	<input type="checkbox"/> III	<input type="checkbox"/> IV	<input type="checkbox"/> V	<input type="checkbox"/> 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 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: Click or tap here to enter text.	<input type="checkbox"/> <b>Required for high-impact activities</b> – 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"> <li><input type="checkbox"/> Use diamond drills instead of powder-actuated fasteners</li> <li><input type="checkbox"/> Use beam clamps instead of shot</li> <li><input type="checkbox"/> Prefab where possible</li> <li><input type="checkbox"/> Use tin snips to cut metal studs instead of using a chop saw</li> <li><input type="checkbox"/> Install metal decking with vent tabs, then use cellular floor deck hangers</li> <li><input type="checkbox"/> Consider pro-press instead of soldering, brazing, or welding</li> <li><input type="checkbox"/> Wet core drill instead of dry core or percussion</li> <li><input type="checkbox"/> Instead of jackhammering concrete, use wet diamond saws</li> <li><input type="checkbox"/> Use HEPA vacuums instead of standard wet/dry vacuums</li> <li><input type="checkbox"/> Use mechanical joining system sprinkler fittings instead of threaded</li> <li><input type="checkbox"/> Where fumes are tolerated, use chemical adhesive remover instead of mechanical</li> <li><input type="checkbox"/> To remove flooring, shot blast instead of using a floor scraper</li> <li><input type="checkbox"/> Use electric sheers instead of reciprocating saw for ductwork cutting.</li> <li><input type="checkbox"/> Install exterior man/material lifts.</li> </ul> <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: Click or tap here to enter text. <input type="checkbox"/> Other: Click or tap here to enter text.

# 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: Click or tap here to enter text.	<input type="checkbox"/> Restrict/shut down air handlers for the duration of 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: Click or tap here to enter text. <input type="checkbox"/> Provide Safety Data Sheets to EH&S for other recommended actions <input type="checkbox"/> Other: Click or tap here to enter text.

# 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:		
<b>Hazardous Materials Present in Project Work Area</b>	<b>Required Control Measures</b>		
<input type="checkbox"/> Asbestos <input type="checkbox"/> Lead <input type="checkbox"/> PCBs <input type="checkbox"/> Universal Waste <input type="checkbox"/> Other: <a href="#">Click or tap here to enter text.</a>	Follow work practices outlined in the General Requirements Division 1 Document.		

## CONTAINMENT REQUIREMENTS WORKSHEET

<b>Containment Barrier</b>	<b>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.</b>		
	<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:			
<b>Negative Pressure</b>	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 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:			
<b>Air Exhaust</b>	<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			
<b>Additional Containment Requirements</b>	<input type="checkbox"/> Ante Room	<input type="checkbox"/> Masonite Floor Protection	<input type="checkbox"/> Protective Clothing
	<input type="checkbox"/> Walk Off Mats	<input type="checkbox"/> Shoe Covers	<input type="checkbox"/> Collect Samples During Work
	<input type="checkbox"/> Other:		
<b>Verification of Work</b>	<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:	
<b>Air Sampling</b>	<input type="checkbox"/> Particle Counting <input type="checkbox"/> Mold <input type="checkbox"/> Asbestos <input type="checkbox"/> Other:		Frequency:
<b>Air Balance in Adjacent Areas:</b>	The contractor is responsible for maintaining air balance in adjacent <u>high</u> and <u>highest-risk areas</u> per design/ASHRAE guidelines. Contact PO&M to verify the air balance requirements of surrounding areas.		
	<b>Adjacent High/Highest Risk Areas</b>		<b>Air Balance Requirements</b>
			Positive/negative pulldown

		Positive/negative pulldown
<b>ICRA Permit Number</b>		<b>ICRA Class</b>
<b>23-00001</b>		Choose an item.

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:	

<b>ICRA Class</b> Choose an item.		<b>Project Start Date</b>	<b>Completion Date</b>
<b>Additional Requirements</b>			
<b>Signatures</b>	Project Manager	General Contractor	Infection Control and Prevention
<b>Downgrade Request – ICRA Class</b> Choose an item.		<b>Project Start Date</b>	<b>Completion Date</b>
<b>Additional Requirements</b>			
<b>Signatures</b>	Project Manager	General Contractor	Infection Control and Prevention
<b>Extension Request – ICRA Class</b> Choose an item.		<b>Project Start Date</b>	<b>Completion Date</b>
<b>Additional Requirements</b>			
<b>Signatures</b>	Project Manager	General Contractor	Infection Control and Prevention



## INFECTION PREVENTION REQUIREMENTS - CLASS I

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

## INFECTION PREVENTION REQUIREMENTS - CLASS II

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

## INFECTION PREVENTION REQUIREMENTS - CLASS III

Prior to and During Construction:	<ul style="list-style-type: none"> <li>• Provide active means to prevent airborne dust dispersion into the occupied areas.</li> <li>• 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.</li> <li>• Remove or isolate return air diffusers to avoid dust from entering the HVAC system.</li> <li>• Remove or isolate the supply air diffusers to avoid positive pressurization of the space,</li> <li>• 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.</li> <li>• Seal all doors with tape that will not leave residue</li> <li>• Contain all trash and debris in the work area.</li> <li>• 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.</li> <li>• 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.</li> <li>• Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.</li> </ul> <p><b>Additional requirements for Class III containments that require negative pressure:</b></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable.</li> <li>• 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.</li> </ul>
Upon Completion of Work:	<p>Cleaning:</p> <ul style="list-style-type: none"> <li>• Clean work areas including all environmental surfaces, high horizontal surfaces, and flooring materials.</li> <li>• Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.</li> </ul> <p>HVAC Systems:</p> <ul style="list-style-type: none"> <li>• Remove isolation of the HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational.</li> <li>• Verify the HVAC systems meet original airflow and air exchange design specifications.</li> </ul> <p><b>Class III precautions require inspection and documentation for downgraded ICRA precautions.</b></p> <p>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>

- 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 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.

**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.

**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

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

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

**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) – process which 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.

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., -0.024" 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 immunocompromised 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 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 projects which 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 clean 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 except for the initial containment inspection (aka “Pre-start”). Containment inspectors must be trained by EH&S (or a qualified consultant) and report to the PM and EH&S.

### **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 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 has the authority to stop work for: excessive noise/vibration, breach of containment, non-compliance with this standard, or other project issues compromising patient care.

### **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 being 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 for 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. EH&S shall approve all containment inspectors before commencing inspection tasks. 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

### **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 lids 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 provided within the negative pressure containment at all times, 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.

<b>Manometer Reading</b>	<b>Why it's a problem</b>	<b>Response Options</b>
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. They are most often used for Class III or IV work and 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.

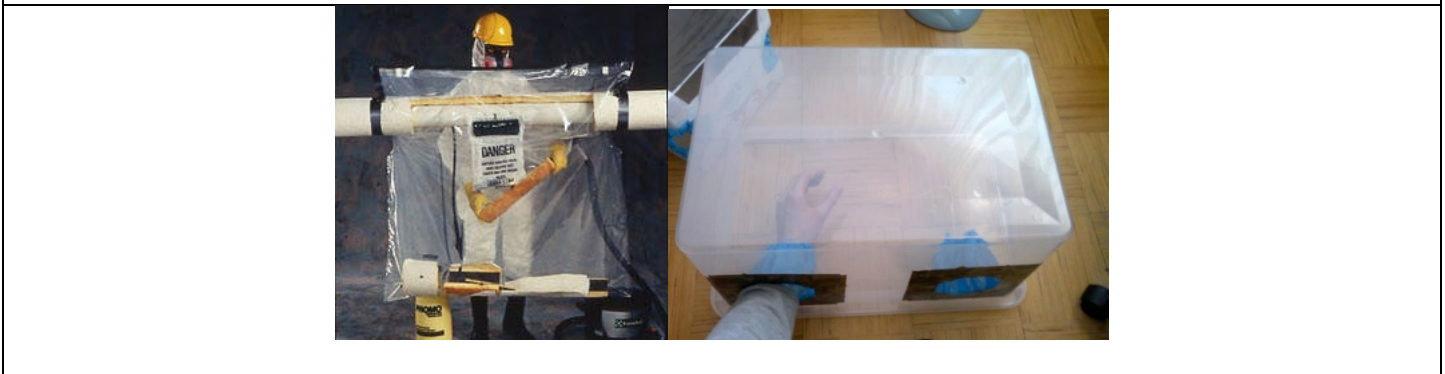
#### **EXAMPLES OF MOBILE CONTAINMENTS OR "CUBES"**



### **"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 OF GLOVE BAGS OR BOXES**



## 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 maintained in the work area at all times a Class I-V permitted project is in progress:

- 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)

## **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 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 it to air dry. Do not wipe 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 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 a 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") – EH&S OR CONSULTANT ONLY**

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 at least once per workday. 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 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 wastes are present
- The Tack mat is clean
- Containment is “white glove” clean – no visible dust can be wiped from any surface

## **REFERENCES**

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

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# APPENDIX A: CONTAINMENT INSPECTION LOG

Permit Number:	UCDH Project Manager:	UCDH Project Manager Phone Number:
Project Number:	Project Name:	Alternate Contact:

CONTAINMENT INSPECTION LOG											
Type of Inspection <small>Pre Start, Post Demo, Downtgrade, Final or Work Day</small>	Date & Time	Performed by (Name & Company)	Pressure Reading (+/-)	Acceptable Negative Pressure? (Yes/No)	ILSM conditions still met? (Yes/No or N/A)	Tack Mat useable? (Yes/No)	Interior free of dust and debris? (Yes/No)	Containment Integrity Intact? (Yes/No)	All ICRA permit conditions met? (Yes/No)	Other Issues? (Explain)	Corrective Actions
<i>Example</i> Work Day	01/13/23 0800	B. Clean ACME Construction	-0.025	Yes	N/A	Yes	Yes	No	Yes	No	Containment Breach; Patched

# Caution

Construction Dust Precautions In Use  
Do Not Enter

For More Information Contact the UCDH Project  
Manager

\_\_\_\_\_  
(Name)

\_\_\_\_\_  
Phone Number

This sign must be posted in color

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 that was included in the review of this packet and agree with the requirements identified within the packet.

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).

<b>Type A</b> <input type="checkbox"/>	<p><b>Inspection and non-invasive activities.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Removal of ceiling tile for visual inspection-limited to 1 tile per 50 square feet with limited exposure time.</li> <li>• 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.</li> <li>• Clean plumbing activity limited in nature.</li> </ul>
<b>Type B</b> <input type="checkbox"/>	<p><b>Small-scale, short duration activities that create minimal dust and debris.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• 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).</li> <li>• Fan shutdown/startup.</li> <li>• Installation of electrical devices or new flooring that produces minimal dust and debris.</li> <li>• The removal of drywall where minimal dust and debris is created.</li> <li>• Controlled sanding activities (e.g., wet or dry sanding) that produce minimal dust and debris.</li> </ul>
<b>Type C</b> <input type="checkbox"/>	<p><b>Large-scale, longer duration activities that create a moderate amount of dust and debris.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Removal of preexisting floor covering, walls, casework or other building components.</li> <li>• New drywall placement.</li> <li>• Renovation work in a single room.</li> <li>• Nonexistent cable pathway or invasive electrical work above ceilings.</li> <li>• The removal of drywall where a moderate amount of dust and debris is created.</li> <li>• Dry sanding where a moderate amount of dust and debris is created.</li> <li>• Work creating significant vibration and/or noise.</li> <li>• Any activity that cannot be completed in a single work shift.</li> </ul>
<b>Type D</b> <input type="checkbox"/>	<p><b>Major demolition and construction activities.</b> Includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• Removal or replacement of building system component(s).</li> <li>• Removal/installation of drywall partitions.</li> <li>• Invasive large-scale new building construction.</li> <li>• Renovation work in two or more rooms.</li> </ul>
<b>Type E</b> <input type="checkbox"/>	<p><b>Exterior Construction typical activities.</b> include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Excavation, Trenching, Grading, Boring, Pile Driving, Demolition</li> <li>• Asphalt, Concrete, Stucco, Scaffolding</li> <li>• Roofing</li> <li>• Window washing, Caulking, Tuckpointing, Cleaning, Painting</li> <li>• Landscaping, Planting</li> </ul>

**Explain this Reasoning for this Assessment:**

**Step Two: Using the table below, identify the Patient Risk Group(s) that will be affected. If more than one risk group will be affected, 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
<p><b>Describe key patient risks:</b></p>			

**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	<input type="checkbox"/> I	<input type="checkbox"/> II	<input type="checkbox"/> II	<input type="checkbox"/> III*	<input type="checkbox"/> Exterior
MEDIUM Risk	<input type="checkbox"/> I	<input type="checkbox"/> II	<input type="checkbox"/> III*	<input type="checkbox"/> IV	
HIGH Risk	<input type="checkbox"/> I	<input type="checkbox"/> III	<input type="checkbox"/> IV	<input type="checkbox"/> V	
HIGHEST Risk	<input type="checkbox"/> III	<input type="checkbox"/> IV	<input type="checkbox"/> V	<input type="checkbox"/> 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 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: Click or tap here to enter text.	<input type="checkbox"/> <b>Required for high-impact activities</b> – 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"> <li><input type="checkbox"/> Use diamond drills instead of powder-actuated fasteners</li> <li><input type="checkbox"/> Use beam clamps instead of shot</li> <li><input type="checkbox"/> Prefab where possible</li> <li><input type="checkbox"/> Use tin snips to cut metal studs instead of using a chop saw</li> <li><input type="checkbox"/> Install metal decking with vent tabs, then use cellular floor deck hangers</li> <li><input type="checkbox"/> Consider pro-press instead of soldering, brazing, or welding</li> <li><input type="checkbox"/> Wet core drill instead of dry core or percussion</li> <li><input type="checkbox"/> Instead of jackhammering concrete, use wet diamond saws</li> <li><input type="checkbox"/> Use HEPA vacuums instead of standard wet/dry vacuums</li> <li><input type="checkbox"/> Use mechanical joining system sprinkler fittings instead of threaded</li> <li><input type="checkbox"/> Where fumes are tolerated, use chemical adhesive remover instead of mechanical</li> <li><input type="checkbox"/> To remove flooring, shot blast instead of using a floor scraper</li> <li><input type="checkbox"/> Use electric sheers instead of reciprocating saw for ductwork cutting.</li> <li><input type="checkbox"/> Install exterior man/material lifts.</li> </ul> <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: Click or tap here to enter text. <input type="checkbox"/> Other: Click or tap here to enter text.

# 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: Click or tap here to enter text.	<input type="checkbox"/> Restrict/shut down air handlers for the duration of 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: Click or tap here to enter text. <input type="checkbox"/> Provide Safety Data Sheets to EH&S for other recommended actions <input type="checkbox"/> Other: Click or tap here to enter text.

# 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:		
<b>Hazardous Materials Present in Project Work Area</b>	<b>Required Control Measures</b>		
<input type="checkbox"/> Asbestos <input type="checkbox"/> Lead <input type="checkbox"/> PCBs <input type="checkbox"/> Universal Waste <input type="checkbox"/> Other: <a href="#">Click or tap here to enter text.</a>	Follow work practices outlined in the General Requirements Division 1 Document.		

## CONTAINMENT REQUIREMENTS WORKSHEET

<b>Containment Barrier</b>	<b>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.</b>		
	<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:			
<b>Negative Pressure</b>	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 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:			
<b>Air Exhaust</b>	<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			
<b>Additional Containment Requirements</b>	<input type="checkbox"/> Ante Room	<input type="checkbox"/> Masonite Floor Protection	<input type="checkbox"/> Protective Clothing
	<input type="checkbox"/> Walk Off Mats	<input type="checkbox"/> Shoe Covers	<input type="checkbox"/> Collect Samples During Work
	<input type="checkbox"/> Other:		
<b>Verification of Work</b>	<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:	
<b>Air Sampling</b>	<input type="checkbox"/> Particle Counting <input type="checkbox"/> Mold <input type="checkbox"/> Asbestos <input type="checkbox"/> Other:		Frequency:
<b>Air Balance in Adjacent Areas:</b>	The contractor is responsible for maintaining air balance in adjacent <u>high</u> and <u>highest-risk</u> areas per design/ASHRAE guidelines. Contact PO&M to verify the air balance requirements of surrounding areas.		
	<b>Adjacent High/Highest Risk Areas</b>		<b>Air Balance Requirements</b>
			Positive/negative pulldown

		Positive/negative pulldown
<b>ICRA Permit Number</b>		<b>ICRA Class</b>
<b>23-00001</b>		Choose an item.

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:	

<b>ICRA Class</b> Choose an item.		<b>Project Start Date</b>	<b>Completion Date</b>
<b>Additional Requirements</b>			
<b>Signatures</b>	Project Manager	General Contractor	Infection Control and Prevention
<b>Downgrade Request – ICRA Class</b> Choose an item.		<b>Project Start Date</b>	<b>Completion Date</b>
<b>Additional Requirements</b>			
<b>Signatures</b>	Project Manager	General Contractor	Infection Control and Prevention
<b>Extension Request – ICRA Class</b> Choose an item.		<b>Project Start Date</b>	<b>Completion Date</b>
<b>Additional Requirements</b>			
<b>Signatures</b>	Project Manager	General Contractor	Infection Control and Prevention

## INFECTION PREVENTION REQUIREMENTS - CLASS I

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

## INFECTION PREVENTION REQUIREMENTS - CLASS II

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

## INFECTION PREVENTION REQUIREMENTS - CLASS III

Prior to and During Construction:	<ul style="list-style-type: none"> <li>• Provide active means to prevent airborne dust dispersion into the occupied areas.</li> <li>• 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.</li> <li>• Remove or isolate return air diffusers to avoid dust from entering the HVAC system.</li> <li>• Remove or isolate the supply air diffusers to avoid positive pressurization of the space,</li> <li>• 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.</li> <li>• Seal all doors with tape that will not leave residue</li> <li>• Contain all trash and debris in the work area.</li> <li>• 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.</li> <li>• 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.</li> <li>• Maintain clean surroundings when area is not contained by damp mopping or HEPA vacuuming surfaces.</li> </ul> <p><b>Additional requirements for Class III containments that require negative pressure:</b></p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Exhaust into shared or recirculating HVAC systems, or other shared exhaust systems (e.g., bathroom exhaust) is not acceptable.</li> <li>• 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.</li> </ul>
Upon Completion of Work:	<p>Cleaning:</p> <ul style="list-style-type: none"> <li>• Clean work areas including all environmental surfaces, high horizontal surfaces, and flooring materials.</li> <li>• Check all supply and return air registers for dust accumulation on upper surfaces as well as air diffuser surfaces.</li> </ul> <p>HVAC Systems:</p> <ul style="list-style-type: none"> <li>• Remove isolation of the HVAC system in areas where work is being performed. Verify that HVAC systems are clean and operational.</li> <li>• Verify the HVAC systems meet original airflow and air exchange design specifications.</li> </ul> <p><b>Class III precautions require inspection and documentation for downgraded ICRA precautions.</b></p> <p>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>

- 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 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.

**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.

**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

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

**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.
- 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:** \_\_\_\_\_

<b>TO: UC DAVIS HEALTH</b> Facilities Design & Construction 4800 2 <sup>ND</sup> Avenue, Suite 3010 Sacramento, CA95817 P: 916-734-7024  Attn.: <a href="mailto:KPICKETT@UCDAVIS.EDU">KPICKETT@UCDAVIS.EDU</a>	<b>FROM:</b> _____ _____ _____ _____ _____
--	--

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): \_\_\_\_\_

<p><b>PRODUCT DATA:</b> ATTACH PRODUCT DATA AS SPECIFIED IN SPECIFICATION SECTION 013300 – SHOP DRAWINGS, PRODUCT DATA AND SAMPLES</p> <p>Similar projects using product (list dates of installation and names/phone numbers of Owners):</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>Similar comparison of proposed substitution with specified product (indicate variation(s), and reference each variation to appropriate Specification Section paragraphs):</p> <p style="text-align: center;"><b>-ATTACH COMPARISON SUMMARY-</b></p>
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(SUBSTITUTION REQUEST CONTINUES)

Quality and performance comparison between proposed substitution and specified product:

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Availability of maintenance services and replacement materials: \_\_\_\_\_

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Effect of proposed substitution on Construction Schedule: \_\_\_\_\_

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Effect of proposed substitution on other work or products: \_\_\_\_\_

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## 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]****[CM/Contractor]****[Design-Builder]**, 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][CM/Contractor][Design-Builder]**.
- 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: \_\_\_\_\_

<b>TO: Facilities Design &amp; Construction</b> <b>UC Davis Health</b> <b>4800 2<sup>nd</sup> Avenue, Suite 3010</b> <b>Sacramento, CA 95817</b> <b>P: 916-734-7024</b> <b><u>kpickett@ucdavis.edu</u></b>	<b>FROM:</b> _____
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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: \_\_\_\_\_

<b><u>UC DAVIS HEALTH USE ONLY</u></b>	
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 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 University's Representative and a method for correcting said interference shall be supplied by 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 SUBMITALS (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]**, 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]'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]** 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]** 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]**'s warranties and guarantees. Whenever possible, **[Contractor]** shall cause warranties of subcontractors to be made directly to University. If such warranties are made to **[Contractor]**, **[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]**'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]**'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]** of warranty on work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractor's requirement to countersign special warranties with **[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]** 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]** 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]**'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]** 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]** 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]**'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]** 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]** 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

- 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

- 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

\_\_\_\_\_  
(Name of **[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]** 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]** License Classification & Number: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

### CONTRACTOR

Signed: \_\_\_\_\_ Title: \_\_\_\_\_

Typed Name: \_\_\_\_\_

Name of Firm: \_\_\_\_\_

**[Contractor]** License Classification & Number: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

**REPORT OF WORK REQUIRED BY WARRANTY**

To:	(Ken Pickett), University Representative
From:	

**On the date noted, the University identified the following work required under warranty:**


Prepared by: \_\_\_\_\_  
(Print Name) Signature Date

In accordance with the terms and conditions of the Contract, the **[Contractor]** has agreed that, if at any time within \_\_\_\_\_ months after the date of the guarantee the **[Contractor]** 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 **[Contractor]** 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.

Prompt notification to be provided by the University Representative to the appropriate **[Contractor]**.

**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 02 07 00  
SELECTIVE DEMOLITION**

**PART I - GENERAL**

1.01 DESCRIPTION

- A. Scope: Work under this Section shall include:
  - 1. Provide selective demolition as indicated on the drawings and as required by new construction.
  - 2. Hazardous materials demolition or removal work is part of this contract, refer to specification section 13281 - Hazardous Materials Management.

1.02 SUBMITTALS

- A. Submit for approval selective demolition schedule, including schedule and methods for capping and continuing utility service.

1.03 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Use experienced workmen.

1.04 PROJECT CONDITIONS

- A. Coordinate all demolition work with the University, with special attention to noise, dust, debris removal, or other disturbances.
- B. Schedule utility shutdowns at least 48 hours in advance. Maintain fire protection services during demolition operations. Reference specification section 01310 for impact notice, shutdown procedures for interruption services.
- C. Remove debris, rubbish and other materials resulting from demolition operations from building site. Transport and legally dispose off site.

**PART II - PRODUCTS – Not Applicable to this Section**

**PART III - EXECUTION**

3.01 DEMOLITION

- A. Do not damage building elements and improvements indicated to remain.
- B. All items not listed for “salvage and return to University” remain property of the University, and shall be collected for reuse or recycling as directed by the Owner’s Representative. Contractor shall not remove any items of salvage or recycle value from the project site without the express permission of the University’s Representative.
- C. Do not close or obstruct streets, walkways, driveways or other occupied or used spaces or facilities without the written permission of the University and authorities having jurisdiction. Do not interrupt utilities serving occupied or used facilities without the written permission

of the University and authorities having jurisdiction. If necessary, provide temporary utilities.

- D. Cease operations if public safety or remaining structures are endangered. Perform temporary corrective measures until operations can be continued properly.

### 3.02 SCHEDULE

- A. Items to remain in place and protected for reuse: See section 01390 – Green Building Policy Implementation.
- B. Items to be salvaged for reinstallation in this project:
  - 1. Coordinate with the University prior to start of work.
- C. Items to be salvaged and delivered to The University:
  - 1. Coordinate with the University prior to start of work.
- D. Utilities requiring interruption, capping, or removal:
  - 1. Coordinate with the University prior to start of work.

**END OF SECTION 02 07 00**

**SECTION 08 31 00  
ACCESS DOORS**

**PART I - GENERAL**

1.01 DESCRIPTION

- A. Scope: Work under this Section shall include all materials and installation necessary to provide Access Doors as shown and detailed on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Reference Standards:
1. National Fire Protection Association (NFPA): Fire tests.
  2. Underwriters Laboratories (UL): Fire tests.

**PART II - PRODUCTS**

2.01 MATERIALS

- A. Access Doors:
1. Steel frame with continuous hinge, manufactured by Milcor, Inc.; sizes as shown, J.L. Industries, or equal.
- B. Walls:
1. Gypsum Wallboard: Style M, with standard cam lock.
- C. Ceilings:
1. Acoustical Tile: Style AT, with flush cam lock.
  2. Plaster: Style AP, with integral lath for plastering and flush cam lock.
- D. Fire Rated Openings:
1. General: "Fire Rated" type with flush face key operated mortise cylinder lock and interior latch release mechanism; UL rating of 1-½ hours; "B" label.
  2. Wall: Model No. 3208.
  3. Ceiling: Model No. 3210.
  4. Security Door: Model No. 3211.
- E. Fasteners: As recommended by manufacturer.
- F. Primer: Rust inhibiting.



**PART III - EXECUTION**

3.01 PREPARATION

- A. Measurements General: Install in conformance with referenced standards, manufacturer's written directions, as shown, and as specified.
- B. General: Take field measurements; report variance between plan and field dimensions.

3.02 ADJUSTMENT

- A. General: Prior to acceptance, adjust moveable parts to assure smooth operation.

3.03 CLEANING

- A. Upon completion, thoroughly clean exposed surfaces per manufacturer's instructions.

**END OF SECTION 08 31 00**

**SECTION 11 73 00  
PATIENT CARE EQUIPMENT**

**PART I - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
  - 1. Elopement prevention system.

1.03 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.04 SUBMITTALS

- A. Shop Drawings:
  - 1. Include plans, system wiring requirements and diagrams, system function description, installation requirements, and equipment data sheets.

1.05 QUALITY ASSURANCE

- A. Coordinate work with the University of device locations before final installation.
- B. Schedule utility shutdowns at least 48 hours in advance. Maintain fire protection services during demolition operations. Reference specification section 01310 for impact notice, shutdown procedures for interruption services.

**PART II - PRODUCTS**

2.01 MANUFACTURER

- A. Securitas Healthcare, (800) 824-2996

2.02 PRODUCTS

- A. Legacy Hugs system – refer to following product information sheets.
- B.

**PART III - EXECUTION – NOT USED**

**END OF SECTION 02 07 00**



# EX3220 Exciter



## DATA SHEET

Provides robust and sophisticated RFID detection capabilities that trigger AeroScout Tags as they pass through an egress point or as they approach the Exciter.

### PRODUCT HIGHLIGHTS

- RFID detection of Tags - Triggers the Tags to transmit as they pass through a defined door or gate area
- Tag behavior modification - Wirelessly activate and deactivate Tags
- Message programming - Stores messages on the Tag for subsequent transmission
- Network connectivity - Enables remote programming, monitoring and software updates by the AeroScout Engine
- No exposed connectors/wires - the Exciter's back connector panel mounts flush with the wall ceiling or other mounting surface

### DESCRIPTION

EX3220 Exciter is a component of the Securitas Healthcare suite of enterprise-level visibility solutions based on standard Wi-Fi wireless communications for location-based applications. The EX3220 Exciter extends the suite to provide robust and sophisticated RFID detection capabilities.

The EX3220 Exciter triggers AeroScout Tags as they pass through an egress point or as they approach the Exciter. Tags in turn transmit a message to either the AeroScout Location Receivers or to compatible Access Points within range.

The Exciter can activate or deactivate Tags, program them, or even instruct the Tags to operate in a specific way (for example, to blink). This provides instant acknowledgment that a tagged asset has passed through a gate, doorway or other specifically defined area.

The detection capabilities of the EX3220 Exciter combine with the location features of the AeroScout Visibility System to make the AeroScout suite a very sophisticated enterprise visibility solution that is applicable in a variety of industries.

The EX3220 Exciter back panel fits flush with the mounting surface so that there are no exposed cables or connectors.



# Key Features

## BROAD RANGE OF INDUSTRY APPLICATIONS

- **Theft Prevention** - The tag's display shows the current temperature and humidity, the minimum and maximum values measured since the last audit, battery and power status, alarm indications, and warnings. The buttons are used to navigate and select the tag's menu options, activate the tag, and perform manual audits with a single-press.
- **Process Control** - Manufacturing companies can track the location of equipment, carriers and work-in-process (WIP) inventory during a production cycle. This provides a real-time view of activity on the production line. The type and quantity of products can be tracked through each step in the manufacturing process.
- **Automatic Inventory Management** – Logistics organizations can update inventory records by automatically determining the assets within defined areas, ensuring real-time knowledge of inventory levels without manual checks or barcode scanning.
- **Access Control** – AeroScout Exciters can be installed at the entrances of restricted areas to trigger alerts when unauthorized persons attempt to enter or leave. Government agencies and enterprises can tag secure assets and people that are restricted to certain areas or require historical location tracking.

## CONNECTOR BACK PANEL

- Power jack (12 VDC)
- Ethernet LAN Connection: RJ-45
- Chain IN Connector: RJ-45
- Chain OUT and Control Connector
- Primary/Chained Switch
- Control Switch intervals using pre-configured static configurations.



## NETWORK AND POWER OPTIONS

**Single EX3220** not connected to the network. The Exciter can be used as a standalone device that functions independently without any network connection. Connect the EX3220 to the power supply only.

**Single EX3220** connected to network. EX3220 Exciters can be remotely controlled (for configuration and monitoring purposes) through the local area network. Connect the EX3220 Exciter to both a power source and the network.

**Chained EX3220s** not connected to a network. EX3220 Exciters can be connected to each other in a chain and receive power/data from one Primary EX3220 Exciter in the chain. Up to eight EX3220 Exciters can be connected in a chain.

## POWER SUPPLY OPTIONS

**PoE Switch.** If your network has a Power-over-Ethernet infrastructure, you can connect a CAT-5 Ethernet cable from the PoE switch to the Exciter's LAN connector. This supplies both the power and network connection.

**110/220 VAC to 48 VDC PoE Single-Port Injector.** The PoE Single Port Injector converts 110/220 VAC to 48 VDC. In addition, it can receive a network connection. You can run a single cable to the Exciter's LAN connector, thus supplying both power and network connectivity.

**12 VDC Power Supply Adaptor.** These adaptors convert 110 VAC or 220 VAC inputs to 12 VDC and have a maximum output power of 25 W.

## FLEXIBLE MOUNTING OPTIONS

The EX3220 Exciter can be mounted in a variety of positions and various surfaces such as the ceiling, wall, rail or other special mounting surfaces as determined by the site survey recommendations.

# Product Specifications

Models	<b>SKU:</b> EX-3220
Range	Up to 3 meters (9.84 feet) Supports chained configurations
Physical and Mechanical	<b>Dimensions:</b> 5.5 Length x 5.5 Width x .19 Thickness inches (140 x 140 x 30 mm) <b>Weight:</b> 7.4 oz. (210 g)
Connectors (RJ-45)	<b>LAN</b> - Ethernet: PoE - to prevent power loss; PoE cable max length 100 m (330 feet) In - Chain IN - for chaining and to set the Exciter IP <b>OUT</b> -Chain OUT for power distribution and chaining
Visual Indications	<b>LED:</b> Constant green/blinking green/constant red
Primary and Chained Switch	<b>CTRL</b> - Defines the Exciter as Primary (M) or Chained (S) in a set of Chained Exciters (not necessary with firmware version 308 and above) <b>CHAIN</b> – RS485 termination - in Chained Exciters, set the EXT in first and last exciters and INT in median exciters
Power Consumed	6 W single power jack (12 V dc) + power adapters
Environmental Specifications	<b>Operating Temperature:</b> 0 °C to 50 °C (32 °F to 122 °F) <b>Humidity:</b> 0% to 95% RH non-condensing <b>Ingress Protection Rating:</b> IP-54
Certifications	<b>Radio:</b> FCC Part 15, sub-part C class B, sub-part B, EN 300-330, EN 301-489 Radio Equipment Directive 2014/53/EU (RED), Radio Equipment Directive S.I.2017/1206 (RED) RoHS 2 Directive 2011/65/EU, RoHS 2 Directive S.I.2012/3032 <b>Safety:</b> CE, UKCA, EN62368/UL62368/IEC62368

4600 Vine Street  
Lincoln, NE 68503  
+1 888 622 6992

North America  
info@securitashealthcare.com

International  
global@securitashealthcare.com

securitashealthcare.com

## About Securitas Healthcare

Securitas Healthcare empowers caregivers to deliver connected, productive and safe care. Its innovative portfolio of healthcare solutions helps over 15,000 hospitals, clinics and senior living organizations worldwide protect people, use assets efficiently and understand their operations for a caring and healing environment. Securitas Healthcare is proud to be part of Securitas, the world's leading intelligent protective services partner. For more information, visit us at [securitashealthcare.com](https://securitashealthcare.com)

Doc: 0971-372-000 REV C | Published: 2023/03/22 | KB Article 11739



# ANT 4210 EXTERNAL LF ANTENNA

## Installation Guide Type

0981-506-000 REV C

KB Article: 10351

Published: 2023/04/26

### **We Are Now Securitas Healthcare**

STANLEY Healthcare is now Securitas Healthcare. We are currently rebranding all our products and documentation, but until that process is complete you may still see visual references to STANLEY Healthcare in this document. All descriptions of functionality are accurate to the best of our knowledge.



## Disclaimer

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The product has not been evaluated for performance/security features.

The efficacy of the basic security RFID devices was not assessed for performance under this investigation.

## Trademark Acknowledgements

AeroScout is a trademark of Securitas Healthcare LLC and/or its affiliates. All other names and marks mentioned are trade names, trademarks, or service marks of their respective owners.

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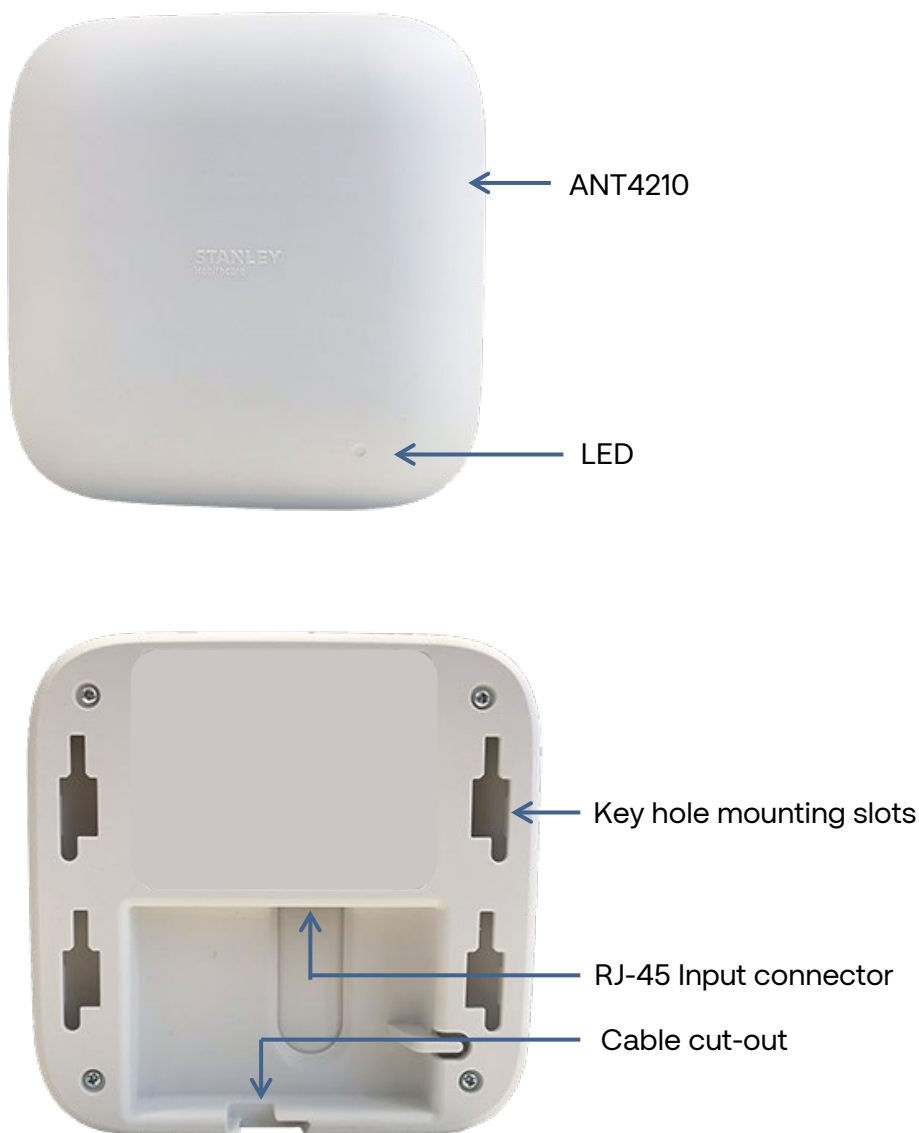
# Connecting an External LF Antenna

The ANT 4210 External LF Antenna device is designed to extend the Exciter's LF coverage. The two devices communicate via a standard CAT5 cable connection.

Connect the Exciter's Chaining OUT connector to the external LF device's IN connector.

For configuration instructions, refer to the AeroScout Location Engine Deployment Guide.

The External LF Antenna's LED blinks while the Exciter transmits.



# Mounting the External LF Antenna

Position and mount each Antenna in the site according to the site survey recommendations.

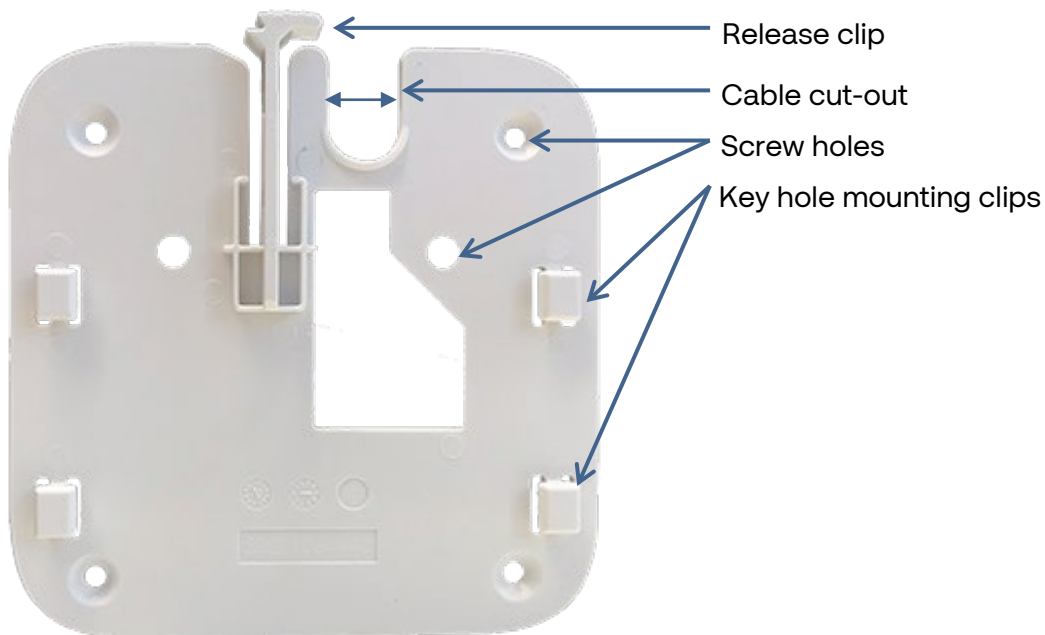
The following mounting options are supported:

- Center Tile Mounting
- Caddy Mounting
- Wall Mounting
- Gang Box Mounting
- Rail Mounting

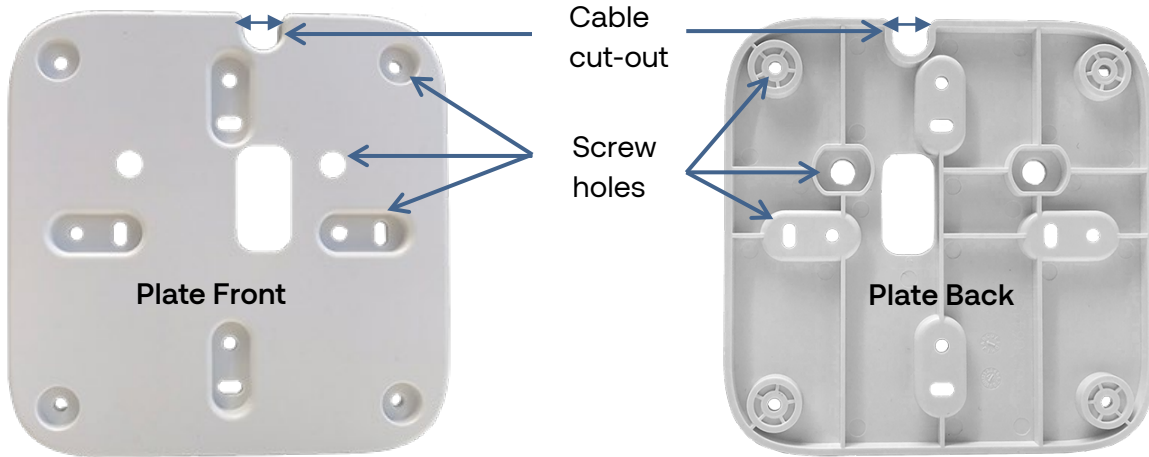
**NOTE:** It is recommended to get familiar with the mounting procedures before mounting the device.

## Mounting Components

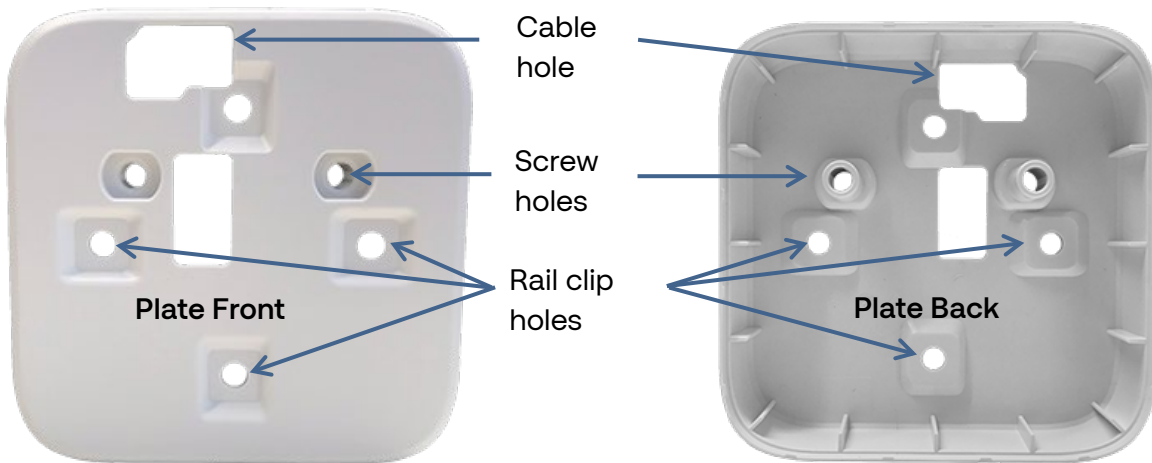
### Mounting Bracket



## Mounting Plate






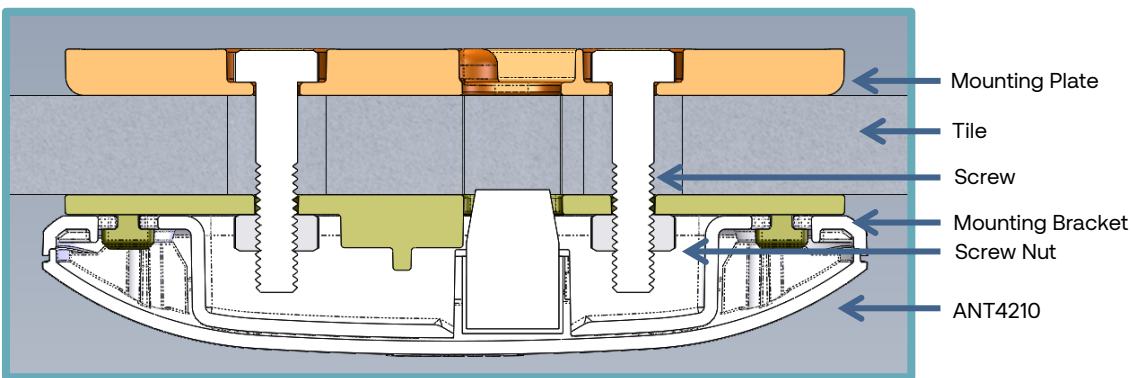
## Rail Mount



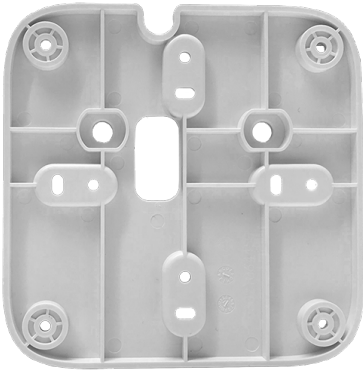
## Tile Mounted

For this mounting option the following parts are required:

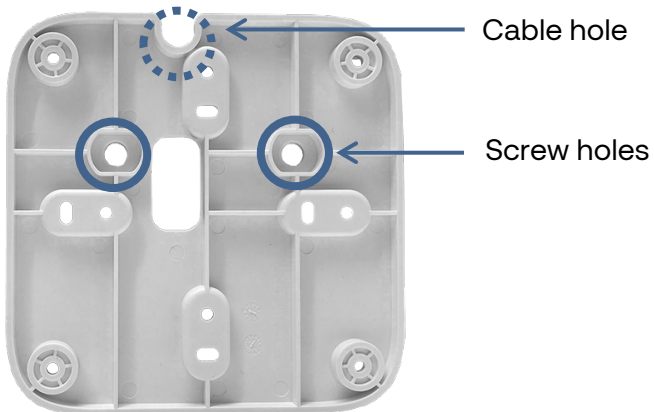
Part Letter	Part Name	Quantity	Image
A	Mounting Bracket	1	
B	Mounting Plate	1	
C	2 Med Hex Bolts & Nuts	2	



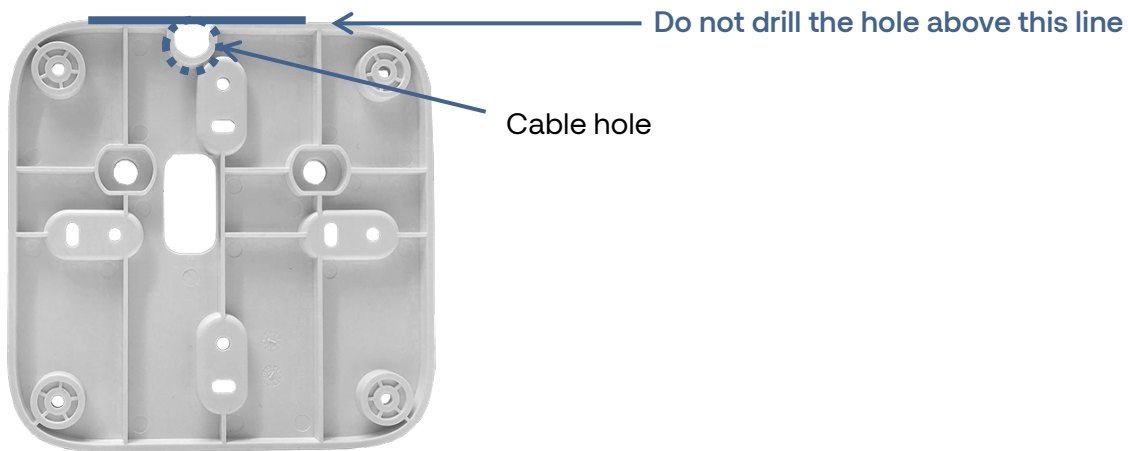
1. Place the Mounting Plate (B), with the plate's front, on the back of the tile in the desired mounting location.



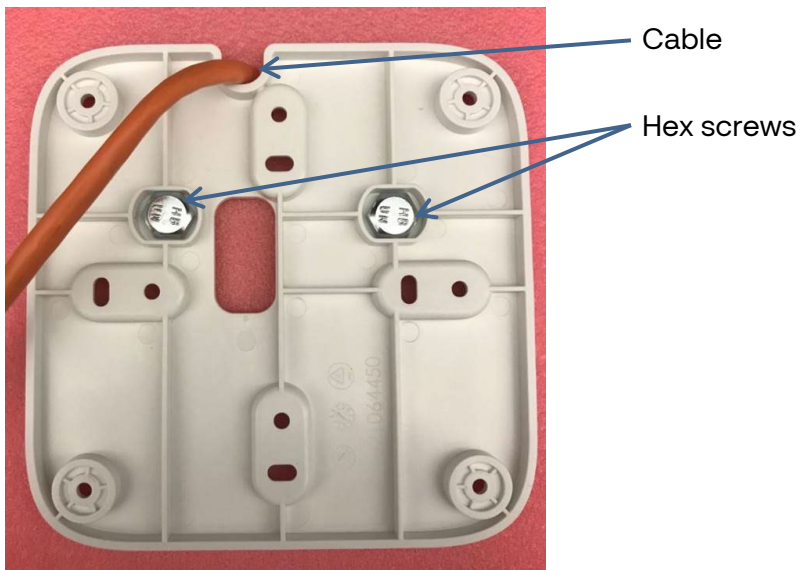
2. Mark the 2 screw holes and 1 cable hole (inside the cable cut-out section) according to image below.



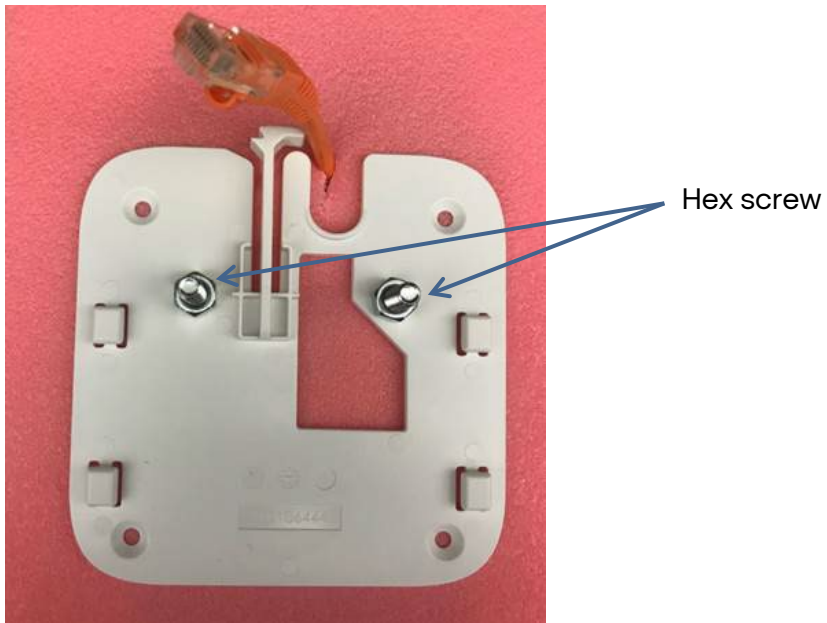
3. Drill the required screw holes according to the width of the screws.
4. Drill the RJ45 cable hole. Drill a larger hole (1.5-2cm in diameter) if the cable already has a connector. When drilling the hole for the cable, make sure the hole is inside the cable cut-out section. Do not drill the hole above the cable cut-out edge.



5. Insert the screws (C) and cable through the holes in the tile.



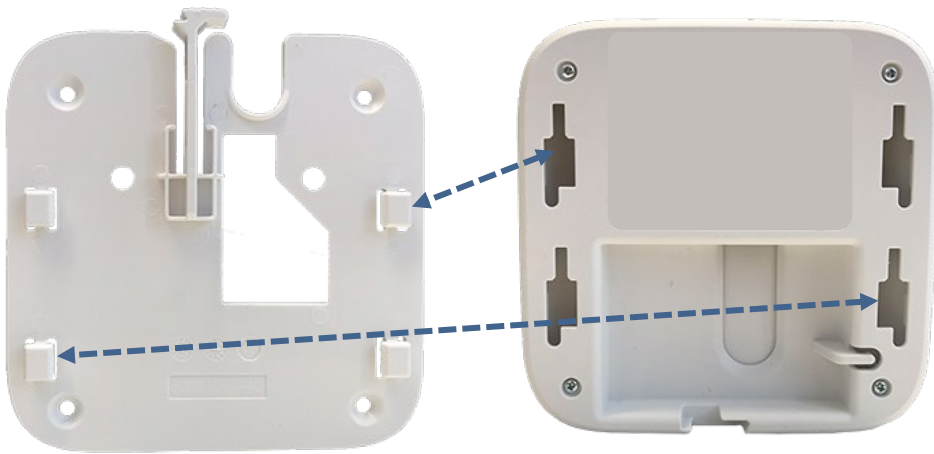
6. Turn the tile over to the front.
7. Assemble the Mounting Bracket (A) through the screws on the front of the tile and tighten using the hex screw nuts (C).



8. Attach the ANT4210 to the RJ45 cable.



- Place the ANT4210 over the Mounting Bracket's key hole mounting clips.



- Slide the ANT4210 upwards until it clicks into place.



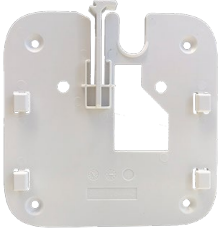



- The ANT4210 can be removed from the Mounting Bracket using the bracket's release clip. Push the release clip to the side and slide the device down.





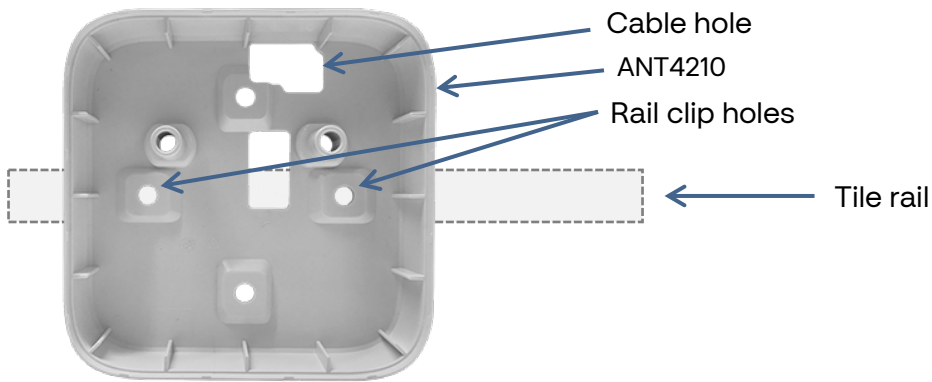
## Rail Mounted

For this mounting option the following parts are required:

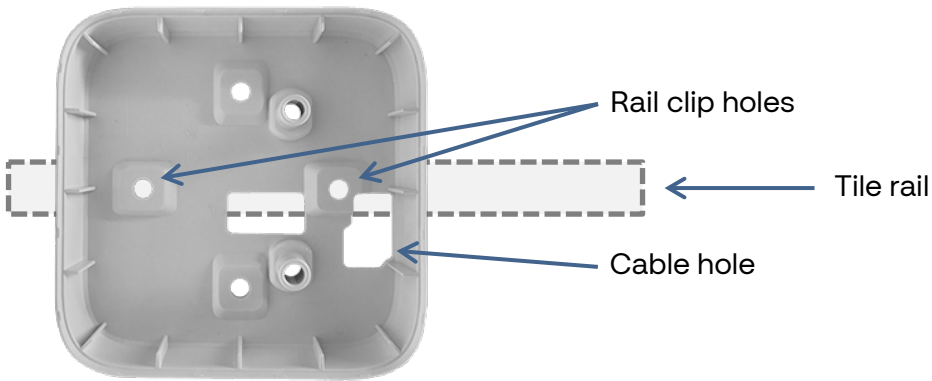
Part Letter	Part Name	Quantity	Image
A	Mounting Bracket	1	
B	Rail Mount	1	
C	2 Med Hex Bolts & Nuts	2	
D	Rail Clips (narrow or wide) and Nuts Additionally screws can be used for recessed rails.		

1. Place the Rail Mount (**B**), with the mount's front, on the tile rail in the desired mounting location. Align the rail clip holes with the tile rail. There are two orientation options:

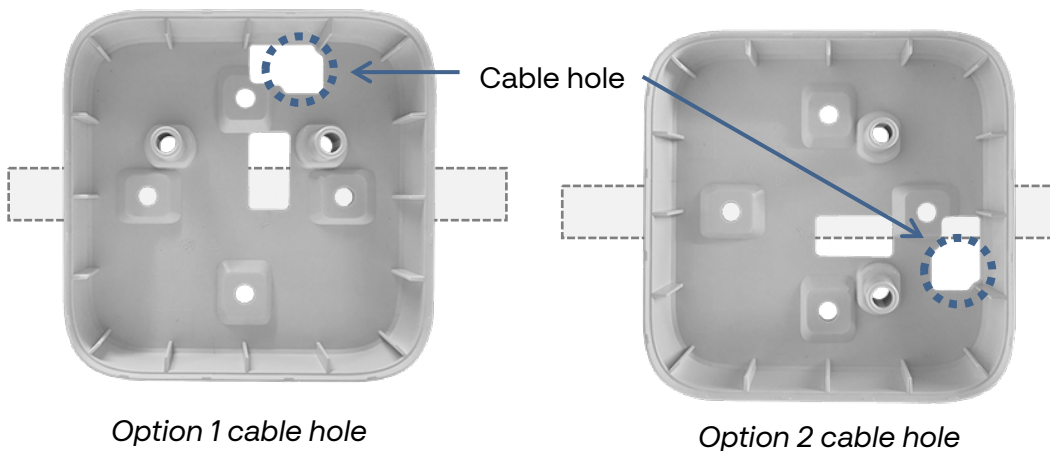
Option 1: Cable hole is away from the tile rail.



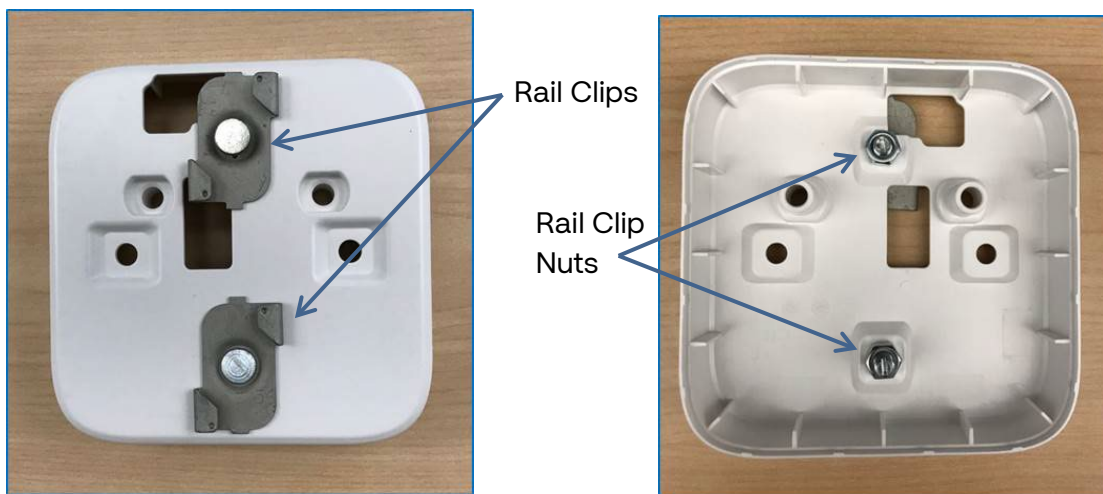
Option 2: Cable hole is slightly over the tile rail.



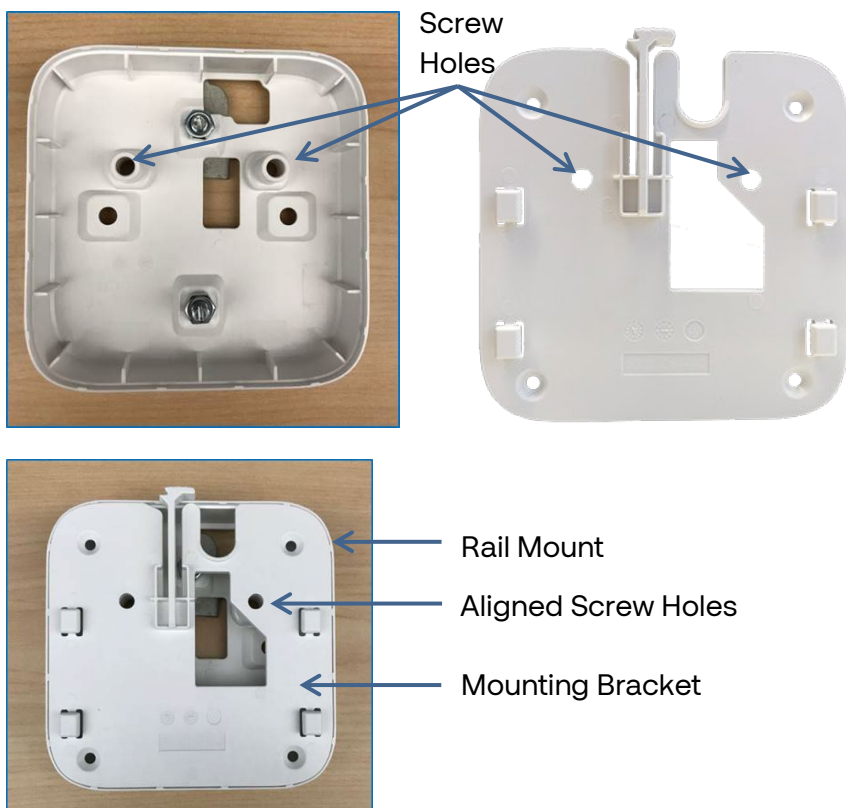
2. Mark the cable hole (inside the cable cut-out section) according to the option used above and according to the images below.



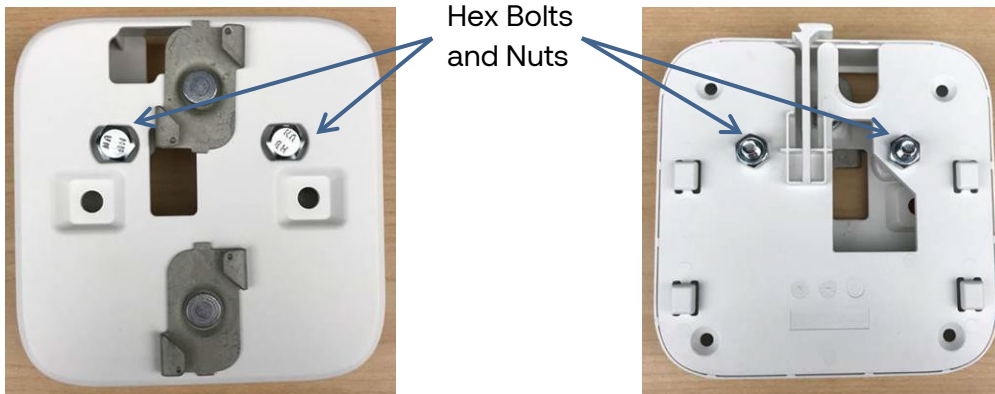
3. Drill the RJ45 cable hole. Drill a larger hole if the cable already has a connector. When drilling the hole for the cable, make sure the hole is inside the cable cut-out section. Do not drill the hole away from the cable cut-out section.
4. Insert the Rail Clips into the required rail clip holes, on the front of the Rail Mount, and tighten with the nuts. Make sure the Rail Clips are aligned correctly.



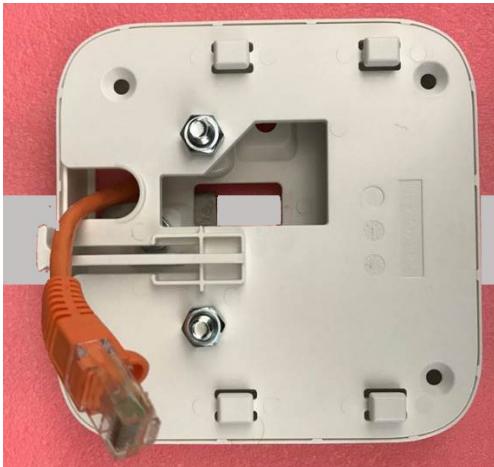
5. Clip the Mounting Bracket (A), into the Rail Mount (B). Make sure the Mounting Bracket's screw holes are aligned with the Rail Mount's screw holes. The Mounting Bracket should be inside the Rail Mount when clipped in correctly.



6. Insert the Hex bolts (C) into the Rail Mount's screw holes, from the front of the Rail Mount. Tighten with the nuts.



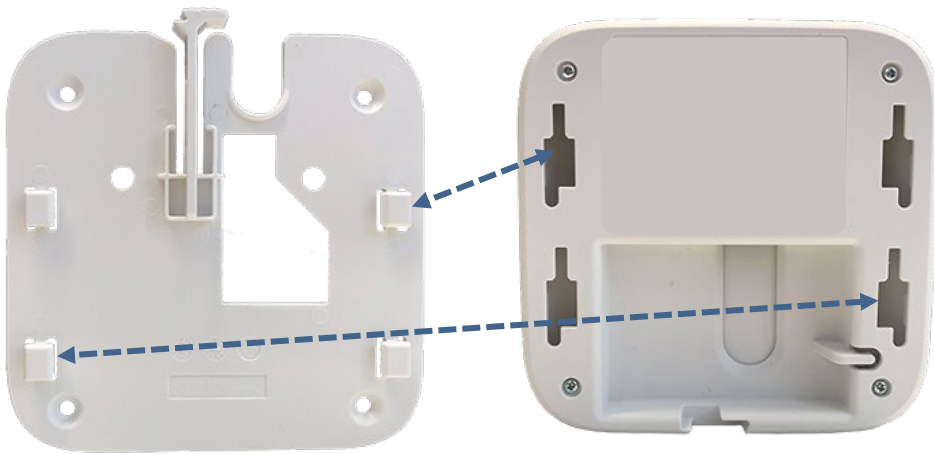
7. Clip the unit onto the tile rail and thread the RJ45 through the unit.



8. Attach the ANT4210 to the RJ45 cable.



- Place the ANT4210 over the Mounting Bracket's key hole mounting clips.



- Slide the ANT4210 upwards until it clicks into place.






- The ANT4210 can be removed from the Mounting Bracket using the bracket's release clip. Push the release clip to the side and slide the device down.

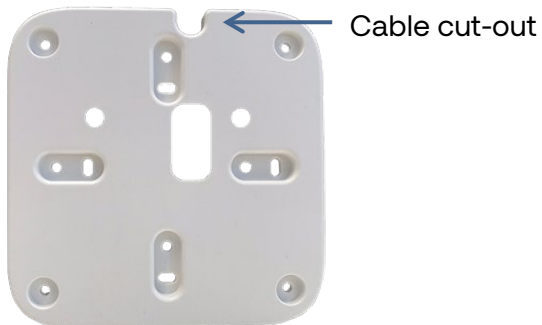


## Wall Mounted

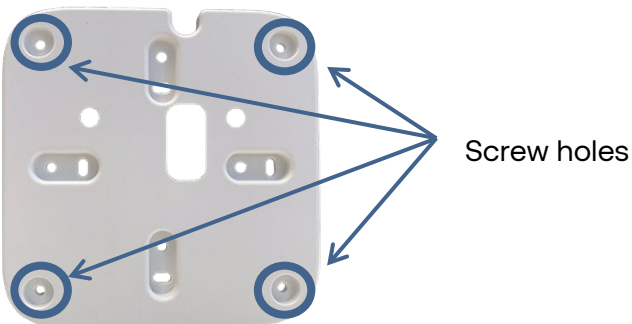
For this mounting option the following parts are required:

Part Letter	Part Name	Quantity	Image
A	Mounting Bracket	1	
B	Mounting Plate	1	
C	2 Small Hex Bolts & Nuts	2	
D	Screws & Anchors	4	

1. Place the Mounting Plate **(B)** with the plate's back on the wall in the desired mounting location. Make sure to align the Plate's cable cut-out with the RJ45 cable.

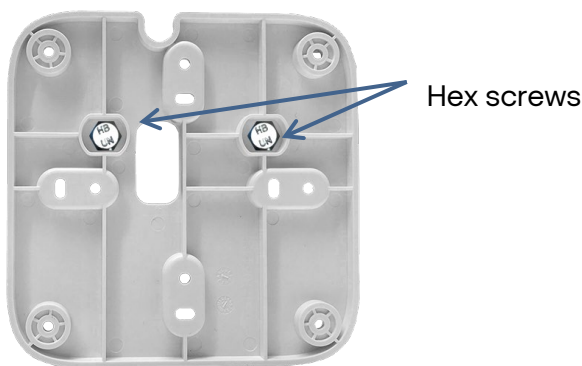


2. Mark the 4 screw holes.

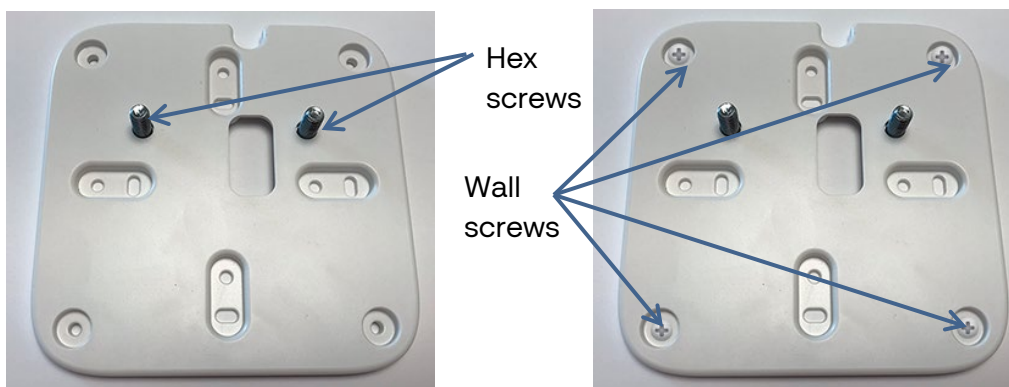


3. Drill the 4 screw holes in the wall.

4. Insert the small hex screws (C) through the screw holes on the back of the Plate.

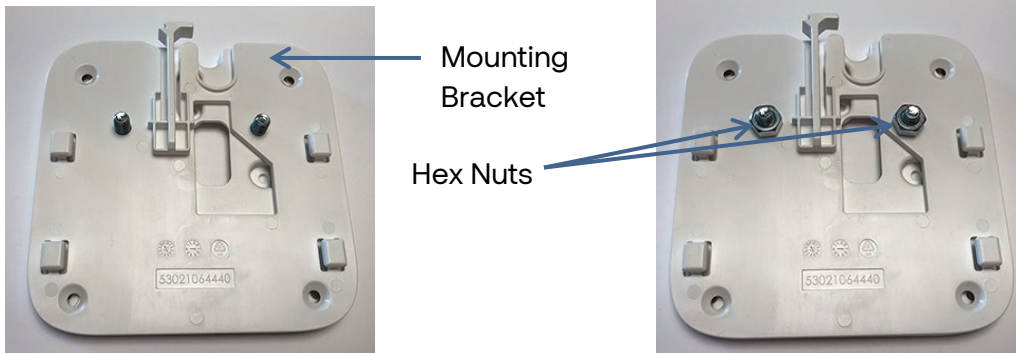


5. Place the Mounting Plate, with the hex screws, on the wall mounting location and screw the Plate in with the wall screws (D).



6. Place the Mounting Bracket (A) over the Mounting Plate (B) and tighten with the hex screw nuts.

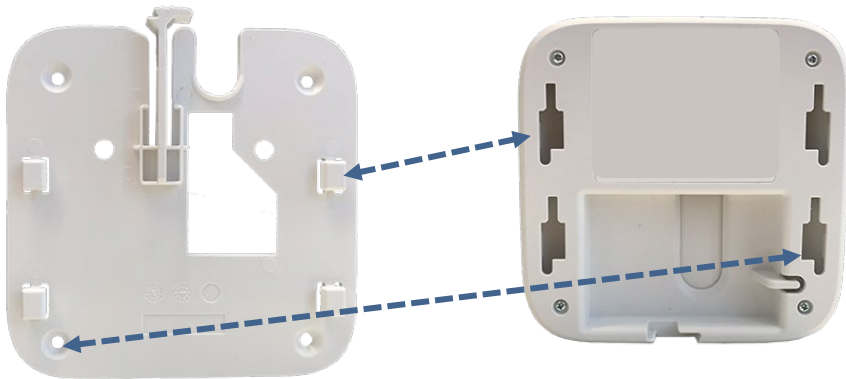




7. Connect the RJ45 cable to the ANT4210.



8. Place the ANT4210 over the Mounting Bracket's key hole mounting clips.



9. Slide the ANT4210 upwards until it clicks into place.



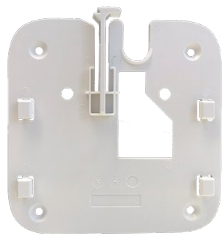




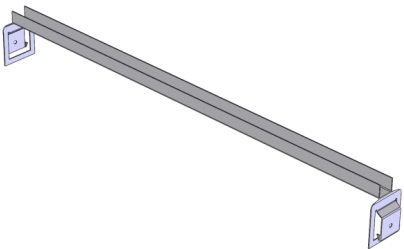


10. The ANT4210 can be removed from the Mounting Bracket using the bracket's release clip. Push the release clip to the side and slide the device down.

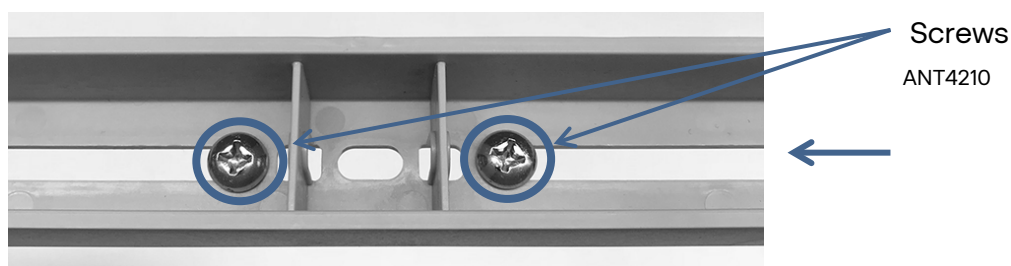


## Caddy Mounted

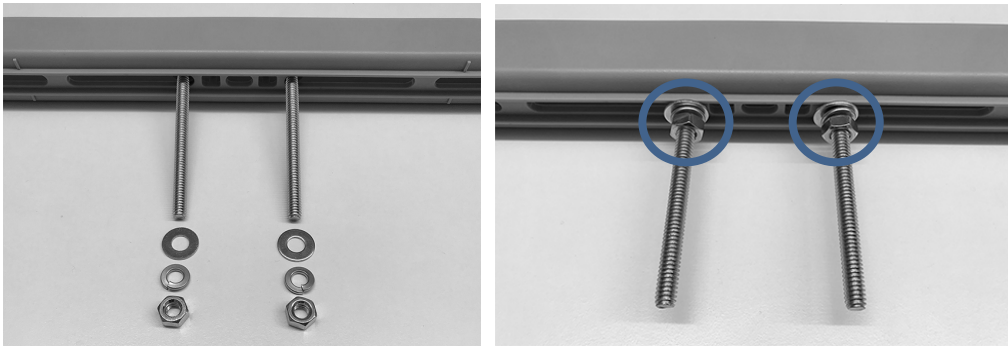
For this mounting option the following parts are required:

Part Letter	Part Name	Quantity	Image
A	Mounting Bracket	1	
B	3" Philips Screw	2	
C	Hex Nuts	6	
D	Spring Washer	2	
E	Flat Washer	2	
F	Bracket	1	

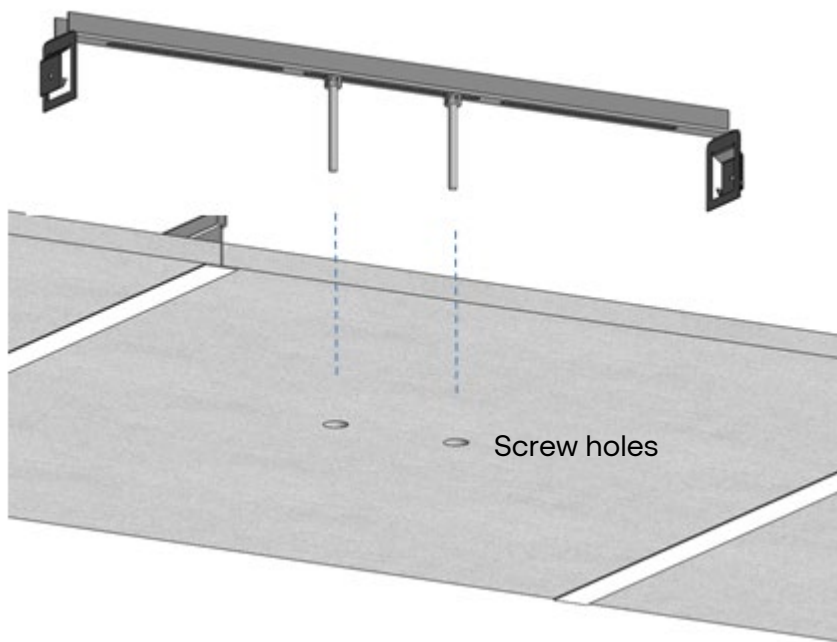
1. Insert 2 screws **(B)** through the middle of the bracket **(F)** as shown in the image below:



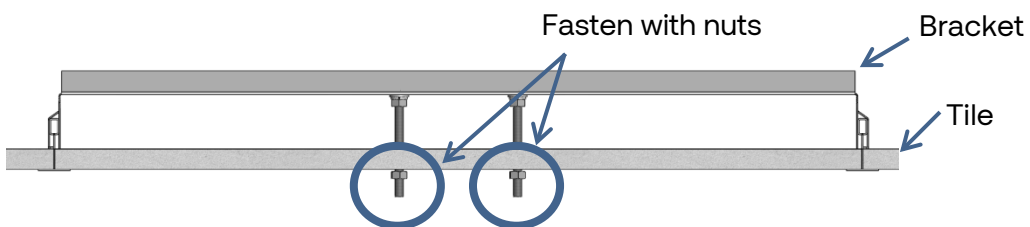
2. Fasten each of the screws **(B)**, to the bracket **(F)**, with a flat washer **(E)**, spring washer **(D)** and hex nut **(C)**.



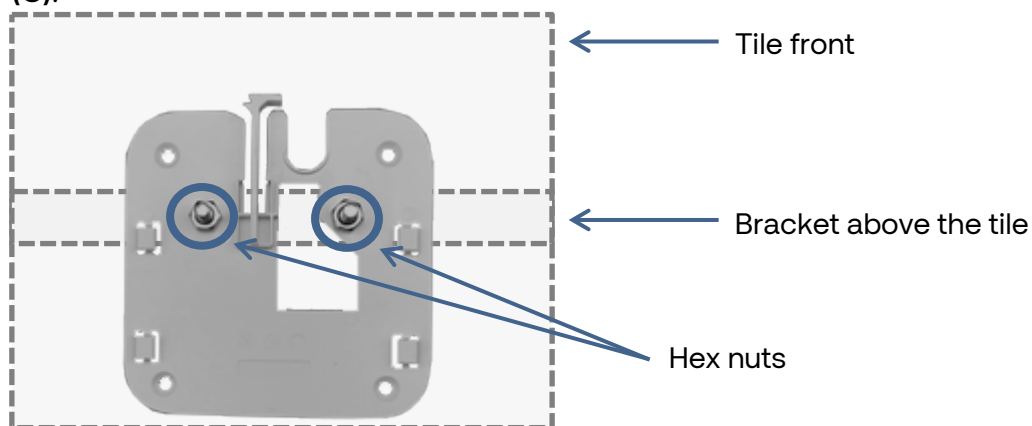
3. Drill 2 holes in the tile for the screws (B). Use the assembled bracket (F) to mark the screw hole locations.



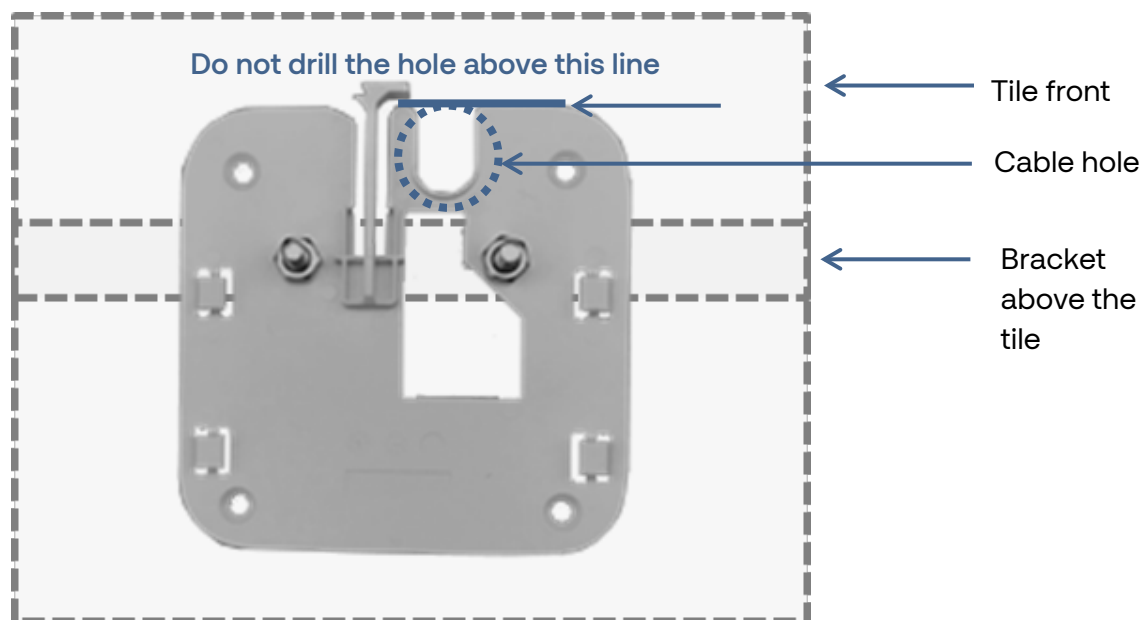
4. Mount the assembled bracket (F) on top of the tile and insert the screws through the tile screw holes. Fasten with 2 hex nuts (C).



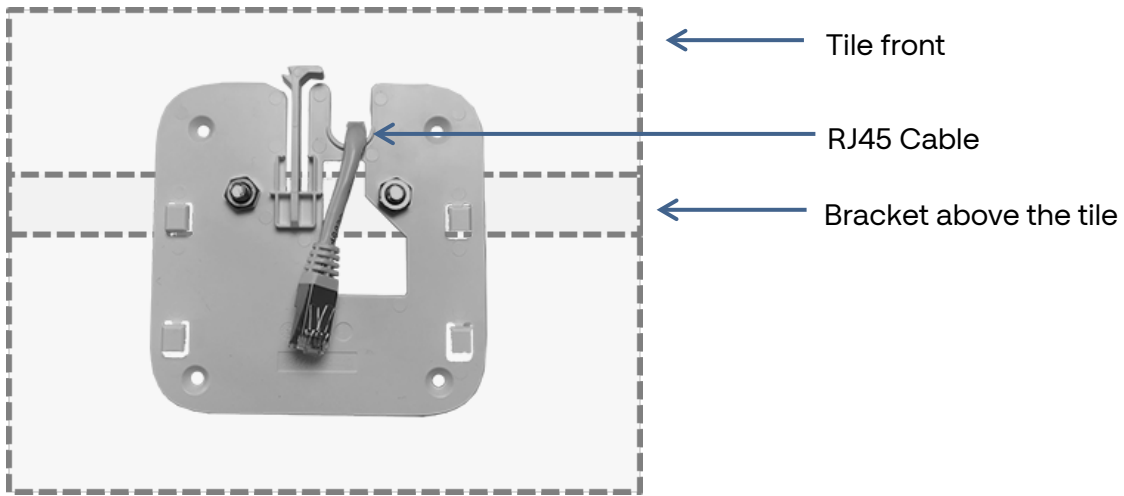
5. Place the Mounting Bracket (A) through the screws (B), on the front of the tile, and tighten with hex nuts (C).



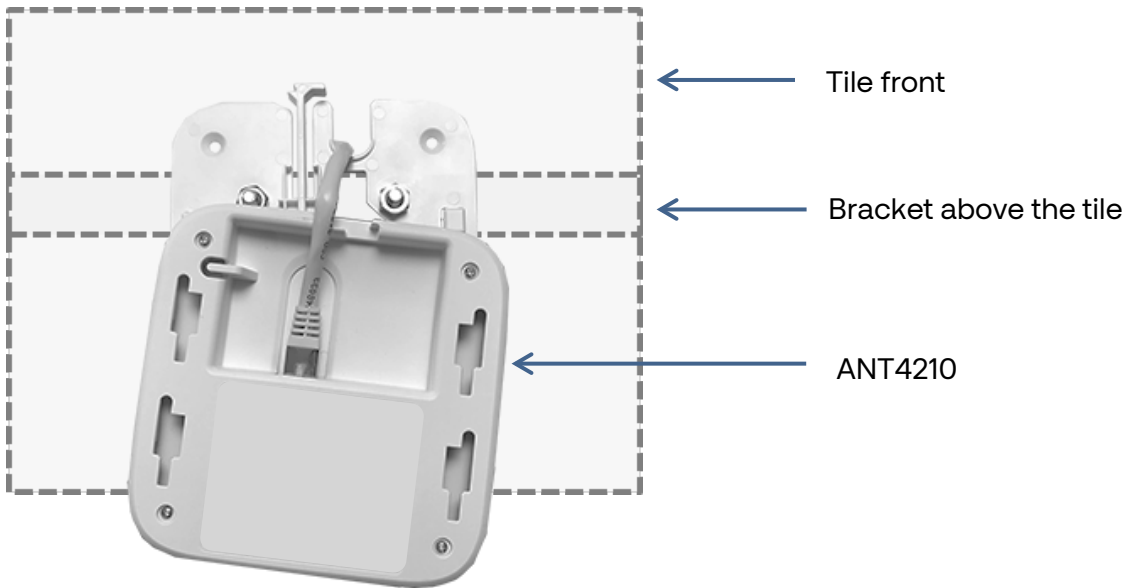
6. Drill the RJ45 cable hole. Drill a larger hole (1.5-2cm in diameter) if the cable already has a connector. When drilling the hole for the cable, make sure the hole is inside the cable cut-out section. Do not drill the hole above the cable cut-out edge.



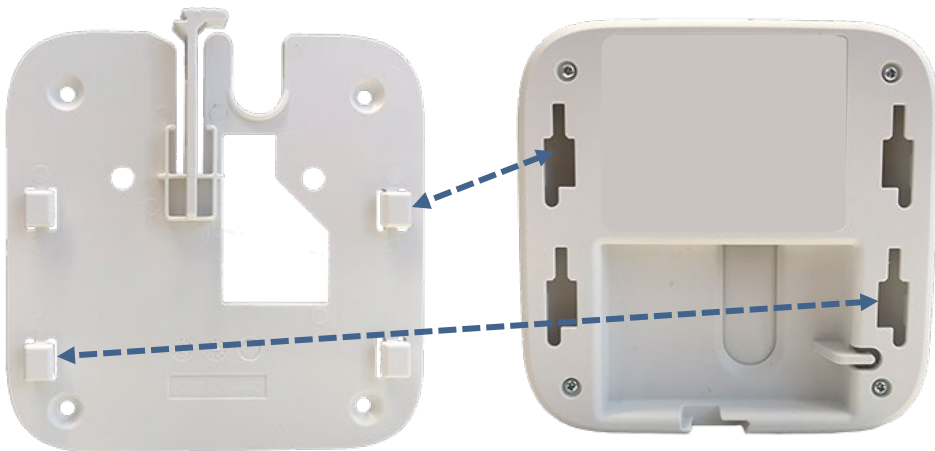
7. Thread the RJ45 cable through the cable hole.



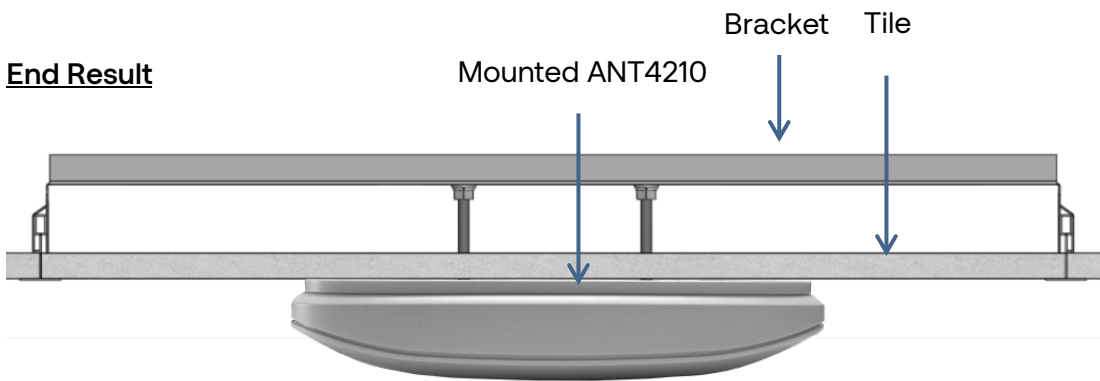
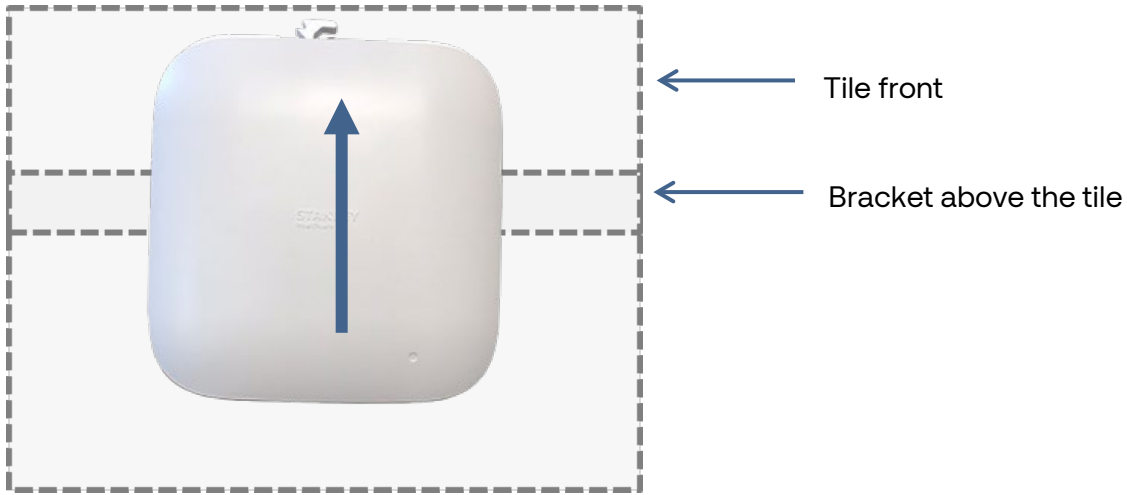
8. Attach the ANT4210 to the RJ45 cable.



9. Place the ANT4210 over the Mounting Bracket's key hole mounting clips.



10. Slide the ANT4210 upwards until it clicks into place.

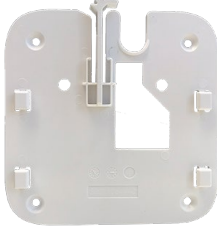





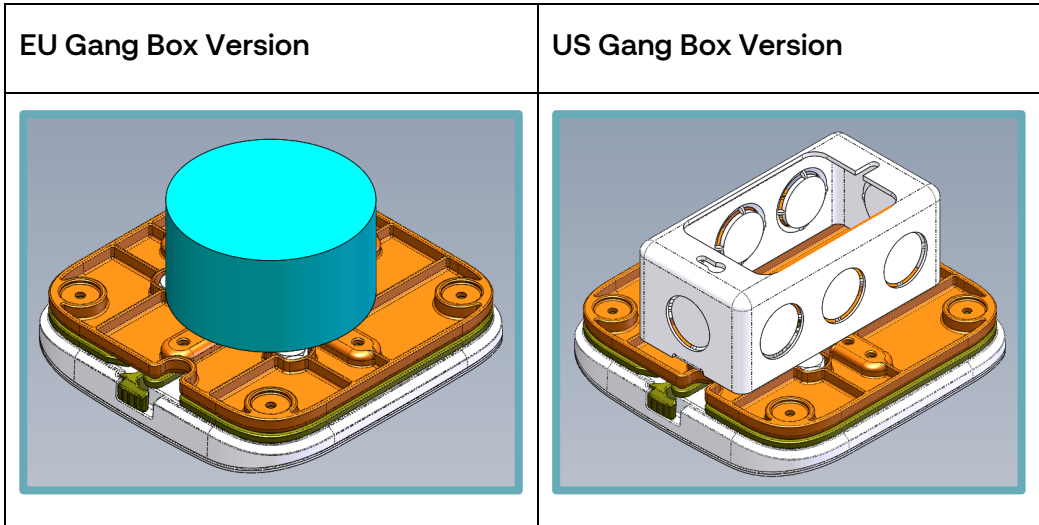
11. The ANT4210 can be removed from the Mounting Bracket using the bracket's release clip. Push the release clip to the side and slide the device down.



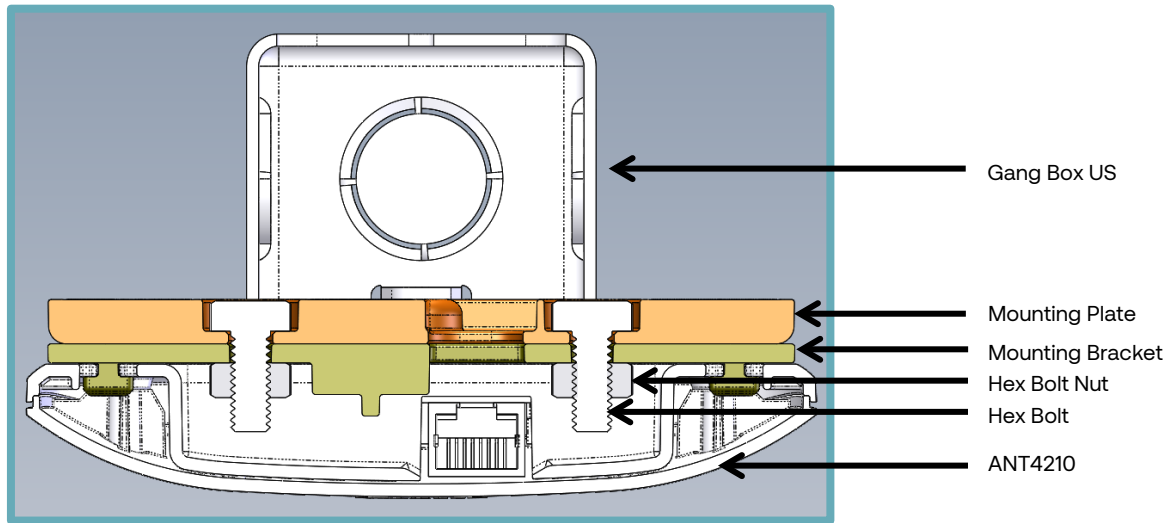
## Gang Box Mounted (EU/US)

For this mounting option the following parts are required:

Part Letter	Part Name	Quantity	Image
A	Mounting Bracket	1	
B	Mounting Plate	1	
C	2 Small Hex Bolts & Nuts	2	
D	2 Gang Box Screws (Not included in the package)	2	
E	Right Angled RJ45 cable (Not included)	1	



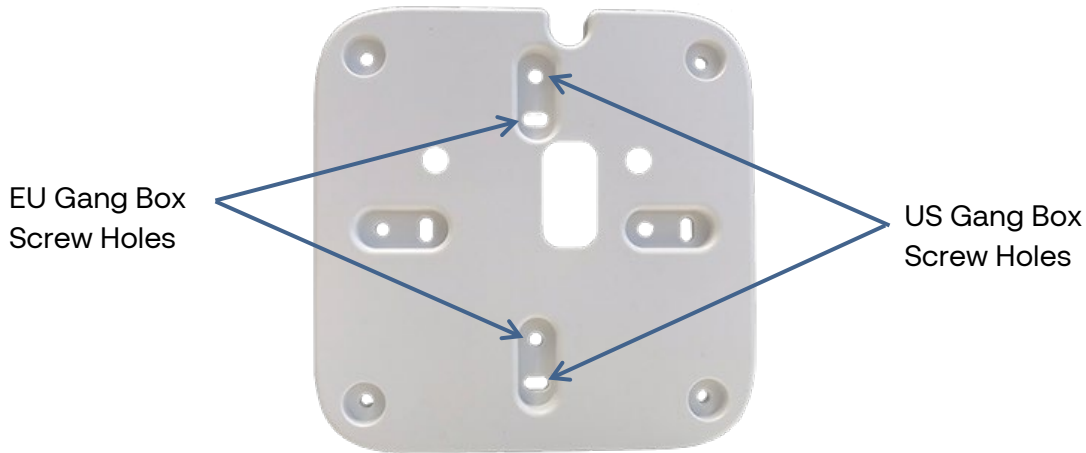
Gang Box US mounting Example





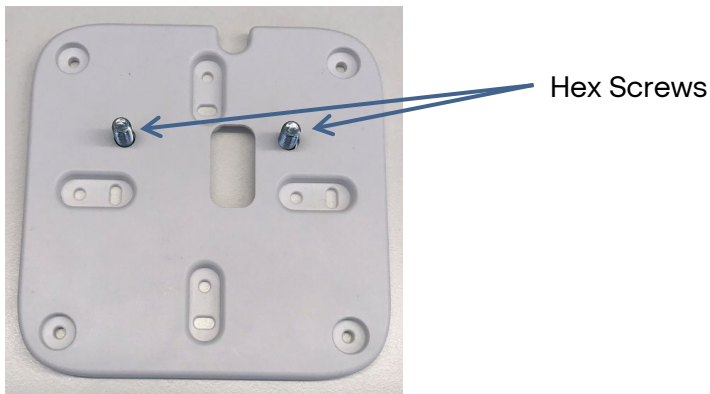
## Mounting Positions

There are 2 mounting positions for Gang Box screws – Horizontal or Vertical. The Mounting Plate has screw holes for US and EU Gang Box versions:

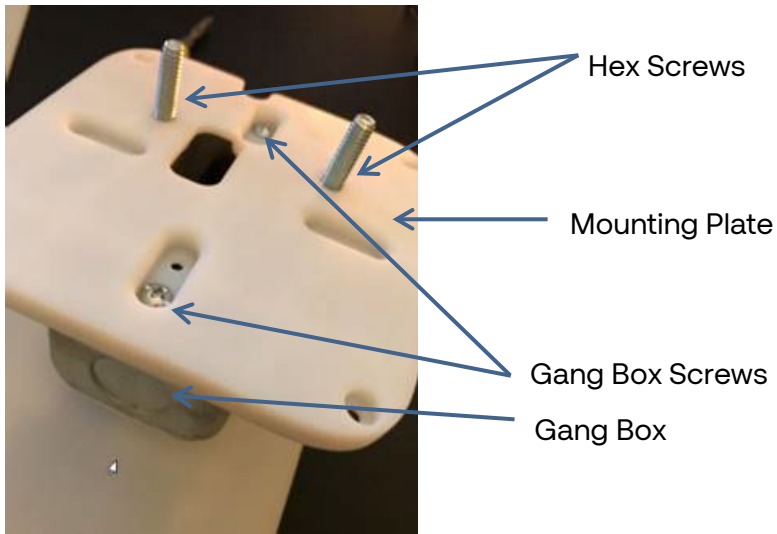


## Mounting Procedures

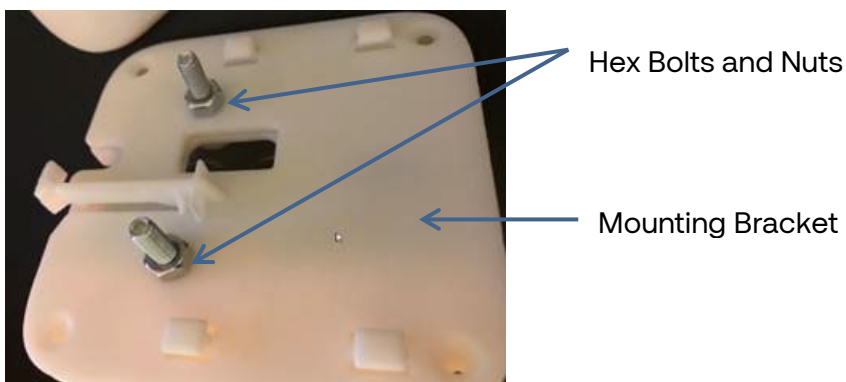
1. Before mounting the Mounting Plate (B) to the Gang Box, insert the 2 hex screws (C).



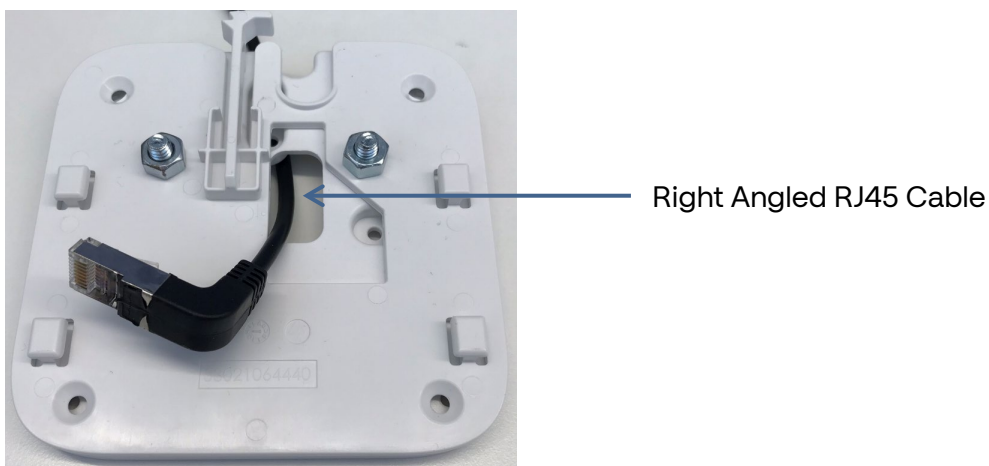
2. Mount the Mounting Plate (B), with hex screws, to the Gang Box accordingly.



3. Place the Mounting Bracket (A) over the Mounting Plate (B) and secure it with the hex nuts.

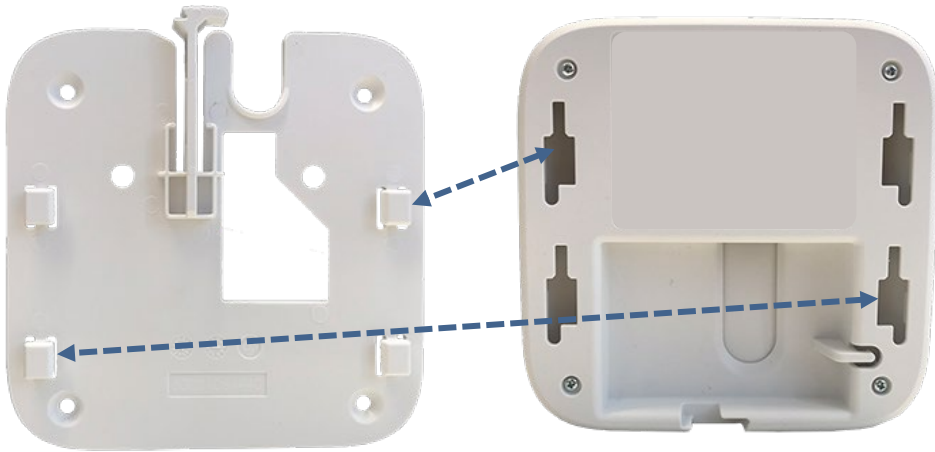


4. Thread the right angled RJ45 cable through the hole in the middle.



5. Attach the ANT4210 to the RJ45 cable.

6. Place the ANT4210 over the Mounting Bracket's key hole mounting clips.



7. Slide the ANT4210 upwards until it clicks into place.
8. The ANT4210 can be removed from the Mounting Bracket using the bracket's release clip. Push the release clip to the side and slide the device down.



# External LF Antenna

## Physical and Mechanical (excluding mounting components)

- Dimensions L/W/H: 125mm x 125mm x 22 mm (4.9in x 4.9in x 0.8in)
- Weight: 122g (4.3 oz)
- Housing: ABS, indoor use only
- RJ-45 Input Connector
- Connected to the Exciter's Chain Out connector

## Coverage

- Adjustable coverage range: 0.25m-3m (0.8ft x 9.8ft)

## Power

- Powered directly from the Exciter

## Environmental

- Operating temperature: 0°C to +50°C (32°F to 122°F)
- Storage temperature: -40°C to +85°C (104°F to 185°F)

## Other

- Connecting to EX2000B Exciter requires a 48/12V adapter

## Certifications

- **Radio, EMC**

EN 301 489, EN 300 330

Radio Equipment Directive 2014/53/EU (RED), Radio Equipment Directive S.I.2017/1206 (RED)

RoHS 2 Directive 2011/65/EU, RoHS 2 Directive S.I 2012/3032

- **Safety**

CE, UKCA, EN62368/UL62368/IEC62368

# Safety, Warnings and Warranty

## FCC STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- a) Reorient or relocate the receiving antenna.
- b) Increase the separation between the equipment and receiver.
- c) Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- d) Consult the dealer or an experienced radio/TV technician.

Operation is subject to the following two conditions:

- a) This device may not cause harmful interference
- b) This device must accept any interference received, including interference that may cause undesired operation.

## FCC Warning

Modifications not expressly approved by the manufacturer could void the user authority to operate the equipment under FCC Rules.

**WARNING:** This device complies with Part 15 of the FCC Rules and RSS-210 of Industry and Science Canada. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## NCC Statement – Taiwan

根據NCC低功率電波輻射性電機管理辦法 規定:	
第十二條	經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十四條	低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。 前項合法通信，指依電信法規定作業之無線電通信。 低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。



4600 Vine Street  
Lincoln, NE 68503  
+1 888 622 6992

North America  
[info@securitashealthcare.com](mailto:info@securitashealthcare.com)

International  
[global@securitashealthcare.com](mailto:global@securitashealthcare.com)

[securitashealthcare.com](https://securitashealthcare.com)

**About Securitas Healthcare**

Securitas Healthcare empowers caregivers to deliver connected, productive and safe care. Its innovative portfolio of healthcare solutions helps over 15,000 hospitals, clinics and senior living organizations worldwide protect people, use assets efficiently and understand their operations for a caring and healing environment. Securitas Healthcare is proud to be part of Securitas, the world's leading intelligent protective services partner. For more information, visit us at [securitashealthcare.com](https://securitashealthcare.com)



# EX5200 Exciter

## Installation & Configuration Guide

0981-237-000 REV J

KB Article: 7814

Published: 2023/06/26

### **We Are Now Securitas Healthcare**

STANLEY Healthcare is now Securitas Healthcare. We are currently rebranding all our products and documentation, but until that process is complete you may still see visual references to STANLEY Healthcare in this document. All descriptions of functionality are accurate to the best of our knowledge.

## **Disclaimer**

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The product has not been evaluated for performance/security features.

The efficacy of the basic security RFID devices was not assessed for performance under this investigation.

## **Trademark Acknowledgements**

AeroScout is a trademark of Securitas Healthcare LLC and/or its affiliates. All other names and marks mentioned are trade names, trademarks, or service marks of their respective owners.

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# Exciter Applications and Industry Examples

The EX5200 Exciter is a component of the Securitas Healthcare suite of enterprise-level visibility solutions based on standard Wi-Fi wireless communications for location-based applications. The EX5200 Exciter extends the suite to provide robust and sophisticated RFID detection capabilities.

The EX5200 Exciter triggers Tags as they pass through a chokepoint or as they approach the Exciter. Tags in turn transmit a message to either the AeroScout Location Receivers or to compatible Access Points within range. The Exciter can activate or deactivate Tags, program them, or even instruct the Tags to operate in a specific way (for example, to blink). This provides instant acknowledgment that a tagged asset has passed through a gate, doorway, or other specifically defined area. The detection capabilities of the EX5200 Exciter combine with the location features of the AeroScout Location Engine, to make the Securitas Healthcare suite the most sophisticated enterprise visibility solution, for various applications.



Figure 1: EX5200 Exciter

# Exciter Applications and Industry Examples

## Theft Prevention

Healthcare organizations or enterprises with expensive and mission-critical equipment can tag valuable assets that are intended to remain within a specified area. The AeroScout System can track the location of such items and trigger an alert when they pass through an exit point or enter a restricted area.

## Process Control

Manufacturing companies can track the location of equipment, carriers, and the work-in-process (WIP) inventory during a production cycle. This provides a real-time view of the production line. The type and quantity of products can be tracked through each step in the process.

## Automatic Inventory Management

Logistics organizations can update inventory records by automatically determining assets within defined areas, ensuring real-time knowledge of inventory levels without manual checks or barcode scanning.

## Real-Time Alerts

Organizations can use AeroScout Exciters to trigger automated events and alerts based on the current location of an asset. For example, in a shipping yard, notifications can be sent when vehicles pass through gates and enter or exit a certain dock or bonded area.

## Security applications

AeroScout Exciters can be installed at the entrances of restricted areas to trigger alerts when unauthorized persons attempt to enter or leave. In hospitals, Exciters can notify staff regarding patient movement, such as a patient leaving the behavioral health department, or an infant being moved out of the NICU.

# Exciter Features

## RFID Detection of Securitas Healthcare Tags

The Exciter triggers Tags to transmit as they pass through a defined area, within a range of up to 6.5 meters (21.3 feet). This is typically enough to cover door or gate areas. The Exciter also supports a chained configuration, thus enabling an increased RFID detection range for larger areas.



**Note**

The Exciter's effective range may be less than the configured range due to specific site or environmental conditions. The effective range must be taken into consideration when planning and designing the deployment.

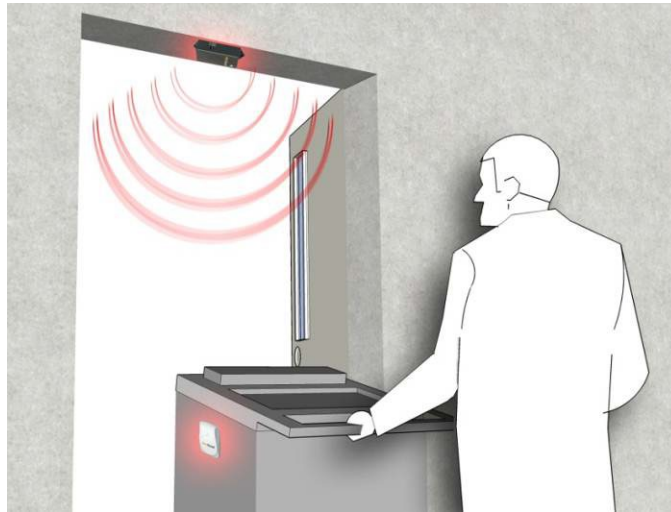


Figure 2: Exciter Positioned at Chokepoint Triggering a Tag

## Tag Behavior Modification

Exciters can be programmed to wirelessly activate and deactivate Tags based on pre-configured conditions. Tag battery life can be extended by switching them off when they leave a defined tracking area through a gate or doorway. The Exciter can also be configured to change the Tag transmission rate temporarily or indefinitely to accommodate different usage patterns in different environments.

## Message Programming Functions

The Exciter can store messages on the Tag for subsequent transmission. The stored messages can subsequently be triggered by other Exciters, enabling sophisticated process control functions.

The Exciter can trigger a Tag to:

- Transmit up to 15 bytes of data sent to it by the Exciter
- Transmit one of 15 pre-stored (customer-created) messages
- Store up to 15 bytes of data sent to it by the Exciter

## Network Connectivity

When connected to the network, the Exciter can be remotely programmed, monitored, and its firmware can be updated via the AeroScout Engine. The Exciter can also work in an offline mode, thus eliminating the need for a physical network connection. In the offline mode, however, remote configuration and monitoring is not available.

## Chaining

In an area where the required low frequency (LF) coverage exceeds the capacity of one Exciter, the Exciter can be chained to another Exciter for complete and precise coverage.

# LED Status Indicators

The EX5200 has a single LED that changes color based on the Exciter's status as follows:

- Green (continuous): The Exciter is transmitting and functioning correctly
- Green (Blinking) During Firmware upgrade the Exciter blinks green until the upgrade is complete
- Red (Blinking) During IP reset the Exciter blinks red
- Red (continuous): Error



Figure 3: Multi-purpose LED

# Exciter Connector Panel

The EX5200 Exciter has four connectors and two switches inside the back panel.



Figure 4: EX5200 Connector Wiring

**(#1) Ethernet LAN Connection:** RJ-45 connector. In a configuration with a physical Ethernet cable connection to the LAN, the network cable is attached here.

Permanent connection to a wired network is not mandatory. However, you must have a wired connection to configure the Exciter. Some monitoring functions are not available if the Exciter is not connected to the network. This connection is also used for Power over Ethernet (PoE, 802.3af).



**Note the Following:**

Starting from Firmware version 314.69 and above, all **LF Exciters** support 100 Mb/Full duplex communication.

Securitas Healthcare recommends that network switches are configured to Auto-negotiation mode. Exciters that follow the 802.3 standards, where the Ethernet device is set to 100Mb/Full duplex, and the network switches are configured for Auto-negotiate, will set the communication to 100Mb/Half duplex. LF Exciters do not require a full duplex connection to work correctly.

**(#2) Power Jack:** Accepts an input voltage of 24-48V DC. This is a standard 5.5 mm jack connector for direct power supply. The power Adaptor is not supplied with the Exciter and can be purchased separately. When PoE is used, this connector becomes redundant.

**(#3) Chain IN:** RJ-45 connector. This connector is used for receiving data from Chained Exciters. The Chain IN port is also used to set the Exciter IP via the Exciter Manager Application using a special 10-pin RJ45 to DB9 serial cable (AeroScout SKU EXM-1000, or part of the Hardware Management kit).

**(#4) Chain OUT and Control Connector:** RJ-45 connector. This connector is used for distributing power and data to Chained Exciters and to connect the External LF Antenna device. The output voltage is 12 V DC (0.5A maximum).

**(#5) Termination Switch:** For defining the termination settings in a Chained Exciters installation. The termination of the first and last Exciter in the Chain must be set to **On (o-o)** and the other Exciters set to **Off: (-o-o-)**.

**(#6) IP Reset:** Restores the Exciter's IP address to the company-set default value. See [Resetting the Exciter IP Address](#) for details.

# LF Coverage

The EX5200 has an adjustable coverage range between 1.5m (4.9 ft.) and 6.5m (21.3 ft.) in intervals of 0.5 m (1.6 ft.). The LF coverage pattern is displayed in Figure 5.

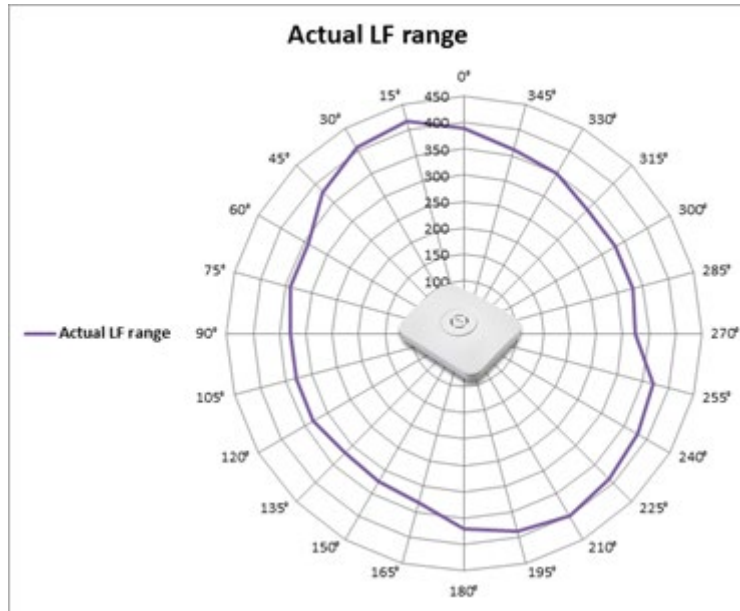


Figure 5: EX5200 LF range and coverage pattern

The EX5200 LF coverage differs from the EX2000B and EX5000. When replacing an EX2000B or EX5000 Exciter with an EX5200 the EX5200 range should be tuned and tested.

# Network and Power Connections

The following is a brief summary of available powering and networking options:

Usage Option	Description
Single EX5200– not connected to a network	EX5200 can be used as standalone devices that function independently without any network connection. In this case, you only need to connect the Exciter to the power supply. Using the AeroScout Engine Manager (AEM), set the device as “not connected to the network.”
Single EX5200– connected to a network	EX5200 can be remotely controlled (for configuration and monitoring purposes) via the local area network. In this case, you need to connect it to both a power source and the network. The power can be provided either via the LAN/ PoE connector, or via the dedicated power supply connection, using 24-48VDC.
Chained Exciter	In case of a chained exciter, the Primary Exciter controls the Chained Exciter over RS485 communication. An external power supply can be used to power up to two Exciters. In case external power is used, every second exciter needs to be powered (#1 in the chain, #3, #5, #7). In case PoE is used (either via a PoE switch or PoE injector), two EX-5200 can be powered from one PoE port.

## Direct Power Supply

To connect to the power supply, connect a 110/220 VAC to 48 VDC power Adaptor to the Exciter’s power jack.



Figure 6: 110/220 VAC to 48 VDC Adaptor



Note

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The EX5200 requires approximately 6W of power. When connecting an Exciter to a direct power source, verify that the power level is sufficient.

When using a direct power source for chaining, you can only power up to two Exciters sequentially, even if the power source is sufficient for more.

Exciters must only be powered by a limited (marked LPS or NEC class 2) power supply.

---

## PoE Switch

If your network has a Power-over-Ethernet infrastructure, you can connect a CAT-5/6 Ethernet cable from the PoE switch to the Exciter's LAN connector. This supplies both the power and the network connection.



Note

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PoE standard 802.3af class 0 allows power for a single EX5200 Exciter.

When using PoE with the other Chained Exciters, a PoE connection must be made to every second Exciter in the Chain. In addition, the LAN connectivity that the PoE supplies is not used for Chained Exciters in a Chain. Chained Exciters receive data from the Primary Exciter via the Chain IN connection.

---

## 110/220 VAC to 48 VDC PoE Single-Port Injector

The PoE Single Port Injector converts 110/220 VAC to 48 VDC. In addition, it can receive a network connection and you can run a single cable to the Exciter's LAN connector, thus supplying both power and network connectivity.

When using this injector, the Exciter power jack is not used.



Figure 7: 110/220 VAC to 48VDC PoE Single-Port Injector

The injector’s IN connector is connected to the network. The injector’s OUT connector is connected to the Exciter’s LAN connector.

The injector can be used for both networked and non-networked Exciters. In the case of a non-networked Exciters, the IN connector on the injector is not used.

## Power Connection Summary

The following table summarizes the power connection options:

Power Supply	Input	Output	Maximum Current	Available Power	Maximum # of Exciters with One Source
PoE single port injector	100-240 VAC, 50-60 Hz	48 VDC	0.32 A(1)	15.4 W	Two
Standard PoE 802.3af switch port(2)	–	48 VDC	0.32 A(1)	15.4 W	Two
External power Adaptor	–	48 VDC	> 0.4 A	> 20 W	Two



**Note**

To prevent power loss, PoE cables must not exceed 100m (330’) in length.

# Chaining EX5200 Exciters

In an area where the required LF coverage exceeds the capacity of one Exciter, you can extend the coverage by chaining several Exciters. For example, a large entrance with two sets of double doors too wide for a single Exciter might require two Exciters chained together.

The system treats Chained Exciters as a single device with a single ID. Transmissions do not interfere with one another.

Each Exciter must be positioned to allow transmission range overlap between neighboring Exciters. This ensures full coverage of the area.

Figure 8 shows 5 Chained Exciters, their connections and the state of each Exciter termination switch.

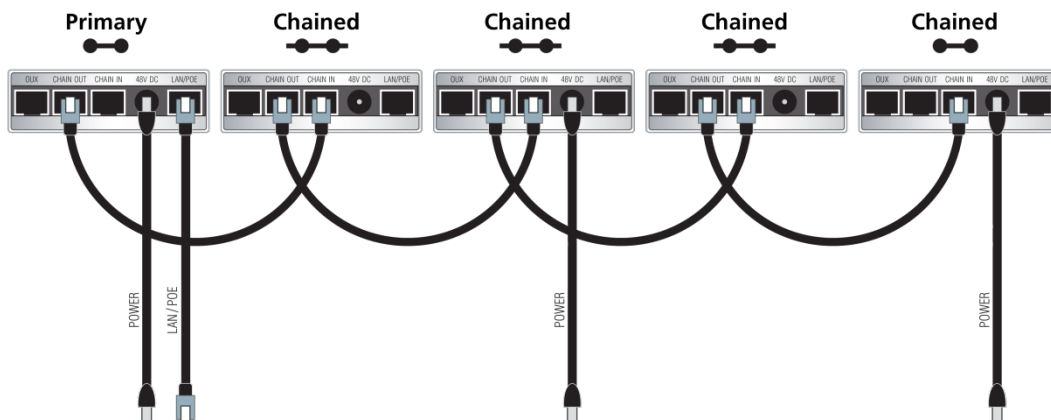


Figure 8: EX5200 Chaining Using a Power Adaptor

## EX5200 Chain Connection

Up to 8 Exciters can be connected in a chain, as follows:

1. The first Exciter in the chain, directly connected to the LAN, is designated the “Primary”. Other Exciters are designated “Chained”.

EX5200R Exciters can act as either Primary or Chained Exciters.

2. The Primary Exciter is connected to the first Chained Exciter as follows: Primary Chaining OUT to Chained Chaining IN.
3. Chained Exciters are then connected as follows: Chaining OUT to Chaining IN.

- The Termination Switch of the Primary Exciter and the last Chained Exciter in the chain must be set to On (o-o).

On the other Chained Exciters, it must be set to Off (-o o-).

- The Primary/Chaining configuration is set via AeroScout Engine Manager.

**Chained Exciters inherit the Primary Exciter ID and LF configuration. Transmission range is configurable.** See Configuring Chained Exciters.



Note

The EX5200 LF coverage differs from the EX2000B and EX5000. When replacing an EX2000B or EX5000 Exciter with an EX5200 the EX5200 range should be tuned and tested.

## Configuring Chained Exciters

Each Chained Exciter must be set as 'Slave Exciter' and the transmission range configured, in the AeroScout Engine Manager, before being connected to the Primary.

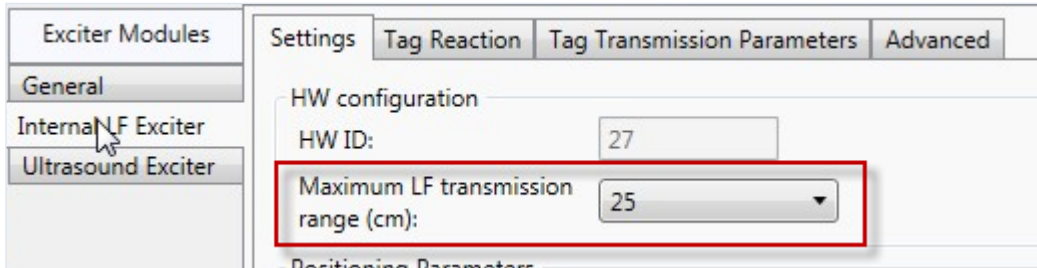
### Configurations for Engine 5.2 and below

- Connect the Chained Exciter directly to the network via the LAN port.
- Under **IP Configuration**, check **Connected to network**.

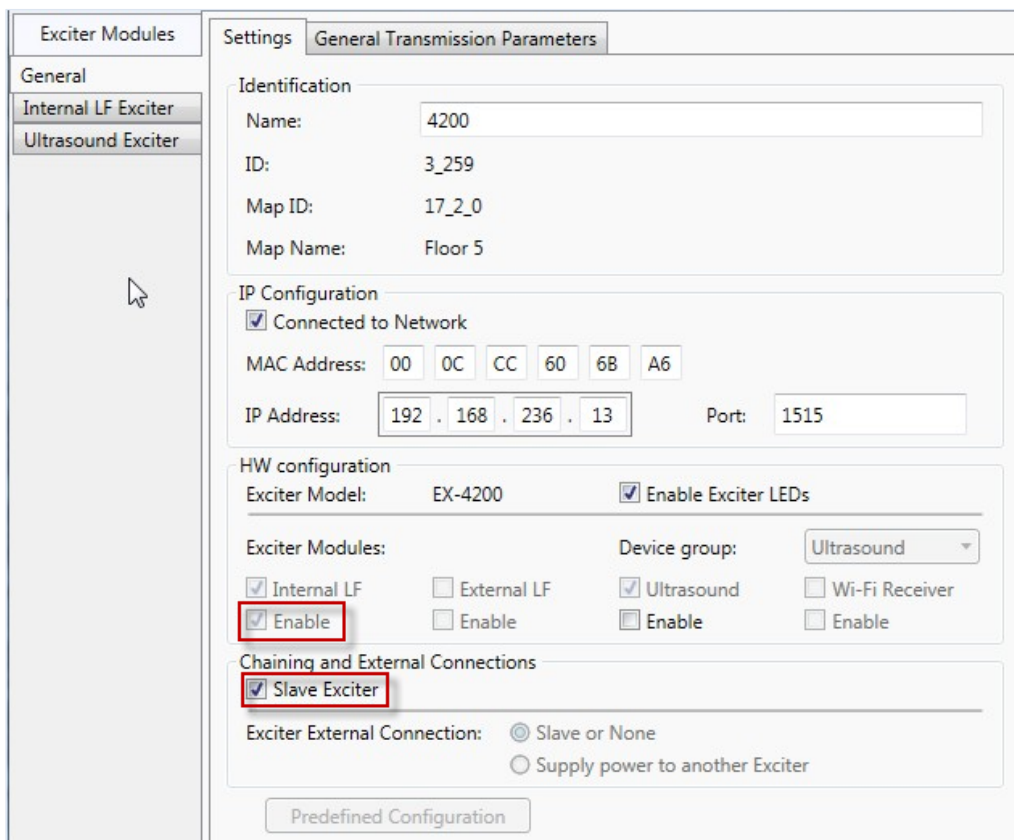
The screenshot shows the 'Settings' tab for an 'Internal LF Exciter'. The 'General Transmission Parameters' section is active. Under 'IP Configuration', the 'Connected to Network' checkbox is checked and highlighted with a red box. Other visible fields include: Name: 4200, ID: 3\_259, Map ID: 17\_2\_0, Map Name: Floor 5, MAC Address: 00 0C CC 60 6B A6, IP Address: 192 . 168 . 236 . 13, and Port: 1515.

- Configure the following parameters:

- Transmission Range** (Internal LF Exciter > Settings tab): Select the desired **transmission range** of the Chained Exciter so that the LF coverage is sufficient and some overlap exists between the chained Exciters.



- Under Exciter Modules (General > Settings tab), make sure **Enable** is checked.
- Under Chaining and External Connections (General > Settings tab), check **Slave Exciter**.



4. Under IP Configuration, uncheck **Connected to Network**.



Exciter Modules

Settings **General Transmission Parameters**

General

Internal LF Exciter

Ultrasound Exciter

Identification

Name: 4200

ID: 3\_259

Map ID: 17\_2\_0

Map Name: Floor 5

IP Configuration

Connected to Network

MAC Address: 00 0C CC 60 68 A6

IP Address: 192 . 168 . 236 . 13 Port: 1515

HW configuration

Exciter Model: EX-4200  Enable Exciter LEDs

5. Click **OK**.
6. Connect the Chained Exciter to the Primary Exciter.

### Configurations for Engine 5.3

1. Connect the Chained Exciter directly to the network via the LAN port.
2. In the **General Settings** tab, under **Network Configuration**, make sure **Connected to Network** is checked.

General Settings **LF General** Internal LF

Identification

Name: Exciter

Map: TP room [17\_1\_0]

Template Name: No Template

Positioning Parameters

Coordinates (meters): X 23.81 Y -1.66

Network Configuration

MAC Address: 00 0C CC 60 60 60

IP Address: . . . . Port: 1511

Connected to Network

3. Select the **LF General** tab and configure the following parameters:
  - Under **General LF Parameters** select **LF Chaining** as **Chained**.

General Settings | LF General | Internal LF

General LF Parameters

LF Functionality: Normal

LF Chaining: Chained

4. Select the **Internal LF** tab and configure the following:

- Select the desired **Transmission Range** of the Chained Exciter so that the LF coverage is sufficient and some overlap exists between the chained Exciters.

General Settings | LF General | Internal LF

General

Maximum LF Transmission Range (cm): 25

5. Select the **General Settings** tab again and perform the following:

- Under **Functional Modules** make sure that **Enable Internal LF** is checked.
- Under **Network Configuration** uncheck **Connected to Network**.

General Settings | LF General | Internal LF

Identification

Name: Exciter

Map: TP room [17\_1\_0]

Template Name: No Template

Positioning Parameters

Coordinates (meters): X 23.81 Y -1.66

Network Configuration

MAC Address: 00 0C CC 60 60 60

IP Address: . . . Port: 1511

Connected to Network

Exciter Parameters

Exciter Model: Unknown Device Group: LF

Enable Exciter LEDs

Functional Modules

Enable Internal LF

6. Click **OK**.

7. Connect the Chained Exciter to the Primary Exciter.

## Configurations for Engine 5.4 and above

1. Connect the Chained Exciter directly to the network via the LAN port.
2. From the AEM, right click the location of the Exciter on the map.
3. Select **Add > Add Device**.
4. Select the **Device Type** as 'EX5200/EX5210R/EX5000/EX2000B'.

5. Enter in a **Device Name** for the Exciter.
6. Enter in the Exciter's **MAC Address**
7. In the **General Settings** tab, under **Network Configuration**, make sure **Connected to Network** is checked.

8. Select the **LF General** tab and configure the following parameters:
  - Under **General LF Parameters** select **LF Chaining** as **Chained**.

The screenshot shows the 'Internal LF' configuration tab. Under 'General LF Parameters', the 'LF Chaining' dropdown menu is set to 'Chained'. A red box highlights this dropdown menu.

9. Select the **Internal LF** tab and configure the following:

- Select the desired **Transmission Range** of the Chained Exciter so that the LF coverage is sufficient and some overlap exists between the chained Exciters.

The screenshot shows the 'Internal LF' configuration tab. Under the 'General' section, the 'Maximum LF Transmission Range (cm)' dropdown menu is set to '25'. A red box highlights this dropdown menu.

10. Select the **General Settings** tab again and perform the following:

- Under **Functional Modules** make sure that **Enable Internal LF** is checked.
- Under **Network Configuration** uncheck **Connected to Network**.

The screenshot shows the 'General Settings' configuration tab. The 'Network Configuration' section has the 'Connected to Network' checkbox unchecked. The 'Functional Modules' section has the 'Enable Internal LF' checkbox checked. Red boxes highlight both the 'Connected to Network' checkbox and the 'Enable Internal LF' checkbox.

11. Click **OK**.

12. Connect the Chained Exciter to the Primary Exciter.

# DHCP

Exciters with firmware version 314.54 and above support Dynamic IP (DHCP) and Static IP configurations.

**Static:** The IP address and connection settings are specified manually.

**Dynamic (DHCP):** The DHCP server automatically assigns an available IP every time the device connects to the network.

Exciters with firmware version 314.54 and above will be set to DHCP by default. The Exciter's IP can be changed via the Location Engine; (Select **Configuration, Exciters, IP Settings** or right-click an Exciter and select **IP Settings**. This command allows you to change the network addressing details of the exciter).

For more information, see the [DHCP](#) section in the any [Location Engine Deployment Guide from version 5.1 and above](#).

**TCP/IP Settings** [X]

Device: 182 gen1 [ID: 3\_621]  
MAC Address: 000CCC63C99D

Obtain an IP address automatically (DHCP)  
 Use the following IP address

IP Address: [ ] . [ ] . [ ] . [ ]  
Subnet: [ ] . [ ] . [ ] . [ ]  
Gateway: [ ] . [ ] . [ ] . [ ]

Listening Port: 1511  
Destination Port: 12091

OK Cancel

# Resetting the Exciter IP Address

You can reset the Exciter's IP address to the factory default value. The default IP address is 192.168.1.178.

To do so, press the **IP Reset button** with a ballpoint pen for 5 seconds.

After a successful IP reset, a flashing red LED indication appears for three seconds.

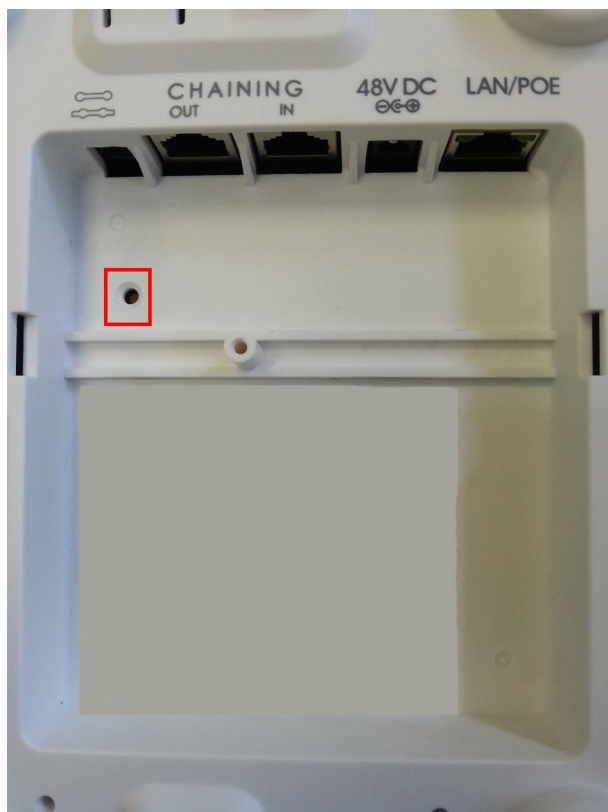


Figure 9: IP Reset Button

# Connecting an External LF Antenna

The External LF Antenna device is designed to extend the Exciter's LF coverage. The two devices communicate via a standard CAT5 cable connection.

Connect the Exciter's Chaining OUT connector to the external LF device's IN connector. **For configuration instructions, refer to the AeroScout Engine Manager.**

The External LF Antenna's LED blinks while the Exciter transmits.



Figure 10: External LF Device

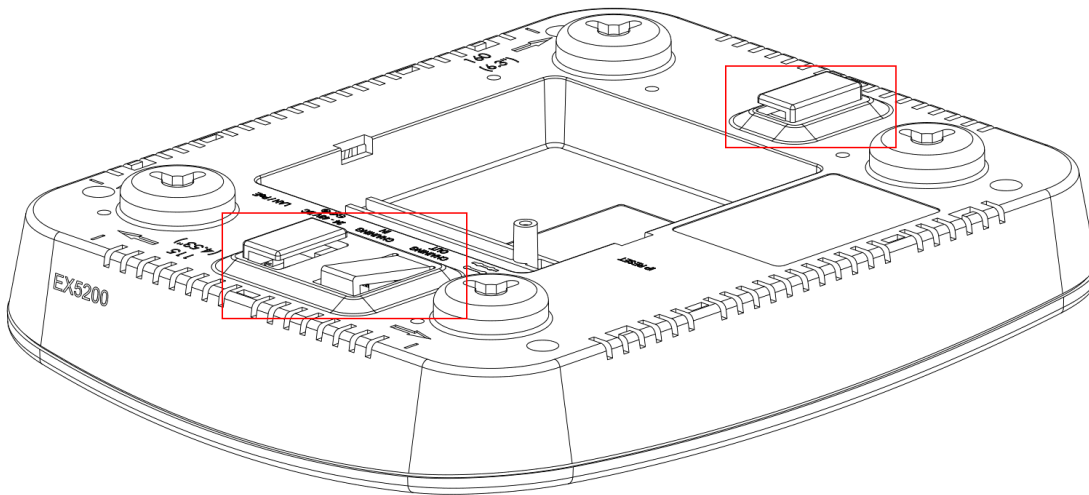
# Mounting the Exciter

Position and mount each EX5200 Exciter in the site according to the site survey recommendations.

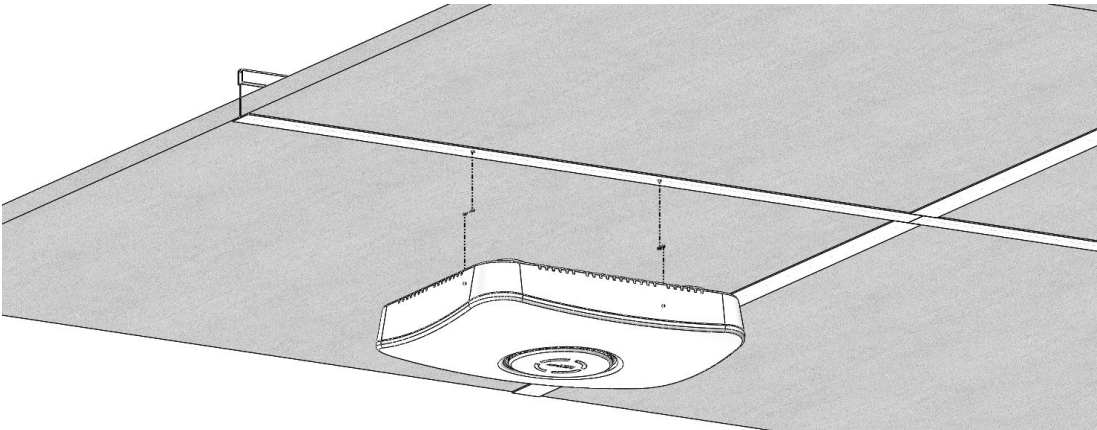
## Fixing the Exciter to a Floating Ceiling:

### Mounting on a Wide grid with Flush Tiles

For this mounting option no mounting kit is required. Attach the device to the false ceiling using the ceiling mounts located on the bottom casing of the device



1. Align the Mounting clips with the wide grid.



2. Twist and click the Exciter into place.



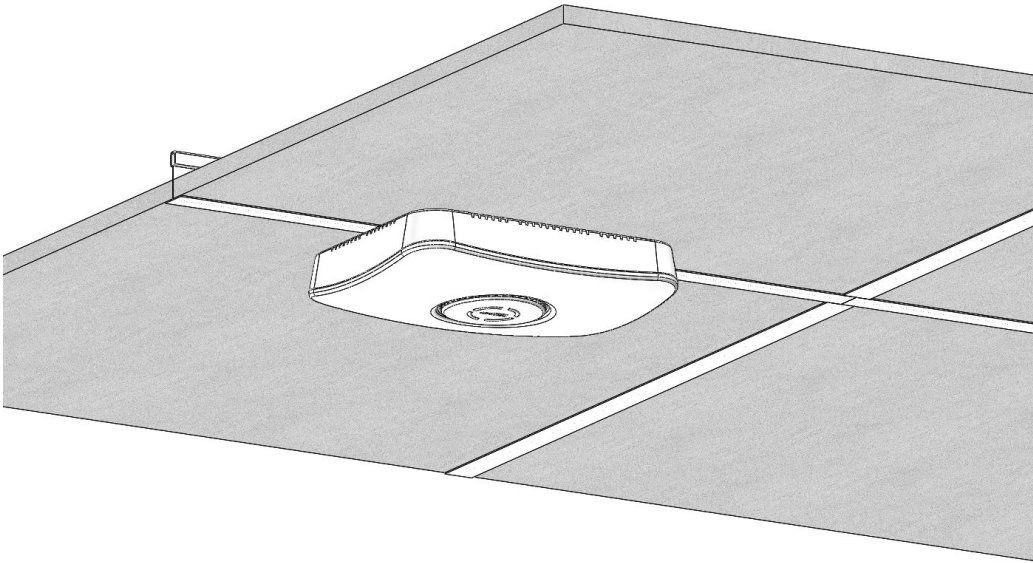
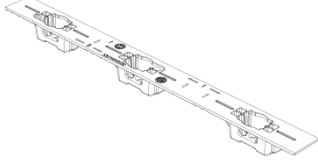




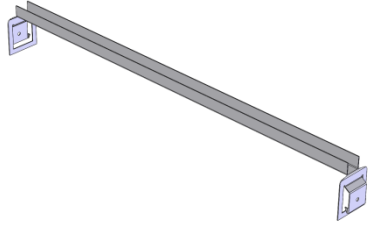


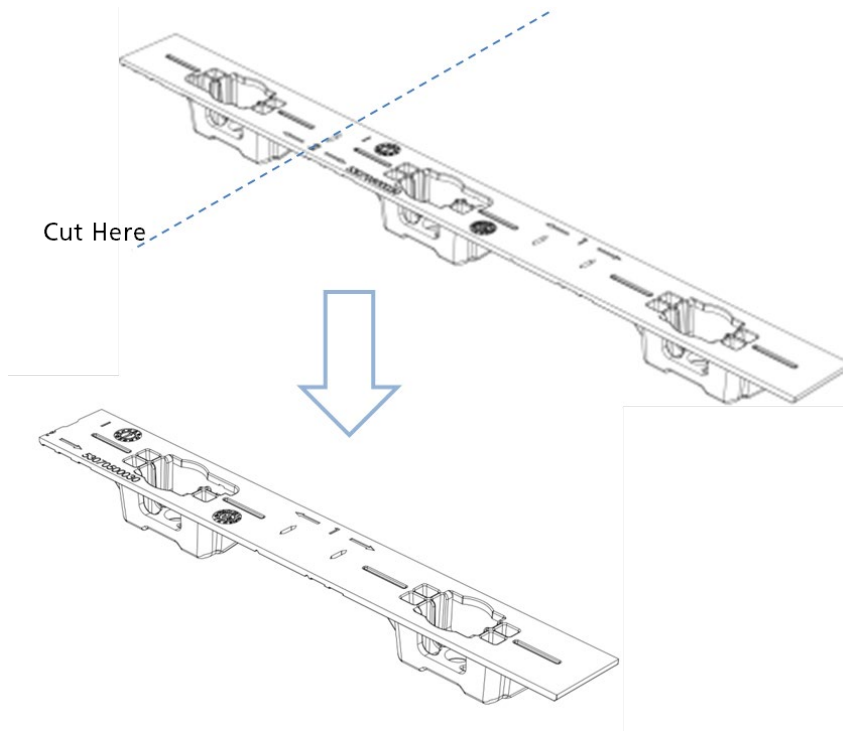
Figure 11: Correct Complete Mounting Position

## Mounting Off-Grid

For this mounting option the following parts from the Type B kit are required:

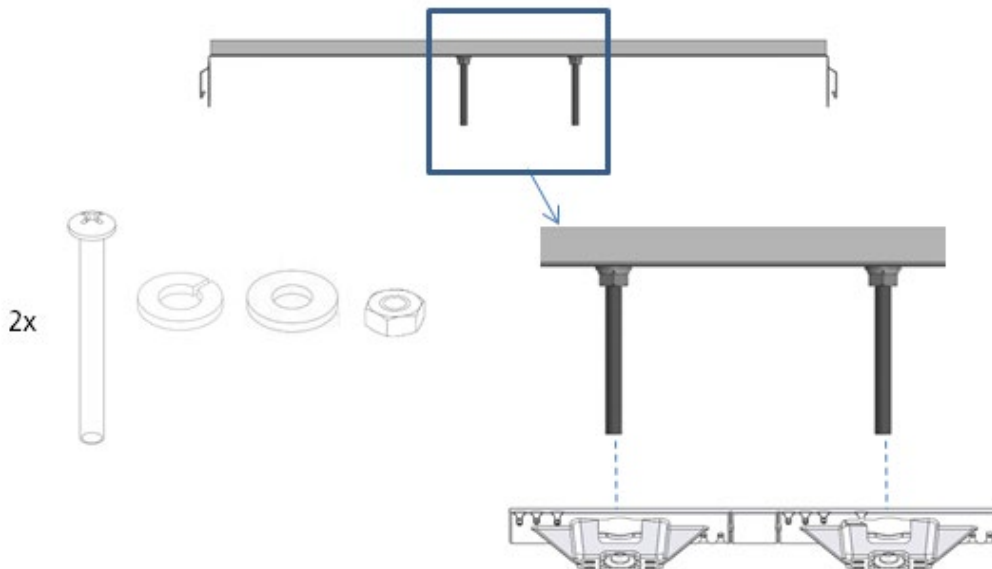
Part Letter	Part Name	Quantity	Image
A	Mounting Adaptor	1	
E	1/4" x 3" Phillips Screw	2	
G	1/4" Hex Nut	6	
I	1/4" Spring washer	2	
H	1/4" Flat washer	2	
D	Bracket 512HD	1	

3. Cut the Mounting Adaptor (A) so that only Section # 1 remains.



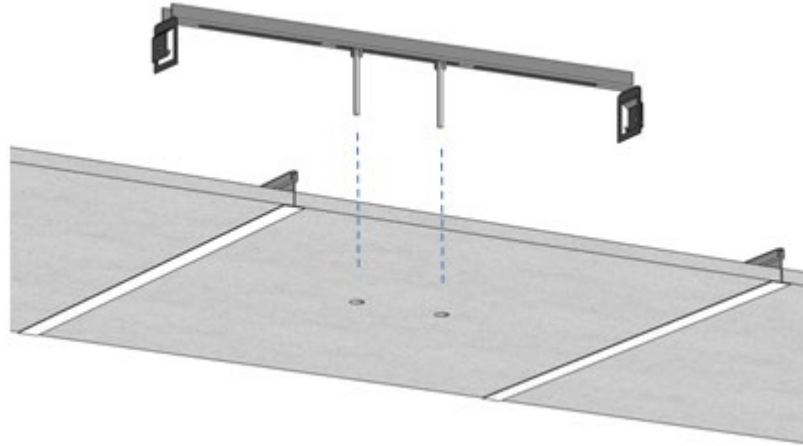
Use Mount Adaptor part marked with “<= 1 =>”

4. Step 2 – Fasten 2 Screws (E) on the 512HD Bracket (D) with 1 Flat Washer (H) and 1 Spring Washer (I). Set the distance between the Screws using the Adaptor (A).

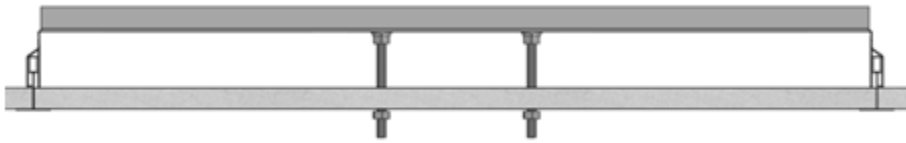


5. Drill 2 holes\* in the designated for installation ceiling tile for the Screws (E). Use the assembled 512HD Bracket (D) to mark the location of the holes.

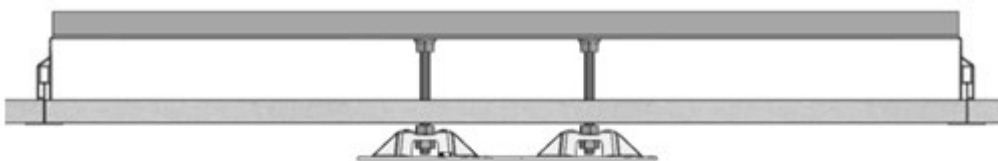
\* Holes should be 5/16" or 8mm in diameter



6. Mount the Assembled 512HD Bracket (D) on the tile. Fix in place 2 Nuts (G) on each of the Screws (E) leaving enough screw length (2/5" or 10mm) to mount the Adaptor.



7. Mount the Adaptor using 2 Nuts (G) using a 7/16" nut driver.



8. Mount the Exciter onto the Adaptor (A) on the ceiling tile.

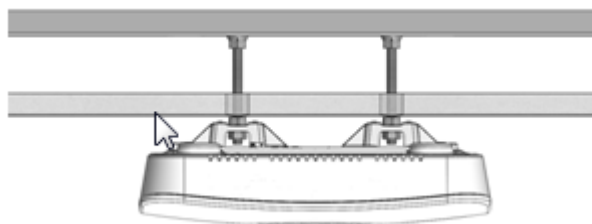
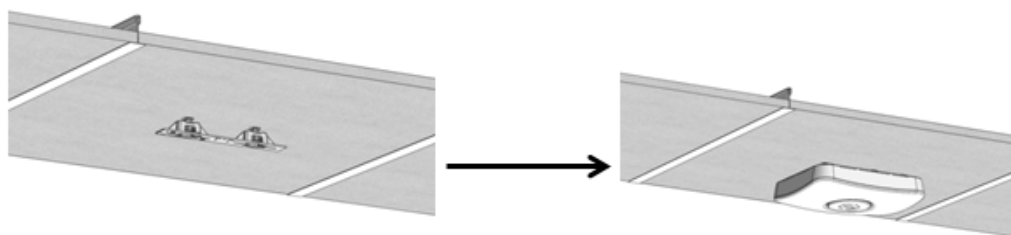


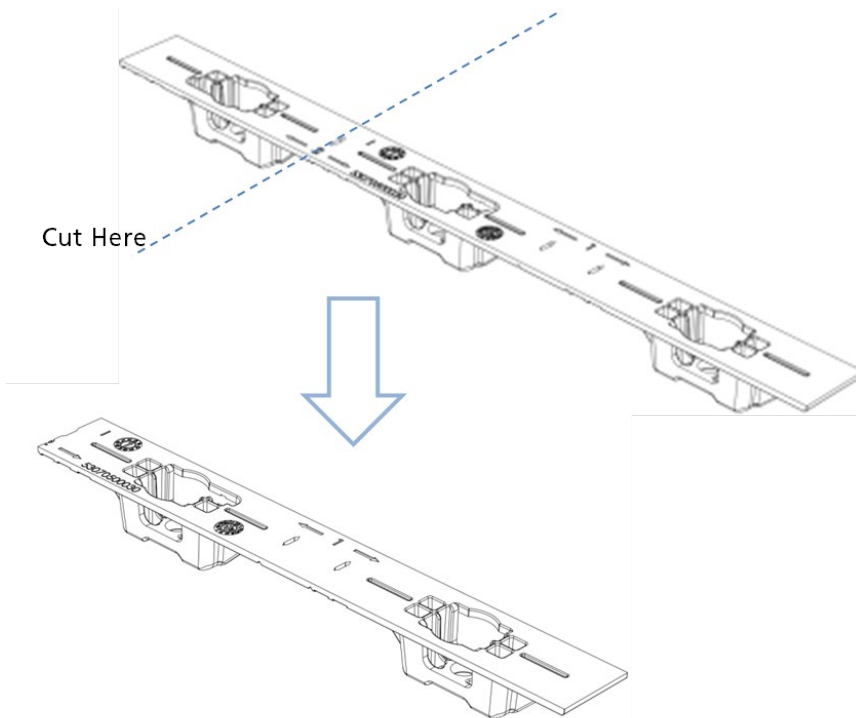
Figure 12: Correct Complete Mounting Position

## Mounting on a Narrow-Grid T-Bar

For this mounting option the following parts from the Type A kit are required:

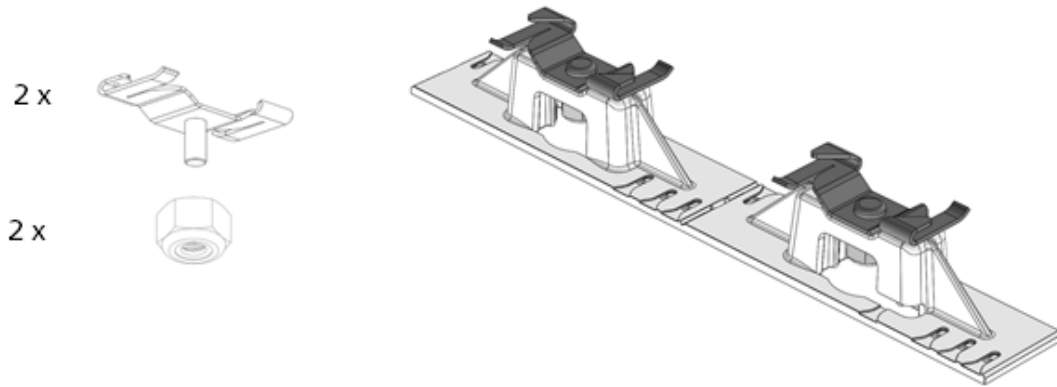
Part Letter	Part Name	Quantity	Image
A	Mounting Adaptor	1	
C	Narrow Grid Clip- 9/16" Clip with #8 Stud	2	
J	#8-32 Hex Nyloc Nut	2	

9. Cut the Mounting Adaptor (A) so that only Section # 1 remains.

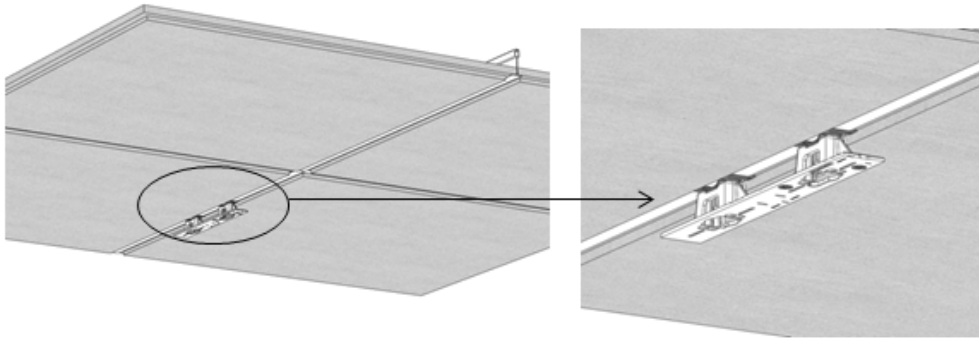


Use Mount Adaptor part marked with “<= 1 =>”

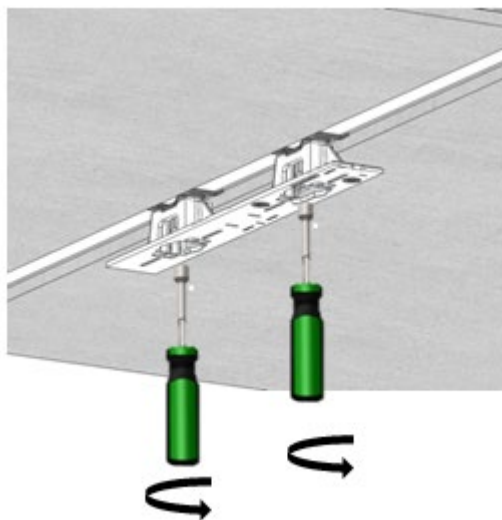
10. Assemble the Grid Clips (C) on the Adaptor (A). Lock each Clip (C) with Hex Nut (J). The Nuts should be loose at this stage to allow easy insertion onto the grid.



11. Attach the Grid Clips (C) with Mount Adaptor (A) onto the ceiling grid. (Push the clips against the grid and twist them until they lock) (turn clockwise).



12. Fasten the Adaptor (A) to the Clips (C) by tightening Nuts (J) into their final position using a 11/32" Nut Driver.



13. Mount the Exciter onto the Mounting Adaptor (A).

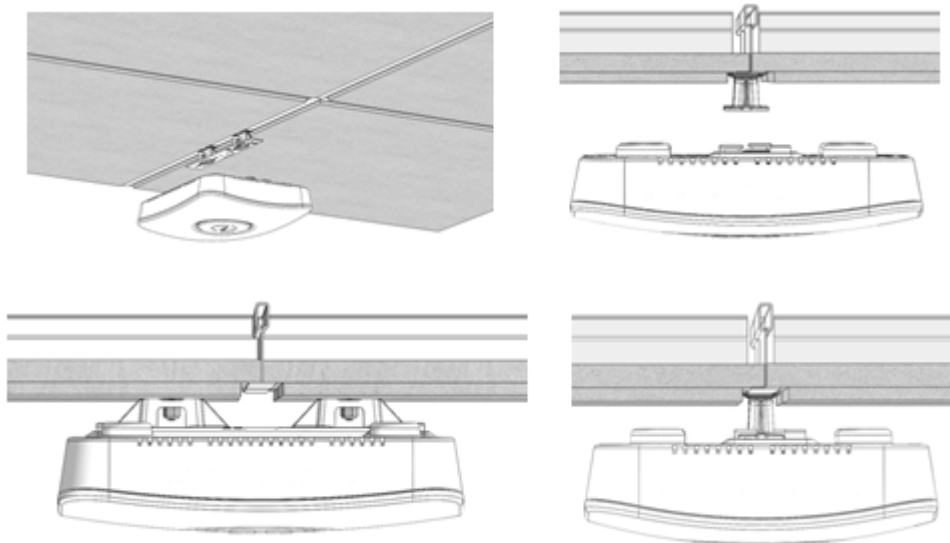
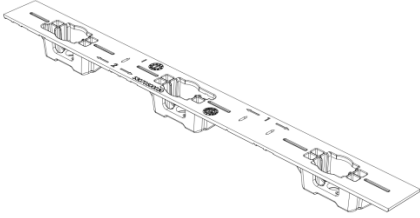




Figure 13: Correct Complete Mounting Position

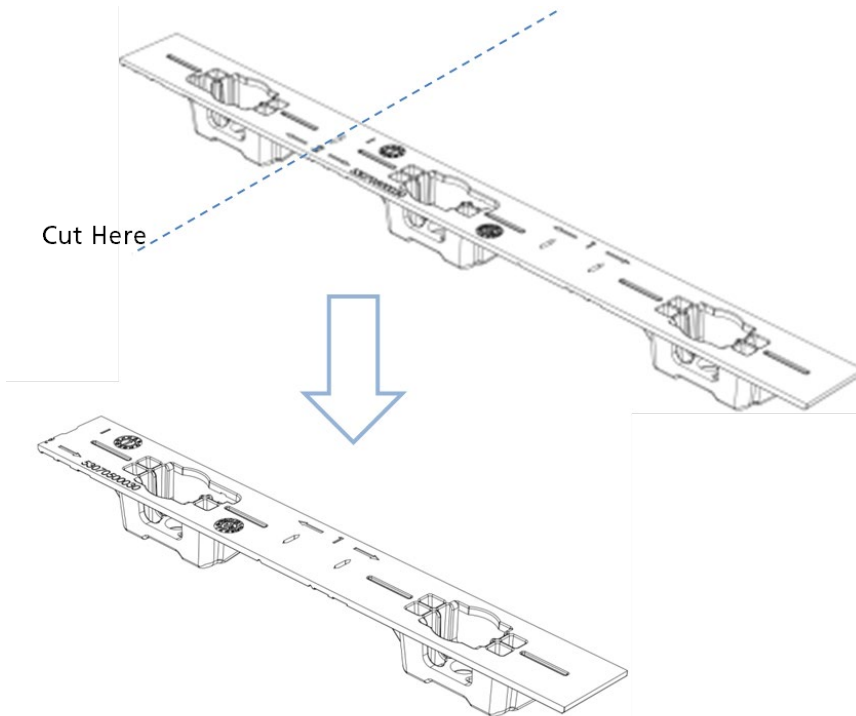


## Mounting on a Wide Grid with Recessed Tiles

For this mounting option the following parts from the Type A kit are required:

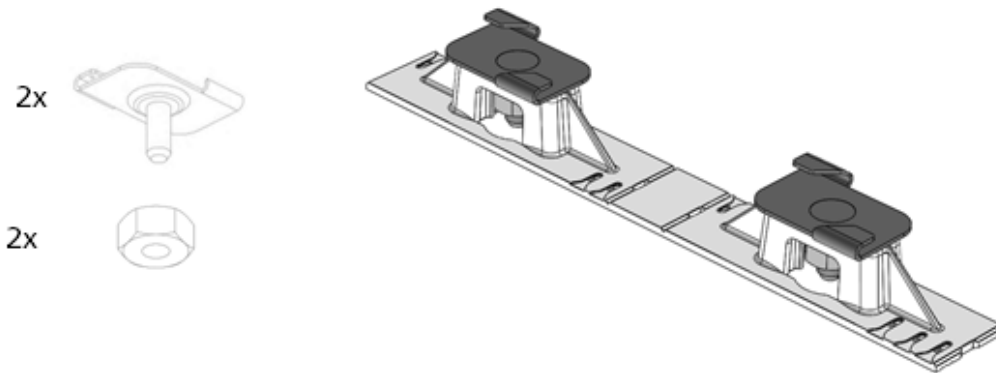
Part Letter	Part Name	Quantity	Image
A	Mounting Adaptor	1	
B	Wide Grid Clip-15/16" Clip with 1/4" Stud	2	
G	1/4" Hex Nut	2	

1. Cut the Mounting Adaptor (A) so that only Section # 1 remains.

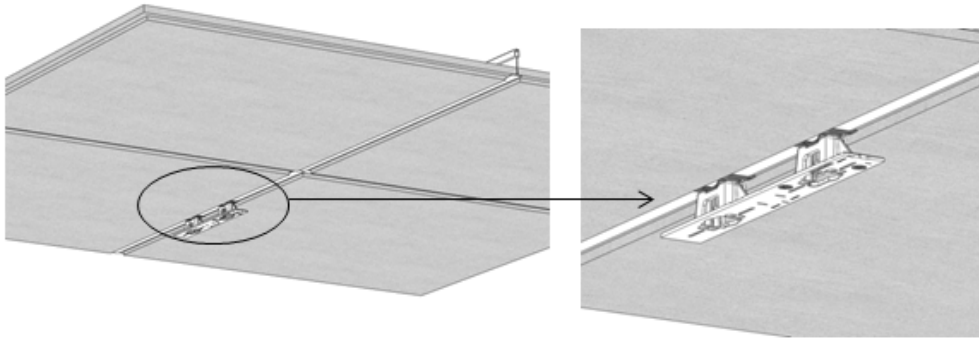


Use Mount Adaptor part marked with “<= 1 =>”

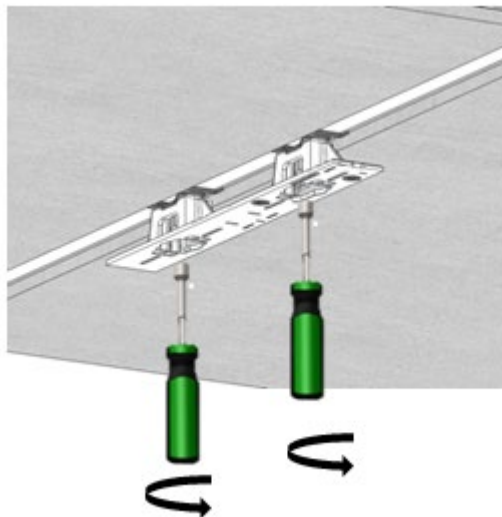
2. Assemble the Grid Clips (B) on the Adaptor (A). Lock each clip (B) with Hex Nut (G). Nuts should be loose at this step to allow easy insertion onto the grid.



3. Attach the Grid Clips (C) with Mount Adaptor (A) onto the ceiling grid. (Push the clips against the grid and twist them until they lock). Fasten the Clip's stud (B) against the grid using a flat screwdriver (turn clockwise).



4. Tighten Nuts (G) to final position using a 7/16" Nut Driver.



5. Mount the Exciter onto the Mounting Adaptor (A).

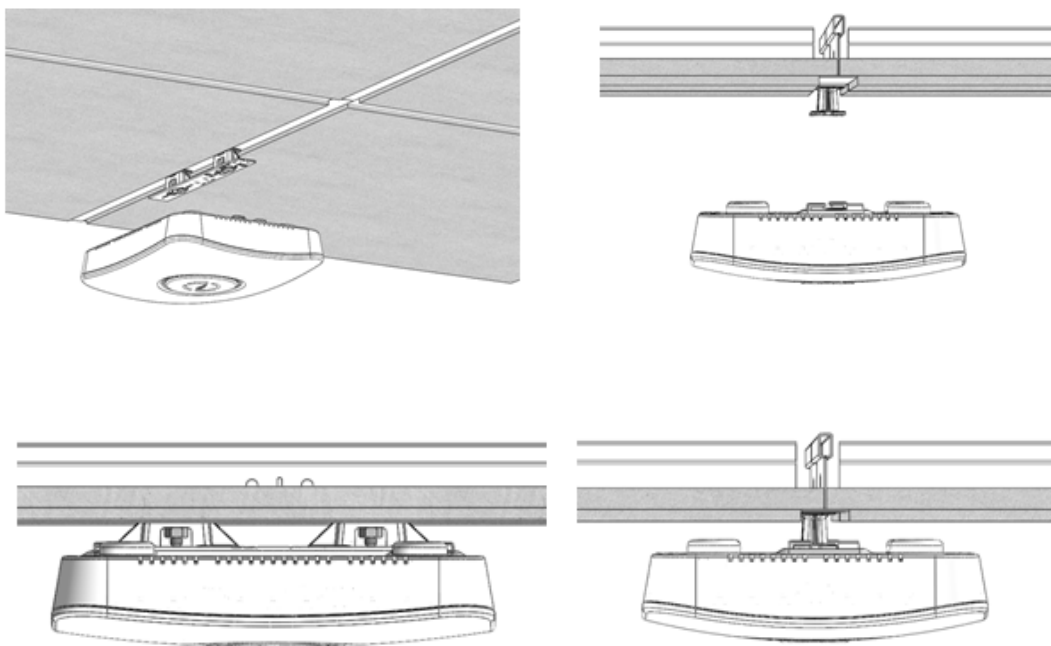
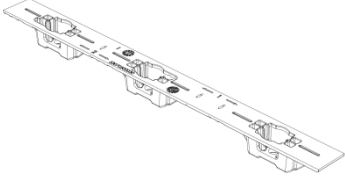




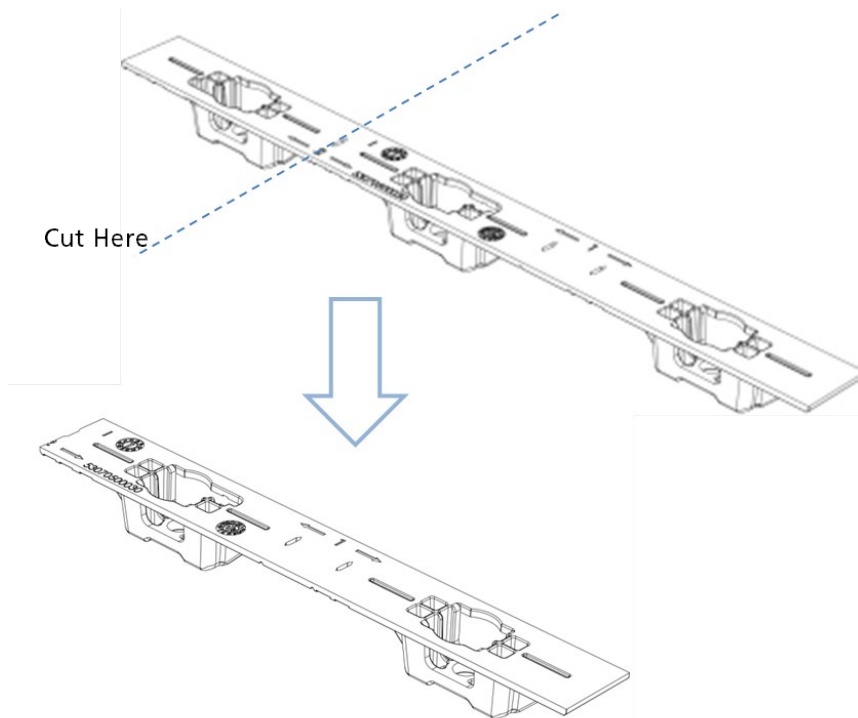
Figure 14: Correct Complete Mounting Position

## Mounting on a Slotted Grid

For this mounting option the following parts from the Type A kit are required:

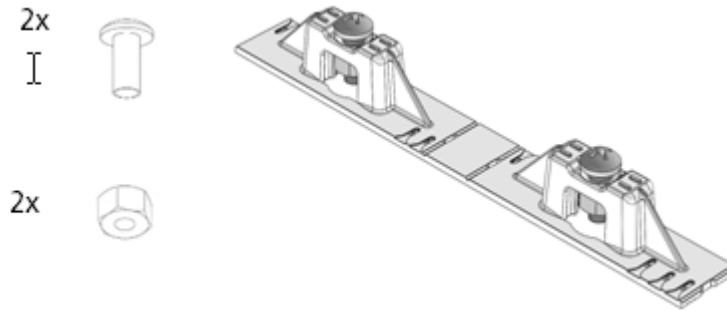
Part Letter	Part Name	Quantity	Image
A	Mounting Adaptor	1	
F	For Slotted Grid-1/4"x0.625" Phillips screw	2	
G	1/4" Hex Nut	2	

1. Cut the Mounting Adaptor (A) so that only Section # 1 remains.

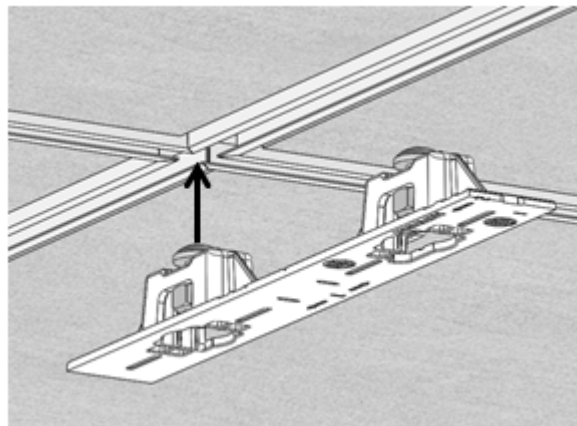


Use Mount Adaptor part marked with "<= 1 =>"

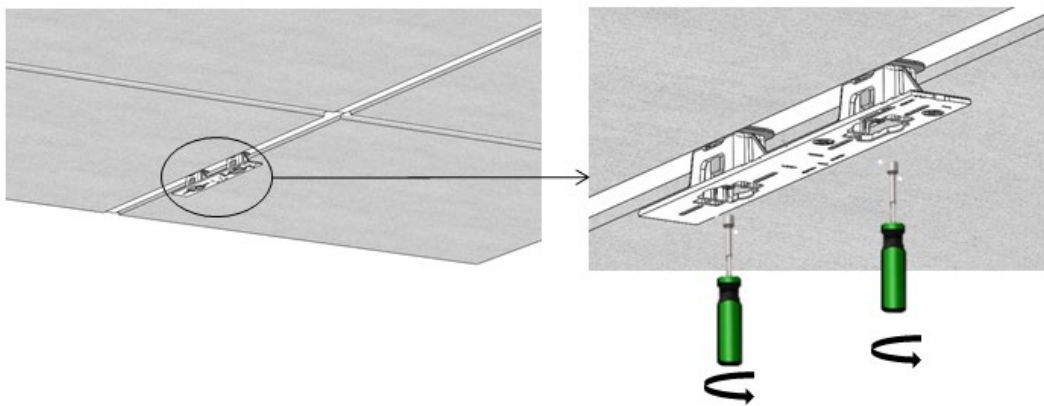
2. Assemble the Screws (F) on the Adaptor. Lock each Screw (F) with Hex Nut (G) \*Nuts should be loose at this step to allow easy insertion into the slotted grid.



3. Mount the Adaptor (A) onto the Slotted-Grid by sliding the screw heads, Screw (F), through the slots.



4. Fasten the Adaptor to the Screws (F) by tightening Nuts (G) to their final position using a 7/16" Nut Driver.



5. Mount the Exciter onto the Mounting Adaptor (A).

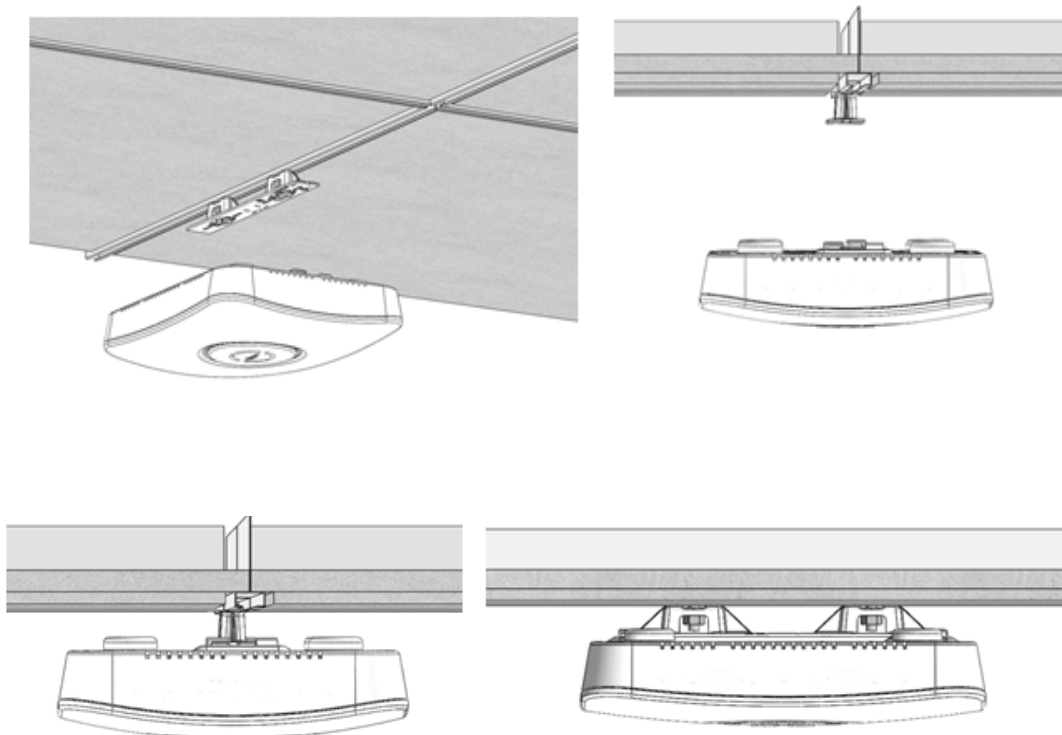


Figure 15: Correct Complete Mounting Position

## Mounting the Exciter on a Wall

The EX5200 Exciter is shipped with a mounting template which can be used to measure the holes for mounting the Exciter on a wall. See Figure 16. The mounting plate supplied with the Exciter is not required for this type of mounting.

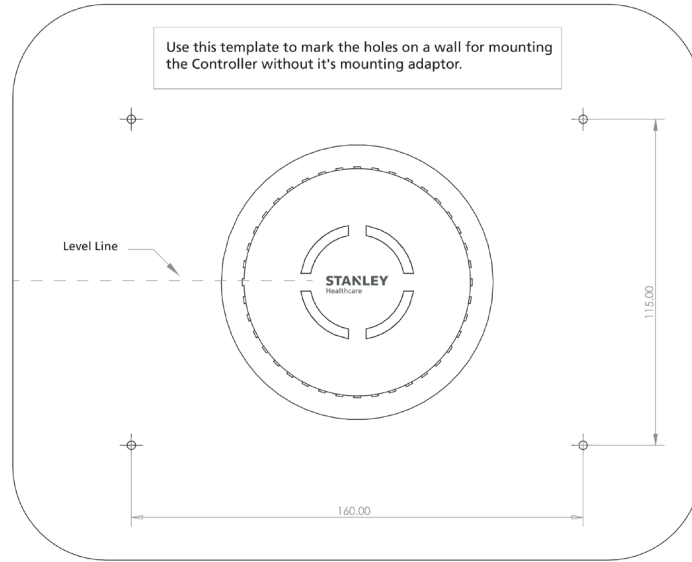


Figure 16: EX5200 mounting template

1. Hold the template on the wall in the location you wish to mount the Exciter. Make sure the template is level.
2. Mark the four holes for the screws through the template.
3. Remove the template.
4. Drill the holes for the screws.
5. Anchor the screws into the wall, leaving 10mm of each of the screws exposed. Use appropriate screws and or anchoring plugs.
6. Mount the Exciter with the Securitas Healthcare logo facing up, onto the 4 screws. The Exciter's back panel has 4 mounting brackets for this purpose.

## Mounting Using the Wall-mount Bracket

This section contains the mounting instructions for the EX5200 Exciter wall-mount bracket.

EX5200 Exciter Wall Mount Bracket (SKU EXAC-143) is used as the mounting device when the EX5200 Exciter is installed on a brick wall or dry wall. Wall mounting is the recommended solution when ceiling mounting is not appropriate.



**Note**

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Wall mounting is recommended when the ceiling is too high. High-ceiling mounting requires that the device emit increased LF power to cover the required area. Strong LF power is not desirable because of possible LF interference or leakage to other areas.

---



This guide contains the following sections:

Installation Components – items necessary to perform wall mounting

Installation Instructions – instructions for performing wall mounting

### Installation Components

Before beginning, verify that you have all the items in the following table.









**Note**

---

These instructions assume that you have a standard toolkit readily available.

---

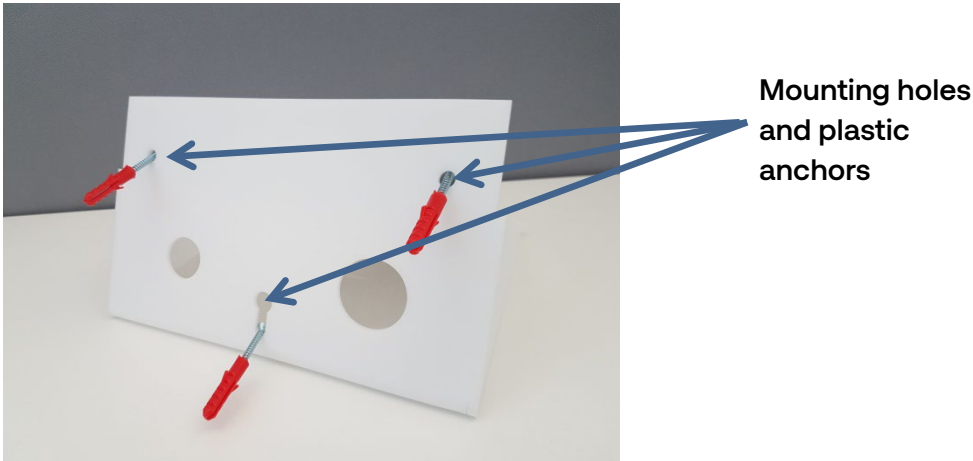


Part Name	Quantity	Image
Wall-mount Bracket	1	
EX5200 Exciter	1	
Plastic Adapter Plate (Note on-plate mounting instructions)	1	
PT Screw	4	
Flat Head Screw	3	
Plastic Anchor	3	

## Installation Instructions

To perform wall mounting, do the following:

1. Mark the wall, and drill holes for the plastic anchors.
2. Insert three plastic anchors into their respective holes in the wall.



3. Attach the Plastic Adapter Plate into the Wall-mount Bracket.  
To do this, align the Plastic Adapter Plate's four holes with the four respective holes in the bracket, and assemble with the four PT screws. If using an electric drill, use caution in order not to crack the Perspex.  
When assembling, take care that the Plastic Adapter Plate's orientation is in the upright position (see picture below).



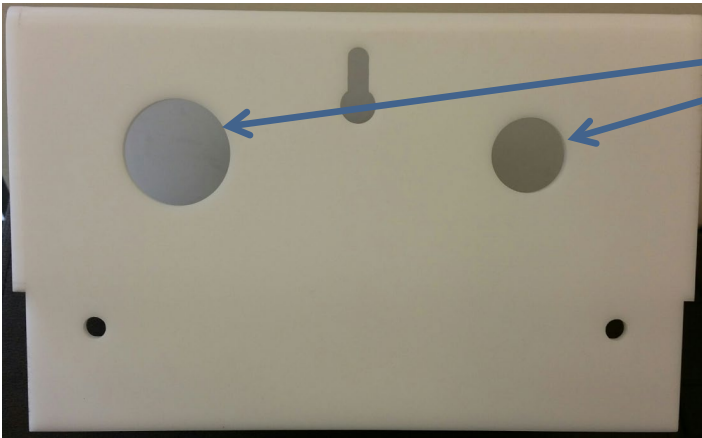
### Note

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There is an exciter attachment diagram on the Plastic Adapter Plate. This diagram is referred to in step 7, when you attach the exciter to the Plastic Adapter Plate.

---

4. Draw the cables through the Wall-mount Bracket cable holes.



Cable holes



Note

It is recommended to run the cables through the wall. If the cable outlet, however, is not situated near the Bracket mounting point or it is not possible to run the cables through the wall, you can optionally affix the cables to the wall externally and then draw them into the Wall-mount Bracket.



External  
cables  
affixed to  
wall

5. To attach the Wall-mount Bracket on the wall (with the cables drawn through it), assemble the 3 flat-head screws through the Wall-mount Bracket onto the 3 plastic anchors. Tighten the flat-head screws with a screw driver to affix the Wall-mount Bracket to the wall.
6. Connect the cables to the Exciter.
7. Attach the Exciter to the Plastic Adapter Plate.



**Note**

---

The Plastic Adapter Plate has an attachment diagram printed on it (see step 3).

---



## Mounting the External LF Antenna

Please refer to the External LF Antenna Installation Guide, KB Article: 8380.

## Appendix B: Exciter and Accessories

Product	SKU	Description
EX5200 Exciter	EX-5200	EX5200 Exciter includes 48 VDC input, Ethernet and PoE interface. Wall mounting plate included. Power supply not included.
Exciter Power Supply	ADP-047-U (US) ADP-047-E (Europe) ADP-047-UK (UK) ADP-047-J (Japan)	AC/DC Adaptor 45W 48 V/1.0A 90-264VAC for EX2000B, EX4200, EX5000, EX5200 and EX5200 Exciters.
PoE Injector	ADP-030-U (US) ADP-030-E(Europe) ADP-030-UK (UK) ADP-030-J (Japan)	PoE Power Injector for use with EX2000B, EX3210, EX4200, EX5000 and EX5200 Exciters. 110/220VAC-48VDC.
Exciter Detector Tool	EXD-1000	Tool for visualizing the effective LF Exciter transmission field. Analyzes the Exciter coverage during deployment. Includes a PC application and detector hardware that can be connected via USB to a PC.
Exciter On-Grid Mounting Kit	EXAC-STD-1000	Multi-ceiling On-Grid Exciter Mounting Kit for EX5200 Exciters. Supports recessed ceiling tiles and 3 types of ceiling grids: <ul style="list-style-type: none"> <li>- 15/16" Ceiling Grid</li> <li>- 9/16" Ceiling Grid</li> <li>- Slotted Grid</li> </ul>
Exciter Heavy Duty Mounting Kit	EXAC-HDUTY-1000	Mounting Kit for mounting in the center of a floating ceiling tile when mounting on the ceiling grid is not possible or when heavy duty mounting is needed. Each kit can be used for a single Exciter.
External LF Antenna	ANT-4210	External LF Antenna Device, powered directly from the Exciter. It includes a mounting plate and a ceiling mount.

# Appendix C: Exciter Specifications

## Physical and Mechanical

- Dimensions: 245mm X 200mm X 60mm (9.6in x 7.9in x 2.4in)
- Weight: 865g (31oz)
- Housing: Polycarbonate and ABS

## Coverage

- Adjustable coverage range between 1.5m (4.9 ft.) and 6.5m (21.3 ft.) by intervals of 0.5 m (1.6 ft.)

## LF Channel

- 125 KHz
- Field intensity limits: 37.3 dB $\mu$ A/m at 10 m (ETSI)
- Propagation limits: 21.8 dB $\mu$ V/m at 300 m (FCC)
- Modulation: ASK

## Network Interface

- Ethernet (RJ-45)

## Power

- Input voltage: 24-48 VDC
- PoE (802.3af) 48 VDC
- Maximum power consumption: 6W
- Maximum power consumption of External LF Antenna: 5W

## Environmental

- Operating temperature: 0 to 50 °C (32°F to 122°F)
- Humidity: 0 to 95%, non-condensing

## Certifications

- Radio:

FCC part 15 sub part B, EN 301 489, EN 300 330 , Radio Equipment Directive 2014/53/EU (RED), Radio Equipment Directive S.I.2017/1206 (RED), RoHS 2 Directive 2011/65/EU, RoHS 2 Directive S.I.2012/3032, TA 2019/2105

- Safety:

CE, UKCA, EN62368/UL62368/IEC62368

## FCC Compliance Statement

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio and television reception.

However, there is no guarantee that interference will not occur in a particular installation. If this device does cause such interference, which can be verified by turning the device off and on, the user is encouraged to eliminate the interference by one or more of the following measures:

- Re-orient or re-locate the receiving antenna.
- Increase the distance between the device and the receiver.
- Connect the device to an outlet on a circuit different from the one that supplies power to the receiver.
- Consult the dealer or an experienced radio/TV technician.

**WARNING!** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with FCC Rules Part 15 and with Industry Canada licence-exempt RSS standard(s). Operation is subject to two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may be received or that may cause undesired operation.

Le present appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes :(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.





4600 Vine Street  
Lincoln, NE 68503  
+1 888 622 6992

North America  
[info@securitashealthcare.com](mailto:info@securitashealthcare.com)

International  
[global@securitashealthcare.com](mailto:global@securitashealthcare.com)

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# EX5500 Controller

## DATA SHEET



Provides robust, sophisticated egress point monitoring and security capabilities for protected tags

### PRODUCT HIGHLIGHTS

- **Wi-Fi Tag Detection:** The EX5500 triggers a tag to transmit and immediately react according to the state of the tag and other defined conditions such as the status of the door. When an active tag enters the field, the relay responds in less than 0.5 seconds to activate a door lock or other device. All processing is done locally in the EX5500 ensuring a fast response.
- **Network connectivity:** The EX5500 enables remote programming, monitoring, and software updates by the AeroScout Engine. The EX5500 can also function in an offline mode for basic security functionality when the network is down.
- **Relay control:** The EX5500 has two built in relays, which can be used to activate alarms, magnetic door locks, cameras, or other devices.

### PRODUCT DESCRIPTION

The EX5500 Controller is a component of Securitas Healthcare's suite of enterprise visibility solutions for location-based applications. The EX5500 Controller provides robust and sophisticated real time detection and location of tags using the AeroScout RTLS system which utilizes any standard Wi-Fi network.

The EX5500 Controller is used to monitor and secure the exits of a facility equipped with a Securitas Healthcare Enterprise Visibility Solution, such as the Hugs Infant Protection Solution or the Patient Protection system. Installed above or beside a doorway, the Controller transmits low frequency (LF) signals that cover the exit. When a patient wearing a tag enters the Controller's field, the tag transmits a message to the AeroScout RTLS System via the Wi-Fi network. If a tagged patient is brought near an open door without authorization, an alarm is generated.

Each Controller is equipped with two relays, which can be used to activate alarms, magnetic door locks, cameras, or other devices. In addition, an optional keypad or proximity card reader may be connected to the Controller to allow selective restriction of access.



## **INDUSTRY BENEFITS**

### **Security Applications**

Together with a Securitas Healthcare Protection System, the Controller is used to monitor doorways of a secured area and trigger relays. The relays can immediately activate alarms, magnetic door locks, cameras or other devices, if a tagged patient without authorization tries to leave the premises.

### **Continual Supervision**

The Controller's status is monitored at all times by the Securitas Healthcare Protection System.

Using AeroScout Engine Manager the EX5500 can be configured to trigger a range of devices including magnetic locks, cameras, strobes, sirens or even elevators. The EX5500 supports basic functionality in an offline mode enabling protection of the facility even when the network is down.

The EX5500 accommodates a failsafe mechanism and a bypass device (Keypad) allowing secure yet rapid 'system override' should the need arise.

### **Chaining**

In an area where the required LF coverage exceeds the capacity of one Controller, the Controller can be chained with up to eight AeroScout Exciters, e.g. the EX5000 Exciter, for complete and precise coverage of large areas such as hallways or gates.

In addition, in small areas with multiple exits that cause the LF fields of Controllers to overlap, chained Controllers can be configured with different ID's. This enables the identification of the precise exit the tagged patient passed through, e.g. an elevator or stairwell.

### **Real-Time Alerts**

Organizations can use the EX5500 Controller to trigger automated events and alerts based on the current location of an asset.



# Product Specifications

<b>Model</b>	SKU: EX-5500	EX5500 Controller
<b>Environmental Specifications</b>	<b>Operating Temperature Range:</b> 0°C to 50°C (32°F to 122°F) <b>Humidity:</b> 0% to 95% RH non-condensing	
<b>Physical &amp; Mechanical</b>	<b>Dimensions LWH:</b> 245 mm X 200 mm X 60 mm (9.6in x 7.9in x 2.4in) <b>Weight:</b> 865g (31oz)	
<b>Housing</b>	Polycarbonate and ABS	
<b>Power</b>	<b>Input voltage:</b> 12, 24-48VDC PoE (802.3af) 48VDC <b>Maximum power consumption:</b> 8W <b>Maximum power consumption of External LF Antenna:</b> 5W	
<b>LF Channel</b>	125kHz <b>Field intensity limits:</b> 37.3dBμA/m at 10m (ETSI) <b>Propagation limits:</b> 21.8 dBμV/m at 300m (FCC) <b>Modulation:</b> ASK	
<b>Network Interface &amp; Settings</b>	Ethernet (RJ-45) Wi-Fi 802.11b/g	
<b>Range</b>	Adjustable from 0.5m (20in) up to 6.5m (21.3ft) in intervals of 0.5m (20in)	
<b>Relays</b>	Two: max. switching voltage 220VDC/250ACD, max. switching power 30W/62.5VA, max. switching current 1A, NO (Normally Open) or NC (Normally Closed)	
<b>Certifications</b>	FCC Part 15, sub-part C class B, sub-part B EN 300-330 EN 301.489 RSS210 (Canada) EMC IEC60601-1-2 (Europe) Safety: CE, cTUVus (EN60950)	

4600 Vine Street  
Lincoln, NE 68503  
+1 888 622 6992

North America  
info@securitashealthcare.com

International  
global@securitashealthcare.com

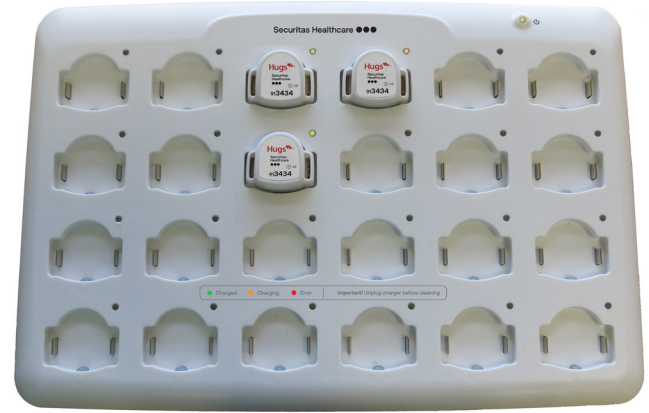
#### About Securitas Healthcare

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Doc: 0971-064-000 Rev E | Published: 2023/06/16 | KB Article 5392

# Hugs® Wi-Fi Tag Charger

## DATA SHEET



### DESCRIPTION

The Hugs Wi-Fi Tag Charger can charge up to 24 tags simultaneously. LEDs display the charging status for each Hugs Tag, as well as indicating tag and charger slot problems. It can be mounted on the table or on the wall.

The Hugs on MobileView software notifies the users when the Hugs Tag battery is getting low. Placing the Hugs Tag in the charger erases all the history data from the tag, including the Kisses® bonding and the tag status. It also triggers MobileView to erase the specific patient admitting information.



Charging LED:

Yellow when Hugs Tag is correctly placed in the Charger



# Product Specifications

Model	Hugs Wi-Fi Tag Charger
Part Number	CGS-HGS-1000 Based on power supply outlet type: <ul style="list-style-type: none"> <li>CGS-HGS-1000-U U.S. and Japanese outlet</li> <li>CGS-HGS-1000-E European outlet</li> <li>CGS-HGS-1000-UK U.K. outlet</li> </ul>
Tag Capacity	Supports charging up to 24 tags simultaneously.
Power Supply	12 V power supply plug is located on the right side of the Charger. The charging station is delivered with power supply that supports 110/220 V AC input voltage level with auto-select (no switch needed). ON/OFF switch is located at the back of the Charger and controls the entire board.
Charging Time	Maximum 3 hours (from a low battery state). Once charged, the Hugs Tag will typically last 10 days under normal use.
Temperature	Operating Temperature: 0° C to +50° C (32° F to 122° F) Storage Temperature: -20° C to 85° C (-4° F to 185° F)
Humidity	3.6V Lithium ½ AA battery (replaceable)
Dimensions (H x W x L)	0 to 95%, non-condensing 95% relative humidity - non-condensing
Weight	1.0 kg (2.20 lbs)
Mounting Options	Screws for wall and table
LED Indications	ORANGE – Battery is charging. BLINKING RED – Issue with the Hugs Tag. SOLID RED - Issue with the charging slot. GREEN - Charging complete. Battery is fully charged.
Compliance and Safety	CE, UKCA, ETL approved for EN62368, EN 301 489, EN 300 328, EN 300 330, Radio Equipment Directive 2014/53/EU (RED), Radio Equipment Directive S.I.2017/1206 (RED), RoHS 2 Directive 2011/65/EU, RoHS 2 Directive S.I.2012/3032, Conforms to UL Std 62368-1:2019 Ed.3 & CSA StdC22.2#62368-1:2019 Ed.3

4600 Vine Street  
Lincoln, NE 68503  
+1 888 622 6992

North America  
info@securitashealthcare.com

International  
global@securitashealthcare.com

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# Hugs® Wi-Fi Tag



## DATA SHEET

Wi-Fi transmitter tag responds to tamper detection through the SoftTouch band, and through a skin-sensing feature that uses a proximity sensor.

### PRODUCT HIGHLIGHTS

The system may be configured to generate alerts under these and other situations:

- Someone tries to exit through a protected doorway with a monitored infant without authorization.
- An infant is located in an unauthorized area (“Out of Unit”).
- The tag’s signal has not been detected by the system for a specified time period.
- The band has been cut or tampered with.
- The tag’s battery power is low.
- An authorized exit has occurred but someone tries to “piggyback” through the protected exit with another infant.
- The infant has been brought to the wrong mother (Kisses only).

### BATTERY LIFE AND CHARGING TIME

- Charging Time - Up to 3 hours is the maximum charging time for a tag from a low battery state.
- Battery Life - Once charged, the Hugs Tag typically lasts 10 days under normal use. It is, however, recommended to place the Hugs Tag in the Charger between uses (ensure the tag is cleaned first!).

**NOTE:** It is important to charge the tag at least once every 10 days.

### DESCRIPTION

At the heart of the Hugs Infant Protection System is the Hugs Wi-Fi Tag. The Hugs Wi-Fi Tag is a very small form factor, Wi-Fi transmitter that responds to tamper detection through the SoftTouch band, and a skin-sensing (BabySense) feature using a proximity sensor.

The tag uses any standard Wi-Fi network infrastructure, keeping costs low and making deployments simple and fast. Leveraging the Wi-Fi network, tagged infants are accurately located in real-time and in any environment – from closed indoor locations such as hospital floors, to open outdoor spaces such as parking lots. The Wi-Fi communication utilizes a unique beaconing method (without associating with networks) that keeps network impact low and ensures scalability as well as long battery life. The transmission of secured tag messages using a unique key that is assigned to the tag (V5 Tag Only) is also supported.

As soon as the tag is applied to the infant using the SoftTouch tamper-proof disposable band, the tag turns on, producing an audible beep. From the moment it is activated, the tag begins to send “supervision” messages indicating that it is OK and protected. The infant is automatically enrolled in the Hugs Application and is constantly monitored against abduction. The disposable band may be adjusted to allow for normal weight loss, is non-allergenic, and does not contain latex. Tags are reusable and come with a warranted life of two years.



## DESCRIPTION (CONT)

The BabySense skin-sensing feature notifies you if the Hugs Wi-Fi Tag is not properly applied to the infant, either because the tag was applied too loosely or due to weight loss. The BabySense feature helps ensure that the tag is always securely applied and protecting the infant by sending timely reminders to a staff member.

The unique patented asymmetric shape of the tag helps to ensure that it does not pinch or irritate the baby's skin, and also helps prevent it from being kicked off, while still allowing the ankle joint to move freely. The tag is water-resistant to allow bathing of the infant, and complies with standards to avoid interference. It is also resistant to soiling and UV light, and may be cleaned with a hospital-approved disinfectant solution.

The Hugs Wi-Fi Tag is also used with the optional Kisses® Tag for Wi-fi mother/infant matching component of the Hugs system. The Kisses Tag identifies a mismatch if the incorrect infant is brought to a mother. The Hugs Tag then emits an audible beep and also sends an alert to the system. A specific Hugs Tag can bond with only one Kisses Tag while the same Kisses Tag can bond with multiple Hugs Tags (supporting multiple births).

The Hugs Wi-Fi Tag contains a non-replaceable, rechargeable battery that needs to be recharged after every use, using a proprietary charger. The charger accommodates up to 24 tags simultaneously. Note that placing the tag in the charger erases all the tag data, including the Kisses bonding and the mother and infant admitting information. Once charged, the Hugs Wi-Fi Tag battery will last for approximately two weeks.

## CLEANING THE TAG

**Note:** The tag is not sterilized at the factory and should be cleaned before first use.



Consult with your Infection Control representative for cleaners available to your hospital that have been approved for use on plastics as stated in Securitas Healthcare Technical Bulletin [KB# 8184] "Approved Cleaning Materials for Patient Security Tags" – available on the Securitas Healthcare Support Community ([Securitashealthcare.com/support](https://securitashealthcare.com/support)).

Please also be aware of the following additional general guidelines:

- Do not use an autoclave to clean the tag or serious damage may result
- Do not use a disinfectant with more than 20% alcohol
- Do not soak the tag
- If required, a disposable soft-bristle brush may be used to remove surface dirt from the tag's surface or the contacts on the tag
- Rinse and thoroughly dry all tags after cleaning



# Product Specifications

Model	Hugs Wi-Fi Tag
Part Number	TAG-HGS-1000
	Based on Wi-Fi protocol: <ul style="list-style-type: none"> <li>• TAG-HGS-1000-I (IBSS mode)</li> <li>• TAG-HGS-1000-C (CCX mode - Cisco)</li> <li>• TAG-HGS-1000-W (WDS mode)</li> </ul>
Tag Life Time	2 years
Battery	Contains a Lithium 4.2 V non-replaceable battery. Recharge after each use.
Wi-Fi Data Rate	1 Mbps
Wi-Fi Transmission Interval	10 seconds
Temperature	32°F to 120°F (0°C to 49°C)
Humidity	0-95% RH @ 70°F (21°C), non-condensing
Solid Objects and Liquids	Water and dust resistant - Ingress Protection (IP) 67
Dimensions	Approximately 1.2 x 0.52 x 1.4 in. (29 x 13 x 34 mm)
Weight	Approximately 0.35 oz. (10 g)
Radio	802.11b compliant (2.4 GHz) Low frequency receiver for chokepoint detection (125 kHz) Transmission power: up to +19 dBm (~81mW) Patented clear channel assessment avoids interference with wireless networks
Medical Device Classification	 This product is certified for Type BF Applied Parts
Certification	Radio: FCC Part 15, sub-part C class B, sub-part B (US), EN 300 328, EN 301 489, Radio Equipment Directive 2014/53/EU (RED), RoHS 2 Directive 2011/65/EU, The Radio Equipment Regulations 2017, S.I. 2017/1206 (as amended), The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, S.I. 2012/3032 (as amended) Safety: CE, UKCA, ETL approved for EN62368, Conforms to UL Std 62368-1:2019 Ed.3 & CSA StdC22.2#62368-1:2019 Ed.3, UL294 

4600 Vine Street  
Lincoln, NE 68503  
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North America  
info@securitashealthcare.com

International  
global@securitashealthcare.com

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Doc: 0971-057-000 REV A | Published: 2023/01/11 | KB Article 5308

SECTION 26 05 00

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish and install all necessary labor, materials, tools and equipment to perform and completely finish the work according to the intent of this specification, and the accompanying drawings.
- B. Provide conduit, wires and other miscellaneous materials, equipment and devices, not specifically mentioned in other sections of Division 26, but necessary and/or required for equipment or system operation of function.
- C. Review all specification sections and drawings for equipment requiring electrical service. Provide service to and make connections to all such equipment requiring electrical service. Refer to Section 260519 of these specifications for connection requirements.
- D. Drawings indicate design loads and voltages and corresponding control equipment, feeders, and overcurrent devices. If equipment actually furnished, other than for equipment provided by the University, have loads or voltages other than those indicated on the drawings or specified herein, control equipment, feeders, and overcurrent devices shall be adjusted in size accordingly at no additional cost to the University. Such adjustment shall be subject to the review of the University's Representative.
- E. Provide connections of all equipment specified under this section and any other section.

1.2 LOCAL CONDITIONS

- A. Examine site; verify dimensions and locations against drawings and become informed of all conditions under which work is to be done before submitting proposal. No allowance will be made for extra expenses because of omission on Contractor's part to include cost of work under prevailing conditions.
- B. Information shown relative to services is based upon available records and data shall be regarded as approximate only. Minor deviations found necessary to conform with actual locations and conditions shall be made without extra cost.
- C. Protect premise and work of other trades from damage arising out of installation of work of this division. If damage has occurred, repair or replace materials and parts of premises as directed by University's Representative at no cost to the University.

1.3 CODES AND STANDARDS

- A. Applicable codes are those specified in Section 01 41 00 – Regulatory Requirements. Nothing in the Drawings or Specifications shall be construed to permit work not conforming to these codes, latest edition as adopted by authority having jurisdiction.
- B. Material Standards: All material shall be new and shall conform to the standards where such have been established for the particular material in question. Publications and Standards of the organization

listed are applicable to materials specified herein. Also refer to Division of these specifications: Insulated Cable Engineers Association (ICEA), Institute of Electrical and Electronic Engineers (IEEE), Edison Electric Institute (EEI), American Wood Preservers Association (AWPA), National Board of Fire Underwriters (NBFU), Illuminating Engineering Society (IES), Electrical Testing Laboratory (ETL).

- C. Code compliance is mandatory - no information or details on the drawings or specifications permits work not conforming to code. Where work is shown to exceed minimum code requirements perform work per drawings and specifications.

#### 1.4 DRAWINGS

- A. The drawings indicate the arrangements of electrical equipment. Review architectural drawings and details for door swings, cabinets, counters and built-in equipment; conditions indicated on architectural plans shall govern. Coordinate installation of electrical equipment with structural system and mechanical equipment and access thereto. Coordinate installation of recessed electrical equipment with concealed ductwork and piping, and wall thickness.
- B. Do not scale drawings. Obtain dimensions for layout of equipment from Architectural plans and details unless indicated on Electrical plans. Field measurements take precedence over dimensioned drawings.
- C. Bring all discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions to the immediate attention of the University's Representative.
- D. Equipment layout is based on one manufacturer's product or from composite dimensions from multiple manufacturers. Where equipment selected for use on the job differs from layout, coordinate space requirements and connection arrangements with Engineer. Equipment which exceeds specified maximum dimensions or which reduces required clearances shall not be accepted.

#### 1.5 RECORD DRAWINGS

- A. Upon completion of all Work, but before final acceptance, the Contractor shall furnish the University's Representative with complete sets of reproducible drawings updated and corrected to "as-built" conditions as specified. The contract documents drawings issued for bid shall be revised for "as-built" conditions. Include electronic panelboard files in Excel format updated to "as-built" conditions, copies of all submittal data, shop drawings, control Panel layout, point to point wiring diagram, conduit routing, underground duct banks, site lighting and any other detailed drawings.
- B. All symbols, designations, and layers used in preparing Record Drawing shall match those used in Contract Drawings and electronic files.
- C. Show all buried and concealed conduit, stub-outs, etc. Locate all buried conduit and stub-outs by dimensions from permanent, easily located and identifiable portions of structure; also, dimension ends of stub-outs, etc. Note depth of buried items below grade.

#### 1.6 SUBMITTALS

- A. Shop Drawings and Product Data:
  - 1. Submit for review by the University's Representative data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive material, catalogs, cuts, diagrams, performance curves, and charts published by the manufacturer to show conformance to specification and drawing requirements; model numbers alone will not be acceptable. Provide

- complete electrical characteristics for all equipment. Submittals for lighting fixtures shall include Photometric data.
2. Refer to the individual sections for identified equipment and materials for which submittals are required.
  3. Refer to Division 1 for required procedures.
- B. Operation and Maintenance Data and Instruction:
1. Refer to Division 1 for detail requirements.
  2. Printed Material: Provide required printed material for binding in operation and maintenance manuals.
  3. Instructions of University Personnel:
    - a. Before final inspection, as designated by the University's Representative provide a competent representative to instruct University's designated personnel in systems under this division of the specifications. For equipment requiring seasonal operation, perform instructions for other season within six months unless requested otherwise.
    - 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.
    - c. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Materials mentioned herein or on drawings require that each item listed be provided and of quality noted, or an approved equal. All material shall be new, full weight and standard in all respects and in first-class conditions. Materials and equipment shall be uniform throughout the installation. Where possible, all materials used shall be of the same brand or manufacturer throughout for each class of material or equipment.
- B. Grade or quality of materials desired is indicated by trade names or catalog numbers stated herein. Substitutions will be also be evaluated on maintenance track record and parts availability for previous installations that have been installed a minimum of five years. Refer to Specification Section 04330 01 33 23. Dimensions, sizes and capacities shown are a minimum and shall not be changed without permission of Engineer.
- C. All electrical equipment and materials shall satisfy minimum requirements of NEMA, IEEE and ANSI standards. All materials must be UL approved, or if not covered by UL testing standards, shall be test and approved by a Nationally Recognized Testing Laboratory (NRTL).
- D. Work such as painting, patching, welding or carpentry related to the work of this Division shall be performed by the appropriate trade experienced in that work, but shall be provided for under this Division.

## PART 3 - EXECUTION

### 3.1 ELECTRICAL SYSTEMS OPERATIONAL TESTS, MANUFACTURERS SYSTEMS CERTIFICATION AND DESIGN AUTHORITY ASSISTANCE

### 3.2 GENERAL

- A. All electricians to be state certified and apprentices in an approved training program.
- B. When changes in location of any work are required, obtain approval of University's Representative before making changes.
  - 1. Make changes at no extra cost.
- C. Do not change indicated sizes without written approval of University's Representative.
- D. Provide all necessary offsets and crossovers in conduits, raceways, cabletrays and ducts.
- E. Provide flexible connections of short length to installations or equipment subject to vibration or movement and to all motors. Provide a separate bonding conductor across all flexible connections.
- F. Install exposed conduits parallel to walls and ceilings and vertically plumb, unless otherwise indicated.
- G. Existing equipment or electrical wiring which is to remain, but has been removed to facilitate the installation of the new equipment, shall be restored to its original operating condition.
- H. Where electrical items penetrate fire or smoke rated walls, ceilings and floors, comply with Section Division 7.
- I. Before any cutting, burning, heating or other work that will emit smoke, dust or other products of combustion that may set off the fire alarm system, request a fire alarm system shutdown from the University's inspector. This request shall be made at least 14 days prior to the date the shutdown is required. If this requirement is ignored and triggers the fire alarm system the offending party shall be responsible for all false alarm charges from the fire department. Instruct all personnel of this requirement before they are permitted on the job site. If the job site has a portable fire alarm system installed for the construction period, turn the system on and off each working day.
- J. Provide concrete foundations or pads as follows for floor mounted electrical equipment where indicated on the drawings:
  - 1. Install minimum 4" high concrete pads or as indicated. Other pad dimensions shall be as required to accommodate the equipment installed.
  - 2. Use 3,000 PSI (14 Kg/s/mm) concrete.
  - 3. Reinforce with 6" x 6" W2.9 x W2.9, 10GA (3.4mm) mesh, with short dowels into floor at 12" OC around perimeter.
  - 4. Chamfer top edges  $\frac{3}{4}$ " (18mm).
  - 5. Make all faces smooth.
  - 6. Set anchor bolts for equipment. Consult with user.
  - 7. Coordinate the size of all pads, the location of all anchor bolts, and the location of all vibration isolators.

### 3.3 QUALITY ASSURANCE AND PROJECT SAFETY

- A. Provide quality assurance and project safety programs. Satisfy the minimum acceptable requirements provided in the specifications.

### 3.4 PREPARATION

- A. Examine Drawings and Site; be familiar with types of construction where electrical installation is involved.

1. Work shall be neatly installed in a professional manner in accordance with NECA Standard of Installation. Work shall be coordinated with other trades to avoid conflicts. Clarifications will be made by University's Representative and minor adjustments shall be made without additional cost to University. Obtain clarification from University's Representative concerning any obvious discrepancies or omissions in work before bidding. All work involved in correcting obvious errors or omissions after award of Contract shall be performed as directed by University's Representative without additional cost to University.
- B. Layouts of equipment, accessories and wiring systems are diagrammatic (not pictorial), but shall be followed as closely as possible. Drawings and Specifications are for assistance and guidance, and exact locations, distances, levels, etc., will be governed by Site.
- C. Schedule of Values:
1. Refer to Division 1 for submittal requirements.
  2. Provide a schedule of values for the electrical work specified under Division 26. Include separate labor and material itemization for each line item requested. The itemized schedule of values will be used to determine project completion and progress for payment requests, including overhead and profit for each itemization. Schedule of values must be submitted and approved prior to first pay request. Provide the following line items as a minimum level of itemization:
    - a. Electrical service and distribution (include all power equipment, i.e., panelboards, transformers, feeders, motor controllers, etc.).
    - b. Lighting systems (include all fixtures, lamps, branch circuiting, and lighting controls).
    - c. Devices (include all power outlets and branch circuit wiring not associated with lighting, motors, or equipment connections).
    - d. Equipment connections (include all wiring and connection to HVAC, elevators, etc., including controlling devices and feeders).
    - e. Basic work and materials (include work common to all systems, i.e., backboards, cutting and patching, demolition, temporary services, record drawings, permits, etc.).
    - f. Special systems (itemize separately, including emergency power supply system, grounding system, UPS equipment, etc.).
    - g. Communications/signaling systems (include all low voltage systems, itemized separately, i.e., fire alarm, sound paging, security, etc.).

### 3.5 WORKING SPACE

- A. Provide adequate working space around electrical equipment in compliance with Article 4 of Electrical Safety Orders. In general, provide 36" minimum clear workspace in front of panelboards and controls.
1. 36" @ 250V and less.
  2. 42" @ 250V to 600V.

### 3.6 PRODUCT DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Inspect materials upon arrival at Project and verify conformance to Contract Documents. Prevent unloading of unsatisfactory material including University furnished material. Handle materials in accordance with manufacturer's applicable standards and suppliers recommendations, and in a manner to prevent damage to materials. Store packed materials in original undamaged condition with manufacturer's labels and seals intact. Containers which are broken, opened, damaged, or watermarked are unacceptable and shall be removed from the premises and replaced at no additional cost to the University.
- B. All material, except items specifically designed to be installed outdoors, shall be stored in an enclosed, dry building or trailer. Areas for general storage shall be provided. Provide temperature and humidity control where applicable. No material for interior installation, including conductors, shall be stored other

than in an enclosed weathertight structure. Equipment stored other than as specified above shall be removed from the premises and replaced at no additional cost to the University.

- C. Equipment and materials shall not be installed until such time as the environmental conditions of the job site are suitable to protect the equipment or materials. Conditions shall be those for which the equipment or materials are designed to be installed. Equipment and materials shall be protected from water, direct sunlight, cold or heat. Equipment or materials damaged or which are subjected to these elements are unacceptable and shall be removed from the premises and replaced at no additional cost to the University.

### 3.7 CARE AND CLEANING

- A. Remove oil, dirt, grease and foreign materials from all raceways, fittings, boxes, panelboard trims and cabinets to provide a clean surface for painting. Touch-up scratched or marred surfaces of lighting fixtures, panelboard and cabinet trim, motor control center, switchboard or equipment enclosures with paint furnished by the equipment manufacturers specifically for that purpose.
- B. Accessible elements of disconnecting and protective devices of equipment, coils of dry type transformers and the like shall be cleaned with compressed air (less than 15 PSI) and the enclosures vacuum cleaned prior to being energized.
- C. Clean light fixtures and lamps thoroughly, just prior to final inspection. Fixture enclosures, shielding, etc., shall be cleaned by an approved method.
- D. Do not paint trim covers for flush mounted panelboards, telephone cabinets, pull boxes, junction boxes and control cabinets unless required by the University's Representative. Remove trim covers before painting. Under no conditions shall locks or exposed trim clamps be painted.
- E. Unless indicated on the drawings or specified herein to the contrary, all painting shall be done under the PAINTING Section of these Specifications.
- F. Where plywood backboards are used to mount electrical equipment provided under Division 26, paint backboards with two coats of light gray semi-gloss fire retardant paint under Division 26.
- G. Plywood, Mounting Backboard for Communications Equipment - Plywood mounting backboard shall extend ceiling-to-floor (10'), unless otherwise specified. Mount plywood to cover the entire area on which connecting hardware and cable management hardware may be mounted. Mounting board shall be AC-grade or better, void-free plywood, with a minimum thickness of 19 mm ( $\frac{3}{4}$ ").
  - 1. Two-coats of FR-S fire-retardant rated paint shall be applied to all exposed surfaces. The plywood-rating stamp shall be left exposed for inspection purposes.
  - 2. Securely fasten plywood to wall-framing members. Use flush hardware and supports to mount plywood.
  - 3. Ensure that the strength and placement of the hardware are sufficient to handle the total anticipated load (static and dynamic) and mounting of cabling components.
  - 4. Color of paint shall be **WHITE**.

- H. All broken, damaged or otherwise defective parts shall be repaired or replaced without additional cost to the University. Work shall be left in a condition satisfactory to University's Representative. At completion, carefully clean and adjust all equipment, fixtures and trim installed as part of this work. Systems and equipment shall be left in a satisfactory operating condition.
- I. All surplus materials and debris resulting from this work shall be periodically cleaned out and removed from site; this includes surplus excavated material.

### 3.8 CUTTING AND PATCHING

- A. Provide necessary cutting and patching required to accomplish the work of Division 26.
- B. Do not endanger the stability of the structure by cutting, drilling or otherwise modifying the structural members of the building. Direct all requests for structural modifications to the University's Representative for approval. Proceed with these modifications only as directed by the University's Representative.
- C. Cutting and patching requirements will be modified only if General Construction Specifications and drawings specifically state that certain portions or all cutting and patching required for each of the various trades is to be performed.
- D. Refer to General Construction Specifications for execution and requirements for patching and painting and comply with applicable provisions as to materials and quality of installation.

### 3.9 PROTECTION

- A. In performance of work, protect work from damage. Protect electrical equipment, stored and installed, from dust, water or other damage.

### 3.10 EQUIPMENT IDENTIFICATION

- A. Panelboards, remote control switches, terminal boxes, etc., shall be properly identified according to section 260553 of these specifications.

### 3.11 RUST INHIBITER

- A. Channels, joiners, hangers, caps, nuts and bolts and associated parts shall be plated electrolytically with zinc followed immediately thereafter by treating freshly deposited zinc surfaces with chromic acid to obtain a surface which will not form a white deposit on surface for an average of one hundred twenty (120) hours when subjected to a standard salt spray cabinet test, or shall be hot dipped galvanized.

### 3.12 ELECTRICAL SYSTEMS OPERATIONAL TESTS, MANUFACTURERS SYSTEMS CERTIFICATION AND DESIGN AUTHORITY ASSISTANCE

- A. Testing:
  - 1. Provide tests specified in other sections. Test all wiring and connections for continuity and grounds; where such test indicate faulty insulation or other defects, locate, repair and retest. Balance loads at panelboards. Furnish all testing equipment.
  - 2. Refer to the individual specification sections and Section ~~26060~~ 26 90 90 of the specifications for test requirements.



3. Prior to the final inspection, the systems or equipment shall be tested and reported as therein specified. Five (5) typewritten copies of the tests shall be submitted to the University's Representative for approval. Testing does not replace the requirement for final inspection of the project work.
  4. All electrical systems shall be tested for compliance with the specifications.
- B. Manufacturers Certifications:
1. The electrical systems specified herein shall be reviewed for compliance with these specifications, installation in accordance with the manufacturers' recommendations and system operation by a representative of the manufacturer. The manufacturer shall submit certification that the system has been reviewed by the manufacturer, is installed in accordance with the manufacturer's recommendations and is operating in accordance with the specifications.
  2. Provide manufacturers certification for the following systems:
    - a. Fire Alarm System
    - b. Clock System
    - c. Security Systems
    - d. Intercom System
    - e. Public Address System
    - f. Lighting Control Systems
    - g. Automatic transfer switches
  3. Design Authority Assistance:
    - a. Remove equipment covers (i.e. panelboard trims, motor controls, device plates, and junction box covers) as directed for inspection of internal wiring. Accessible ceilings shall be removed as directed for inspection of equipment installed above ceilings.
    - b. Energize and de-energize circuits and equipment as directed. Demonstrate operation of equipment and systems as directed by the University's Representative.
    - c. Provide authorized representatives of the manufacturers to demonstrate to the University's Representative compliance with the specifications of their respective system during or prior to the final inspection at a time designated by the University's Representative. Refer to the specific specification section for additional testing requirements. Representatives of the following systems are required for demonstrations:
      - 1) Fire Alarm System
      - 2) Intercom System
      - 3) Surveillance System
      - 4) Public Address System
      - 5) Lighting Control System
      - 6) Automatic Transfer Switches

3.13 CLOSING OF AN UNINSPECTED WORK

- A. Do not allow or cause any of work installed hereunder to be covered up or enclosed before it has been inspected and approved.
- B. Should any work be enclosed or covered up before it has been approved, uncover such work and after it has been inspected and approved, make all repairs necessary to restore work of others to conditions in which it was found at time of cutting, all without additional cost to the University.

3.14 TEMPORARY FACILITIES

- A. Provide temporary shop office and storage space on site only at locations approved by the University's Representative. Remove these facilities upon completion of work.

3.15 NOISE AND VIBRATION

- A. Cooperate in reducing objectionable noise or vibration. If noise or vibration occurs as a result of the use of improper material or installation, correct these conditions at no cost to the University.

END OF SECTION 26 05 00

**SECTION 26 05 19**  
**LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART I - GENERAL**

1.1 DESCRIPTION

A.The work required under this section of the specifications consists of furnishing, installing and connecting the building wiring system, 600 volts and below. Exterior branch circuit wiring and feeder conductors extended beyond the building are included. Wiring systems for communication and alarm systems are not included in this section unless specified to be included, by reference, in the respective specification sections for alarm and communication systems.

1.2 RELATED WORK

A.Section 260533 – Raceways

B.Section 260520 – Electrical Connections for Equipment

1.3 QUALITY ASSURANCE

A.Industry Reference Standards. The following specifications and standards are incorporated into and become a part of this Specification by Reference.

1. Underwriters' Laboratories, Inc. (UL) Publications:
  - a. No. 83 Thermoplastic - Insulated Wires
  - b. No. 486 Wire Connectors and Soldering Lugs
  - c. No. 493 Thermoplastic - Insulated Underground Feeder and Branch Circuit Cables
  - d. No. 854 Service Entrance Cables
2. Insulated Cable Engineers Association Standards (ICEA):
  - a. S-61-402 Thermoplastic Insulated Wire and Cable
3. National Electrical Manufacturer's Standards (NEMA):
  - a. WC-5 Thermoplastic Insulated Wire and Cable
  - b. WC-26 Wire and Cable Packaging
4. UBC Standard 4-1 for non-combustible materials for wires and cables above non-sprinklered ceilings.

B.Acceptable Manufacturers: Products produced by the following manufacturers which conform to this specification are acceptable.

1. Hydraulically applied conductor terminations:
  - a. Scotch (3M)
  - b. Thomas and Betts (T&B)
  - c. or equal
2. Mechanically applied (crimp) conductor terminations:
  - a. Scotch (3M)
  - b. Thomas and Betts (T&B)
  - c. or equal
3. Vinyl electrical insulating tape:
  - a. Scotch (3M)
  - b. Tomic
  - c. or equal
4. Twist-On Wire Connectors:

- a. Buchanan
- b. Ideal
- c. or equal
- 5. Encapsulated insulating kits:
  - a. Essex Group, Inc.
  - b. Raychem
  - c. Scotch (3M)
  - d. or equal
- 6. Portable cable fittings:
  - a. Crouse Hinds
  - b. T & B
  - c. or equal
- 7. Insulated cable:
  - a. Pirelli Cable Corp.
  - b. Southwire Co.
  - c. or equal

- C. Performance: Conductors shall be electrically continuous and free from short circuits or grounds. All open, shorted or grounded conductors and any other damaged insulation shall be removed and replaced with new material free from defects.
- D. Delivery, Storage and Handling: Deliver wire and cable in accordance with NEMA WC-26. Wires and cables shall not be stored in an exterior or unprotected location. Material subject to direct exposure to the elements shall be replaced and removed from the project. Bring wire to job in original unbroken packages. Obtain approval of University's Representative before installation of wires.

#### 1.4 SUBMITTALS

- A. Submit shop drawings in accordance with the Conditions of the Contract and Division One Specifications Sections for the conductors, terminations, connectors, insulating tape, and insulating kits.
- B. Submit field test reports indicating and interpreting test results required by the "Electrical Equipment Acceptance Testing" section of these specifications.

### PART II - PRODUCTS

#### 2.1 GENERAL MATERIALS REQUIREMENTS

- A. Provide all materials under this section of the specifications.
- B. All wire and cable shall be UL listed and shall bear a UL label along the conductor length at intervals not exceeding 24 inches.
- C. All conductors shall have size, grade of insulation, voltage and manufacturer's name permanently marked on the outer cover at intervals not exceeding 24 inches.

- D. Conductor size shall be a minimum of No. 12 AWG. Conductor size shall not be less than indicated on the drawings. The minimum size of emergency systems conductors shall be No. 10 AWG.
- E. Insulation voltage level rating shall be 600 volts.
- F. All conduit and conductor sizes indicated on the drawings are based upon copper conductors. 60C ampacities shall be used for sizing of all wire and cable for branch circuits and feeders rated below 125 amps. 75C ampacities shall be used for sizing of all wire and cables for feeders rated 125 amps and above.
- G. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet, and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.

## 2.2 PRODUCT/MATERIALS DESCRIPTION - CONDUCTORS

- A. Conductors shall be stranded copper, 90°C, type THHN/THWN or XHHW unless otherwise indicated on the drawings, required by the California Electrical Code, or specified herein.
- B. Fixture wire shall be No. 16 AWG silicone rubber insulated, stranded fixture wire, type SFF-2 (150°C), or No. 16 AWG thermoplastic, nylon jacketed stranded fixture wire, type TFFN (90°C). Color code as specified herein shall not be required for fixture wire; however, neutral conductor shall be identified distinctly from phase conductors. Conductors connected to vaportight fixtures shall be type AF.
- C. Control conductors for use on 120 volt control wiring systems shall be No. 12 AWG stranded type THHN/THWN, where properly protected, unless indicated otherwise on the drawings. Switch legs are not considered control wiring.
- D. Portable power cables and outlets shall be provided where indicated on the drawings. Cables shall be sized as indicated on the drawings with equal size green equipment ground. Cables shall be jacketed 600 volt SO type. Cable connectors shall be steel case liquid tight sized for cable diameter and shall use strain relief gland fitting to prevent tension on conductor terminals. Where cable drops are indicated on the drawings, use wire mesh strain relief cable grips at both ends of cable. Use cast type outlet device box for device cable drops.
- E. Wire shall be 1991 Code type copper wire of not less than 98% conductivity. All wires shall be stranded. Wires shall bear the Underwriters' label, be color coded and be marked with gauge, type and manufacturer's name on 24" centers.

## 2.3 SPLICES, TAPS, AND CONNECTORS

- A. Splices, taps and connectors (No. 10 AWG and smaller) - Splices and joints shall be twisted together electrically and mechanically strong and insulated with approved type insulated electrical spring connectors.
- B. Splices, taps and connectors (No. 8 and larger) - Joints and connections shall be made with Burndy, T & B, or equal, solderless tool applied pressure lugs and connectors. Uninsulated lugs and wire ends shall be insulated with layers of plastic tape equal to insulation of wire and with all irregular surfaces properly padded with "Scotchfil", 2nd product or equal putty prior to application of tape. Tape shall be equal to Scotch #33, General Electric #AW-1, or equal. Feeder splicing, where permitted, shall be made with high compression sleeve type connector followed by manufactured splicing kit utilizing as insulators, resins poured into a ready-to-use plastic mold to provide a uniform, moisture-proof tough, impact-resistant insulation. Hydraulically applied crimping sleeve or tap connector sized for the conductor. Insulate the hydraulically applied connector with 90°C, 600 volt

insulating cover provided by the connector manufacturer. Insulator materials and installation shall be approved for the specific application, location, voltage and temperature and shall not have an insulation value less than the conductor being joined.

- C. Electrical insulating tape shall be 600 volt, flame retardant, cold and weather resistant, minimally .85 mil thick plastic vinyl material; Scotch No. 88, Tomic No. 85, Permacel No. 295, or equal.

### Part III - EXECUTION

#### 3.1 EXECUTION

- A. Install all wiring in raceway system, except where conductors are indicated or specified not to be installed in raceway. Any conductors found to be damaged or defective, including insulation damaged during installation, shall be removed and replaced at no expense to the University.
  - 1. Pull conductors into raceway simultaneously where more than one is being installed in the same raceway.
  - 2. Use UL listed pulling compound or lubricant where necessary to reduce cable pulling tension below the manufacturer's recommended levels. Compound used shall not deteriorate conductor or insulation.
  - 3. Use pulling means, including fish tape, cable rope, or basket-weave wire/cable grips that will not damage cable or raceway.
- B. Connect all conductors. Torque each terminal connection to the manufacturer's recommended torque value. A calibrated torquing tool shall be used to insure proper torque application.
- C. Do not install more conductors in a raceway than indicated on the drawings. A maximum of three branch circuits are to be installed in any one conduit, on 3 phase 4 wire system, unless specifically indicated otherwise on the drawings. No two branch circuits of the same phase are to be installed in the same conduit, unless specifically indicated on the drawings.
- D. Conductors shall be tested to be continuous and free of short circuits and grounds.
- E. Maintain phase rotation established at service equipment throughout entire project.
- F. Group and lace with waxed linen lacing cord (T & B "Ty-Rap", Holub "Quik-Wrap" or equal) all conductors within all enclosures, i.e., panels, motor controllers, equipment cabinets, switchboards, etc.
- G. Splices in homerun conductors to panelboards, switchboards, switchgear, motor control centers, motor control enclosures, and other panels shall be kept to the minimum practicable and shall only be made as necessary to support pulling of the conductors. Make splices in conductors only within junction boxes, wiring troughs and other enclosures as permitted by the California Electrical Code. Do not splice conductors in pull boxes, panelboards, safety switches, switchboard, switchgear, motor control center, or motor control enclosures.
- H. Splices in conductors installed below grades are not permitted, unless approved in writing by the University's Representative. For taps indicated on the drawings and approved splices below grades, connections shall be made in flush mounted watertight junction box with crimp connectors and watertight resin encapsulating insulating kit. Service entrance conductors shall not be spliced.

- I. Support conductors installed in vertical raceways at intervals not exceeding those distances indicated in the California Electrical Code. Support conductors in pull boxes with bakelite wedge type supports or "Kellem" grips or equal, provided for the size and number of conductors in the raceway. Do not splice conductors in pull boxes used for vertical cable supports unless written permission for splicing is obtained. Where splicing is permitted, make splice with hydraulically applied splicing sleeve.
- J. Terminate conductors No. 10 AWG and smaller specified in Division 26 to be stranded, with crimp type lug or stud. Direct termination of stranded conductors without crimp terminator to terminal screws, lugs, or other points is not permitted even if terminal is rated for stranded conductors. Crimp terminal shall be the configuration type suitable for terminal point.
- K. Make connections between fixture junction box and fixture with fixture wire.
- L. Control, communications or signal conductors shall be installed in separate raceway systems from branch circuit or feeder raceway, unless indicated otherwise on the drawings.
- M. Conductor lengths for parallel circuits shall be equal. Do not configure isolated phasing in separate conduits for parallel conductors.
- N. Install a minimum of twelve inches (300 mm) of slack conductor at each outlet.
- O. Thoroughly clean conductors prior to installing lugs and connectors.
- P. Secure portable cables in accordance with the CEC. Install strain relief devices to prevent tension on terminations if cable is pulled. Install cable grips on drops and connect to outlet box or structure. Leave slack cable loop at drop point.
- Q. All cables and wires passing through manholes and handholes shall be full looped inside the manhole and handhole and supported on galvanized steel racks.

### 3.2 IDENTIFICATION

#### A. Color Code Conductors:

- 1. Color code all secondary service, feeder and branch circuit conductors. Control and signal system conductors need not be color coded.
  - 2. Coding shall be as follows:
    - a. 208Y/120 volt three phase four wire wye system - Phase A: Black, Phase B: Red, Phase C: Blue, Neutral: White, Travellers: Orange.
    - b. 480Y/277 volt three phase four wire system - Phase A: Brown, Phase B: Violet, Phase C: Yellow, Neutral: Gray, Travellers: Pink.
    - c. Grounding conductors shall be green. Grounding conductors for isolated ground circuits shall be green with a yellow trace.
  - 3. Phase conductors No. 10 and smaller shall have solid color compound insulation or color coating. Phase conductors No. 8 and larger shall have solid color compound, color coating or colored phase tape. Colored tape shall be installed on conductors in every box, at each terminal point, cabinet, through manhole or other enclosure.
- B. Conductors within pull boxes shall be grouped and identified with nylon tie straps with circuit identification tag.
- C. Identify each control conductor at its terminal points with wrap around tape wire markers. I.D. to indicate terminal block and point designation, or other appropriate identifying indication.

- D. Refer to ELECTRICAL IDENTIFICATION section of these specifications for additional identification requirements.

### 3.3 TESTING

- A. Refer to Electrical Equipment Acceptance Testing section of this specification for testing requirements.

**END OF SECTION**  
**26 05 19**



**SECTION 26 05 20  
ELECTRICAL CONNECTIONS FOR EQUIPMENT**

**PART I - GENERAL**

1.01 SUMMARY

A. Section Includes:

1. Electrical Connections to equipment specified under other sections or as shown on drawings.

1.02 SUBMITTALS

A. None Required.

1.03 REFERENCE STANDARDS.

- A. Underwriters Laboratories.
- B. NEMA WD5 – Specific Purpose Wiring Devices.

1.04 QUALITY ASSURANCE

- A. Field verify equipment rating with manufacturers nameplate data. Adjust feeders and overcurrent protectors as required to comply with code requirements.

**PART II - PRODUCTS**

2.01 LUGS

A. Acceptable Manufacturers.

1. Burndy Corporation.
2. ILSCO Corp.
3. Or Equal

B. Compression Type: Seamless, one piece, copper, size per conductor applied to, two NEMA Drill.

C. Set Screw Type: Pin type compression fittings for use on #2 AWG and larger conductor sizes, barrels filled with conductive paste.

2.02 CRIMP ON TERMINALS

A. Acceptable Manufacturers

1. Thomas-Betts
2. 3M

3. Or Equal

B. Crimp on, insulated terminals for use on #14 AWG thru #10 AWG conductor size, flanged fork or ring torque style.

## 2.03 CONNECTORS, SPLICES AND TAPS

A. Acceptable Manufacturers

1. Burndy

2. ILSCO

3. Or Equal

B. Compression or set screw type with insulating cover for use on #8 AWG and larger conductor.

C. Split bolt connectors with insulating covers for use on #6 AWG and larger conductor.

## 2.04 WIRE CONNECTORS

A. Acceptable Manufacturers

1. Ideal Industries

2. Buchanan

3. Or Equal

B. Conical spring type with nylon or plastic outer shell, color coded to denote wire size, for use on #14 AWG thru #10 AWG conductors.

C. Butt Compression style insulating crimp splices for use on #14 AWG and smaller conductors.

## PART III - EXECUTION

### 3.01 INSTALLATION

A. Bus Connection: Use compression lugs, bolt to bus bars using cap screws, lock washers and nuts of material electrically compatible with bus.

B. Set Screw Connection: Install pin type compression fitting of similar construction as compression lugs.

C. Terminations to Motors: Use crimp on connectors for motor terminations from stranded conductors and where terminal lugs are not provided by equipment supplier. Use ring-tongue terminals where ever possible.

D. Use connector manufacturer approved crimping tool to install connectors. Do not remove conducting strands or oversize connector. Apply insulating tape over exposed conductor to 150% of conductor insulating material.

E. Tighten connections to ensure maximum surface contact between terminals.

- F. Strip insulation per manufacturers instructions, use conductive paste where required.
- G. Install electrical connections as indicated; in accordance with equipment manufacturer's written instructions and with recognized industry practices.
- H. Coordinate with other work, including wires, cables, raceway and equipment installation, as necessary to properly interface installation of electrical connections for equipment with other work.
- I. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.
- J. Fasten identification markers to each electrical power supply conductor which indicates their voltage, phase and feeder number in accordance with Electrical Identification section. Affix markers on each terminal conductor, as close as possible to the point of connection.

### 3.02 INSPECTION

- A. Inspect area and conditions under which electrical connections for equipment are to be installed. Do not proceed with the work until conditions are acceptable for terminations.

### 3.03 FIELD QUALITY CONTROL

- A. Upon completion of installing of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirements. Correct malfunctioning units at site, then retest to demonstrate compliance.
- B. Test all wiring and connections for continuity and grounds; where such test indicate faulty insulation or other defects, locate, repair and retest. Balance loads at panelboards. Furnish all testing equipment.
- C. Provide documentation of all tests as specified by this and other sections in the following formats. Submit in an electronic form (2 copies) and in hard paper form (2 copies). Submit interim test reports to the University's Representative and 'final' acceptance test reports (where only one test iteration is required consider it be the 'final') to the prime electrical contractor (for a single, consolidated submission of all electrical test and O&M's to the University). Compile the electronic copies (including graphics or drawings) entirely in the current version of Acrobat Abode complete with an interactive field linked Table of Contents (linked to the chapters and subsections within the report). Submit electronic copies on a CD (or CD's).
- D. All electrical systems testing (power and low voltage) as described by each central collection point for all test documentation, whether the tested systems were provided and installed under his contract or not. All Division 16 contractors and vendors are required to cooperate with the prime electrical contractor in this regard and the single submission of tested results shall be considered a contract requirement of all contractors and vendors for all electrical, communication, data, etc. work performed under Division 16.
- E. Provide a copy of the test documentation with the O&M Manual submission.

**END OF SECTION 26 05 20**

**SECTION 26 05 26**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART I - GENERAL**

1.01 SUMMARY

- A. Section Includes:
  - 1. Power System Grounding.
  - 2. Communications System Grounding.
  - 3. Electrical Equipment and Raceway Grounding and bonding.

1.02 SUBMITTALS

- A. Submit a complete set of marked-up record drawings to indicate installed location of system grounding electrode connections, and routing of grounding electrode conductor.
- B. Submit certified test results stating ground resistance from service neutral at service entrance.

1.03 REFERENCE STANDARDS

- A. National Electrical Manufacturers Association (NEMA).
- B. American National Standards Institute (ANSI).

**PART II - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

- A. Erico
- B. Oz Gedney.
- C. or equal

2.02 MATERIALS

- A. Ground Clamp: Water pipe connection, bronze two-piece with serrated jaws, lug sized for grounding electrode conductor.
- B. Connectors, Compression Type: Bronze or Copper, pretreated with conductive paste, sized for conductor to which applied.
- C. Connectors, Exothermic Weld Type: Powder actuated weld. Bond made through exothermic reaction producing molten copper from premixed copper oxide and aluminum powder. Form bond in mold or crucible.

2.03 GENERAL BRANCH CIRCUITS GROUNDING

- A. All grounding conductor wire shall be insulated green copper conductors.

- B. All conduit bushings shall be grounding type.
- C. All grounding connections shall be made with solderless lugs and nonferrous hardware.

### **PART III - EXECUTION**

#### **3.01 GENERAL BRANCH CIRCUITS AND FEEDERS**

- A. All conduit systems, equipment housings, material housings, junction boxes, cabinets, motors, ducts, wireways, cable trays, light fixtures, portable equipment and all other conductive surfaces shall be solidly grounded in accordance with the California Electrical Code to form a continuous, permanent and effective grounding system.
- B. Install a separate green grounding conductor in all conduits, including feeder, branch circuit, and flexible; both metallic and non-metallic. The conduit systems shall not be relied upon as the system equipment grounds. Size all grounding conductors per CEC 250 unless a larger ground is indicated on the drawings. Secure grounding conductors using approved methods to each pull box, junction box, and equipment housing.
- C. All panelboards, junction boxes, pullboxes, wireways and equipment enclosures shall be bonded to the conduit systems.
- D. All building expansion joints shall be bonded.
- E. Isolated ground receptacles shall have both an isolated ground conductor and a separate equipment grounding conductor.

#### **3.02 FLEXIBLE RACEWAY GROUNDING**

- A. Install a ground conductor inside all flexible raceways (e.g. flexible steel, liquid tight). Bond the conductor to the enclosure or ground bus in the nearest box or access on either side of the flexible section. Size conductor as specified, indicated or required by code, whichever is larger.

#### **3.03 SECTIONAL RACEWAY**

- A. Install a ground conductor in all sectional raceways with removable covers for access (e.g., plug-in strips, surface raceways systems, and wireways). Size conductor in accordance with the CEC for the largest phase conductor size installed in raceway, or as indicated. Bond all sections of the raceway to the ground conductor. Connect all receptacle ground terminals in the raceway to the ground conductor, and make other ground connections indicated. This also includes all sectional raceways installed in or on University provided furniture. All surface metal raceways shall be UL listed as an equipment grounding conductor.

#### **3.04 GENERAL GROUNDING REQUIREMENTS**

- A. All ground connectors shall be bronze of the clamp type. All clamp accessories such as bolts, nuts, and washers shall also bronze to assure a permanent corrosion-resistant assembly. Connector shall be as manufactured by Burndy Engineering Company, IlSCO Corporation, or equal. Make connections easily accessible for inspection, underground or concealed in floors or walls.

- B. All ground cable splices, joints, and connections to ground rods shall be made with an exothermic welding process which shall provide a weld with current-carrying capacity not less than that of the conductors welded. Soldered connections shall not be used.
- C. All ground wire shall be insulated, unless otherwise indicated on the Drawings, extra flexible stranded copper cables. Grounding cables installed in earth shall be laid slack.

**END OF SECTION 26 05 26**

**SECTION 26 05 29  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART I - GENERAL**

1.01 SUMMARY

- A. Section Includes:
  - 1. Conduit and equipment supports.
  - 2. Fastening hardware.

1.02 SUBMITTALS

- A. Submit for each isolator, complete manufacturer's description including quantity loading and static deflection.

1.03 REFERENCE STANDARDS

- A. American Plywood Association. (APA)
- B. Underwriters Laboratories. (UL) "Building Materials Directory".

1.04 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

**PART II - PRODUCTS**

2.01 SUPPORT CHANNELS

- A. Acceptable Manufacturers – Support Channels
  - 1. Unistrut
  - 2. Super Strut
  - 3. Or Equal
- B. Support Channel: 12-gauge galvanized or painted steel, "U" section, 1-½" square nominal in section.
- C. Hardware: Manufacturer's standard as required to support equipment. Provide corrosion resistant finish.

2.02 CONDUIT SUPPORTS

- A. Conduit clamps, straps, and supports shall be steel or malleable iron for all exposed individual conduit runs. Clip type hangers may be used in concealed areas on individual conduit runs. Group mounted, exposed or concealed shall be supported by trapeze hangers constructed of formed steel channels and threaded rods.

### **PART III - EXECUTION**

#### **3.01 INSTALLATION**

- A. Fasten hanger rods, conduit clamps, outlet and junction boxes to building structure using bolts, beam clamps, and spring steel clips.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, other conduit, or roof deck.
- D. Install all support devices according to manufacturers guidelines and recommendations.
- E. Do not drill through structural framing members.
- F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- G. Install freestanding electrical equipment on concrete pads four inches high and overlapping equipment footprint by two inches on all sides.
- H. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall, or on ¾" plywood backboards.
- I. Install plywood backboards over gypsum board or directly to stud framing as indicated. Fasten to studs with self-tapping screws according to APA recommendations.
- J. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls with #10 S.M.S. at 12" O.C., 4 minimum, typical unless otherwise noted.
- K. Do not support equipment or fixtures from the roof deck. Provide necessary framing and joist hangers to span between structural members to locate hangers properly.
- L. Do not exceed a maximum point load of 100 lbs. to any member. Locate point loads at least 4' from any other point load on the same member.
- M. All equipment shall be installed in full compliance with all applicable seismic requirements of Title 24, Part 2, CBC.

**END OF SECTION 26 05 29**



**SECTION 26 05 32**  
**PULL BOXES AND JUNCTION BOXES**

**PART I - GENERAL**

1.01 SUMMARY

- A. Section Includes:
  - 1. Interior Pull and Junction Boxes

1.02 SUBMITTALS

- A. Required.

1.03 REFERENCES

- A. Underwriters Laboratories (UL)
- B. National Electrical Manufacturers Association (NEMA) #250 - Enclosures for Electrical Equipment (1000 volts maximum).

**PART II - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

- A. O.Z. Gedney; General Signal
- B. Hoffman
- C. Or Equal

2.02 PULLBOXES AND JUNCTION BOXES

- A. Indoor general purpose boxes shall be a NEMA 1 enclosure, constructed of code gauge galvanized steel. The boxes shall be constructed from a single piece of steel with folded and welded corners. The boxes shall have a flat removable, galvanized sheet metal cover held in place with binder head sheet metal screws. Supply boxes with no knockouts.
- B. Size boxes by code requirements related to the number and size of conduits and wire entering the box.
- C. Standard size metal boxes stamped from galvanized steel shall be used for indoor general purpose where size and capacity are acceptable by code.
- D. Boxes shall be of the depth required for wiring capacity.
- E. Boxes for hazardous (classified) locations shall be approved for the classification and use.
- F. Provide boxes with a blank cover.

### **PART III - EXECUTION**

#### **3.01 INSTALLATION**

- A. Pull boxes and junction boxes required are not shown on the plans; however, they shall be provided to meet Code requirements and improve ease of wire pulling. Provide pull boxes or junction boxes in conduit runs over 90' long or when more than 4 quarter bends occur in a conduit run. Boxes shall be sized to meet CEC requirements.
- B. Mount all pullboxes and junction boxes securely to the building structure. Boxes shall not depend on conduit for support.
- C. Install pullboxes and junction boxes such that covers are accessible. Do not install in finished areas unless approved by University's Representative.
- D. Cut or sheared edges shall be filed or honed, eliminating all sharp edges.
- E. Pullboxes and junction boxes shall be installed with unused or open knockouts plugged.
- F. All junction boxes shall be labeled on cover indicating circuit number and panel number and all wires shall be labeled in junction boxes with circuit numbers.

**END OF SECTION 26 05 32**

**SECTION 26 05 33  
RACEWAYS**

**PART I - GENERAL**

1.01 DESCRIPTION

- A. This section covers the complete interior and exterior raceway system.
- B. Definition: The term conduit, as used in this Specification, shall mean any or all of the raceway types specified.

1.02 QUALITY ASSURANCE

- A. Referenced Industry Standard: The following specifications and standards are incorporated into and become a part of this Specification by reference.
  - 1. Underwriters' Laboratories, Inc. (UL) Publications:
    - a. No. 1 Flexible Metal Electrical Conduit
    - b. No. 1242 Rigid Galvanized Conduit
    - c. No. 467 Electrical Grounding and Bonding
    - d. No. 797 Electrical Metallic Tubing
    - e. No. 1242 Intermediate Metal Conduit
  - 2. American National Standards Institute (ANSI):
    - a. C-80.1 Rigid Galvanized Conduit
    - b. C-80.3 Electrical Metallic Tubing
- B. Acceptable Manufacturers: Products of the following manufacturers, which comply with these specifications, are acceptable.
  - 1. Metallic Conduit Fittings:
    - a. RACO
    - b. Thomas and Betts
    - c. or equal
  - 2. Support Channel:
    - a. Powers
    - b. Unistrut
    - c. or equal

C. Coordination

1. Coordinate conduit installation with electrical equipment furnished.
2. Coordinate conduit installation with contract documents. Adjust installation to eliminate conflicts. Review all shop drawings submitted under this and other sections to insure coordination with all equipment requiring electrical service and to avoid conflict interferences. Coordinate installation sequence to avoid conflicts including equipment access and provide the fastest overall installation schedule.

1.03 STORAGE AND HANDLING

- A. Refer to the Basic Electrical Requirements section of the specifications for storage and handling requirements.
- B. Damaged, oxidized, warped, improperly stored material or material with excessive amounts of foreign debris will be removed from the project and replaced with new materials, at no cost to the University.

1.04 SUBMITTALS

- A. Required.

**PART II - PRODUCTS**

2.01 GENERAL MATERIALS REQUIREMENTS

- A. Furnish all materials specified herein.
- B. All conduit and fittings shall be listed and bear a label by Underwriters' Laboratories (UL) for use as raceway system for electrical conductors.
- C. Raceway is required for all wiring, unless specifically indicated or specified otherwise.
- D. Size: The minimum size of conduit shall be  $\frac{3}{4}$ ". The size of all conduits shall be in accordance with the CEC using 30% fill, but not less than indicated on the drawings.
- E. Bushings shall be metallic insulated type. Weatherproof or dust-tight installations shall be liquid-tight with sealing ring and insulated throat. Bushing shall be OZ/Gedney type KR, or equal (Or equal, no known equal.)
- F. Expansion and deflection fittings shall be OZ/Gedney, type DX, or equal

2.02 EMT CONDUIT AND FITTINGS

- A. Electrical Metallic Tubing shall conform to UL 797, cold rolled steel tubing with zinc coating on outside and protective enamel coating on inside.
- B. Electrical Metallic Tubing (EMT) couplings and connectors shall be steel compression "concretetight" type. Malleable iron, die cast or pressure cast fittings are not permitted. All connectors shall be nylon insulated throat type. Fittings shall meet same requirements for finish and material as EMT conduit. Box connectors shall be equipped with insulated throat.

- C. Connectors at cabinets, boxes, and gutters shall be metallic nylon grounding type with insulated bushings.

#### 2.03 RIGID AND IMC CONDUIT and FITTINGS

- A. Intermediate metallic conduit and rigid steel conduit shall conform to UL 6, standard weight, mild steel pipe, zinc coated on both inside and outside by a hot dipping or sherardizing process. Inside and outside of conduit shall be finished with a protective coating.
- B. Fittings for rigid steel and IMC shall be standard threaded couplings, locknuts, bushings and elbows. Fittings shall be assembled with anti-corrosion, conductive anti-seize compound at joints made absolutely tight to exclude water. All materials shall be steel or malleable iron only. Setscrew or non-thread fittings are not permitted.
- C. Bushings shall be metallic insulating type consisting of insulating insert molded or locked into the metallic body of the fittings.
- D. Erickson-type couplings may be used to complete a conduit run. IMC couplings may be the integral retractable (Uni-Couple) type.
- E. Connectors at cabinets, boxes, and gutters shall be metallic nylon grounding type with insulated bushings.

#### 2.04 CONDUIT SUPPORTS

- A. All parts and hardware shall be zinc-coated or have equivalent corrosion protection.
- B. Conduit straps shall be single hole cast metal type or two hole galvanized metal type. Conduit clamps shall be spring steel type for use with exposed structural steel.
- C. Conduit support channels shall be 1.5" x 1.5" x 14 gauge galvanized (or with equivalent treatment) channel. Channel suspension shall be minimum 1/4" threaded steel rods. Spring steel clips are not acceptable. Conduit straps shall be spring steel conduit straps compatible with channel. Wire or chain is not acceptable for conduit hangers. All installations shall meet applicable seismic requirements.
- D. Individual conduit hangers shall be galvanized spring steel specifically designed for the purpose, sized appropriately for the conduit type and diameter, and have pre-assembled closure bolt and nut and provisions for receiving threaded hanger rod. Support with 1/4" threaded steel rod for individual conduits 1.5" and smaller and 3/8" rod for individual conduits 2.0" and larger. All installations shall meet applicable seismic requirements.
- E. Individual conduit straps on metal studs shall be spring steel and should wrap around entire face of stud securely biting into both edges and have provisions for screwing into stud. Size for conduit to be support. Tie wraps are not acceptable.
- F. Support multiple conduits from metal studs using pre-assembled bar hanger assembly consisting of hanger bar, retaining clips and conduit straps.

#### 2.05 FLEXIBLE CONDUIT AND FITTINGS

- A. Flexible conduit shall be steel metallic type, zinc coated on both inside and outside by hot dipping or sherardizing process.

- B. Where specified herein, indicated on the drawings, or when used in damp or wet locations, as classified by the California Electrical Code, flexible conduit shall be liquid tight. Liquid-tight conduit shall be galvanized with extruded polyvinyl covering and with water-tight connectors.
- C. All flexible conduit shall be classified as suitable for system grounding.
- D. Connectors for flexible conduit shall be steel insulated throat type rated as suitable for system ground continuity. Connectors for liquid tight flexible conduit shall be screw-in ground cone type.
- E. Flexible conduit shall not be less than ¾" trade size and in no case shall flexible conduit size be less than permitted by the California Electrical Code for the number and size of conductors to be installed herein.
- F. No aluminum flexible conduit shall be used.

## 2.06 MISCELLANEOUS CONDUIT FITTINGS AND ACCESSORIES

- A. Vinyl all weather electrical tape for corrosion protection shall be Scotch #88, Tomic #85, Permacel #295 or equal.
- B. Expansion and deflection couplings shall be in accordance with UL 467 and UL 514. They shall accommodate ¾" deflection, expansion, or contraction in any direction and shall allow 30° angular deflections. Couplings shall contain an internal flexible metal braid to maintain raceway system ground continuity.
- C. Fire and smoke stop materials shall be UL rated to maintain the fire floor or firewall partition rating.

## PART III - EXECUTION

### 3.01 INSTALLATION

- A. General
  - 1. Conceal all conduits, except in unfinished spaces such as equipment rooms or where indicated by symbol on the drawings or as approved by the University's Representative. Run concealed in areas having finished ceilings and furred walls. Run all cross conduits and vertical risers or drops concealed in wall and/or partitions. Run vertical risers or drops up or down between wall studs. Should it be necessary to notch any framing members, notch only at locations in a location and manner approved by University's Representative.
  - 2. Exposed conduit below 8'-0" shall be rigid type.
  - 3. Provide flexible connections of short length to equipment subject to vibration or movement and to all motors. Provide a separate bonding conductor in all flexible connections.
  - 4. Support conduits per seismic guidelines outlined in section 16012.
  - 5. Maintain a minimum of 6" clearance from conduit to steam or hot water pipes.
  - 6. Leave all empty conduits with a galvanized pull wire or nylon pull rope.

7. Install as complete raceway runs prior to installation of cables or wires.
8. Flattened, dented, or deformed conduits are not permitted and shall be removed and replaced.
9. Secure rigid conduit i.e., rigid galvanized conduit and intermediate metal conduit, to sheet metal enclosures with two (2) locknuts and insulated bushing. Secure EMT to sheet metal enclosures with insulated throat connectors.
10. Fasten conduit support device to structure with wood screws on wood, toggle bolts on hollow masonry, anchors as specified on solid masonry or concrete, and machine bolts, clamps, or spring steel clips, on steel. Nails are not acceptable.
11. Protect conduits against dirt, plaster, and foreign debris with conduit plugs. Plugs shall remain in place until all masonry is complete. Protect conduit stud-ups during construction from damage; any damaged conduits shall not be used.
12. Install conduit with wiring, including homeruns as indicated on the drawings. Any change resulting in a savings in labor or materials is to be made only in accordance with a contract change. Deviations shall be made only where necessary to avoid interferences and when approved by University's Representative by written authorization.
13. Where conduit passes through finished walls or ceilings, provide steel escutcheon chrome plates or paint as directed.
14. Provide sleeves for conduit passing through floor slabs and/or concrete masonry walls.
15. Separate raceway systems are to be installed for power systems and for control, signal and communications systems. Do not install control, signal or communications cables in the same raceways as branch circuit or feeder cables, unless indicated otherwise on the drawings.
16. Provide expansion fitting in all conduits where length of run exceeds 200' or where conduits pass building expansion joints.
17. Telephone and data conduits shall be installed with wide sweep 90° bends; minimum radius shall be 60".

B. Uses Permitted

1. Electrical metallic tubing (EMT) shall be used as follows:
  - a. Concealed in stud partitions and hollow masonry walls.
  - b. For connections from junction box to lighting fixtures except in accessible ceilings.
  - c. Above In
  - d. suspended or accessible ceilings above 8'.
  - e. Exposed in dry locations above 8 feet where not subjected to mechanical damage.

- f. In furred ceiling spaces.
  - g. For fire alarms system conduit. Paint red 6" wide every eight feet.
2. All other conduit, unless excluded herein, not permitted in accordance with the California Electrical Code, or otherwise indicated on the drawings, shall be electrical metallic tubing (EMT).
  3. Conduit types shall not be mixed indiscriminately with other types in the same run, unless specified herein or required by the CEC.
  4. Use flexible conduit for connections to motors, dry type transformers, electrical duct heaters, unit heaters, expansion joints, and flush mounted lighting fixtures. Conduit must be secured.
    - a. Flexible conduit used for connection of motor, dry type transformers, electric duct heaters, and unit heaters, shall not exceed 18" in length.
    - b. Flexible conduit from outlet box to flush mounted lighting fixture shall not exceed 6 3 feet in length.
    - c. Maintain ground continuity through flexible conduit with green equipment grounding conductor; do not use flexible conduit for ground continuity.
    - d. Liquid tight conduit shall be used to connect equipment in mechanical equipment rooms and exterior installations, and for final connections to all equipment containing water or other liquid service.



5. No conduit requiring cutting of cross-webs of concrete masonry units is permitted. Conduit shall be threaded through cells or concrete masonry units lowered around conduit. Neither horizontal joint reinforcement nor bond beam reinforcement shall be cut for conduit installation.
6. Where hazardous locations, as classified by the California Electrical Code, exist, all conduits and fittings and the installation of these materials shall comply with Article 500 of the California Electrical Code.
7. LB condulets for conduits larger than 1-½" I.D. shall not be used unless of the mogul design and secured to the building structure within 6" below and along the side of the condulet.

C. Concealed (Above Ceilings and in Walls) and Exposed Raceway Installation

1. Conduit shall be run parallel or at right angles to walls, ceilings, and structural members.
2. Support branch circuit conduits at intervals not exceeding 10' and within 3' of each outlet, junction box, cabinet or fitting. Attach individual branch circuit conduits to structural steel members with spring steel type or beam conduit clamps and to non-metallic structural members with one hole conduit straps. For exposed conduits and where conduits must be suspended below structure, single conduit runs shall be supported from structure by hangar rod and conduit clamp assembly. Multiple conduits shall be supported by trapeze type support suspended from structure. Do not attach conduits to ceiling suspension system channels or suspension wires.
3. Attach feeder conduits larger than 1" trade diameter to or from structure on intervals not exceeding 10' with conduit beam clamps, one hole conduit straps or trapeze type support in accordance with support systems described for branch circuit conduits.
4. Single-flange clamps are unacceptable
5. Exposed conduits shall be painted, see Section 09900 of the specifications.
6. For fire alarms system conduit. Paint red 6" wide every eight feet.
7. Install conduit sleeves in slabs where conduits 2.0" and larger pass through. Sleeves shall extent 1" minimum above finished slab. Seal all spare sleeves and between conduits and sleeves to maintain fire rating and to make watertight and smoketight.
8. Install all conduits or sleeves penetrating rated firewalls or fire floors to maintain fire rating of wall or floor.
9. Conduits rigidly secured to building construction on opposite sides of a building expansion joint shall be provided with an expansion and deflection coupling. In lieu of an expansion coupling, conduits 2-½" and smaller may be provided with junction boxes on both sides of the expansion joint connected by 15" of slack flexible conduit with bonding jumper.

3.02 ADJUSTMENT, CLEANING AND PROTECTION

PROJECT NO. 9557760  
UC DAVIS HEALTH  
MAIN HOSP IT HUGS UPGRADE

- A. Clean: Upon completion, clean all installed materials of paint, dirt, and construction debris. All conduit systems shall be cleaned of water and debris prior to the installation of any conductors.

**END OF SECTION 26 05 33**

**SECTION 260535  
ELECTRICAL BOXES AND FITTINGS**

**PART I - GENERAL**

1.01 SUMMARY

- A. Section Includes:
  - 1. Pressed Steel Boxes and Fittings.
  - 2. FS and FD Boxes.

1.02 SUBMITTALS

- A. Required.

1.03 REFERENCE STANDARDS

- A. Underwriters Laboratories (UL).
- B. National Electrical Manufacturers Association (NEMA) #250 - Enclosures for Electrical Equipment.
- C. NEMA 051 - Sheet steel outlet boxes, device boxes, covers and box supports.
- D. NEMA 052 - Non-metallic outlet boxes, covers and box supports.

**PART II - PRODUCTS**

2.01 STEEL BOXES AND FITTINGS

- A. Acceptable Manufacturers:
  - 1. Midwest Electric
  - 2. RACO
  - 3. or equal
- B. Boxes to be non-gangable, having knockouts as required and compatible covers or extension rings suitable for installed devices.
- C. Boxes to be galvanized stamped steel, with grounding lug tapped hole.
- D. Provide  $\frac{3}{8}$ " fixture studs in ceiling outlet boxes where required.

2.02 FS AND FD BOXES

- A. Acceptable Manufacturers:
  - 1. Appleton

2. Crouse - Hinds
  3. or equal
- B. Provide cast iron alloy boxes with epoxy paint or galvanized finish. Aluminum or pot metal boxes are not acceptable. Boxes shall have threaded hubs sized for conduit without adapters and threaded holes for securing cover. Device boxes shall be provided with proper weatherproof, gasketed cover assemblies, junction and pull boxes shall be provided with flat gasketed covers. Fixture boxes shall be 4" round or as required for the fixture. Junction and pull boxes requiring more than one gang shall be multi-gang FS or FD or dimensioned cast boxes with cast covers.

### **PART III - EXECUTION**

#### **3.01 GENERAL**

- A. Install all boxes so they are completely covered by the wall plate or fixture.
- B. Provide galvanized one-piece or welded pressed steel boxes and fittings unless indicated otherwise. Provide galvanized steel outlet box covers for surface mounted galvanized steel boxes in unfinished areas. Boxes in unfinished areas, installed exposed, shall be cast type "conduit" for switches and convenience outlets. Exposed boxes mounted below 8' from finished floor shall be cast type. Provide blank cover for all boxes without fixture or device.
- C. Provide FS and FD boxes and required covers surface mounted in damp or wet locations and as indicated on plans. Boxes shall be securely mounted using mounting lugs or other method made in a way so as not to degrade the weatherproof nature of the system.
- D. Install all outlet boxes rigidly, plumb, and level. Secure outlet boxes to ceiling system support members and wires using only clips designed and approved for the purpose. Do not cut insulation in outside walls to install outlet boxes. Do not use through-the-wall boxes unless specifically noted. Do not install boxes back-to-back in adjoining rooms. Offset outlet boxes installed back-to-back in fire-rated walls and partitions a minimum of 24 inches horizontally. Protect boxes during construction to prevent entrance of foreign materials such as concrete, mortar, plaster, paint, etc.
- E. Flush mounted boxes shall be installed with opening edge flush with finish surface.
- F. Pull boxes shall be provided in all runs of 90' or more in length or such that not more than four 90° bends occur between boxes. Junction and pull boxes shall be located in accessible locations and shall be concealed in finished work and shall be permanently identified with system label. Where concealed accessible space is not available in finished areas, boxes shall be flush mounted with rings and blank plates at standard boxes, flanges and plaster stops at large boxes. Flush boxes shall be carefully aligned to be plumb. Locations to be coordinated with University's Representative prior to installation.
- G. 4" octagonal boxes or square boxes with plaster rings shall be used for ceiling or wall light fixture outlets. Boxes for fixtures shall be equipped with fixture studs. Boxes shall be supported as required to carry loads as required by code. Other ceiling outlets shall be 4" square or larger with plaster rings unless indicated otherwise on drawings. Boxes shall be flush mounted or concealed in finished construction.

- H. Provide minimum of  $\frac{3}{4}$ " plaster rings designed for the purpose for outlet boxes in plaster or gypsum board walls.
- I. Provide masonry boxes and extension rings for boxes in concrete block, brick, and glazed tile walls. Secure with auxiliary plates, bars or clips and grout in place.
- J. Install outlet device mounting rings such that they extend no more than  $\frac{1}{16}$ ", or are recessed no more than  $\frac{3}{16}$ " from wall surface.
- K. Support all outlet boxes independently from the raceway systems. Securely support by adequate wood backing or by manufactured adjustable channel type heavy-duty box hangers. Boxes with metal box hangers shall be attached to metal studs. Box hangers shall be securely tied or welded (where permitted) to metal studs. Paint weld with rust inhibitor.
- L. Install outlet boxes for electric water coolers concealed inside cooler cabinets. Locate outlet boxes as recommended by equipment supplier.
- M. For dimensional locations of the actual installed location shall not vary from the dimensioned location by more than plus or minus one-half inch, unless otherwise noted.
- N. Boxes for local switches shall be at least 1- $\frac{1}{2}$ " deep 4" square for 1 or 2 gang switches, with switch plaster rings and gang box with gang cover.
- O. Boxes for telephone and data shall be minimum 2- $\frac{1}{8}$ " deep.
- P. Use screws and not nails to support outlet boxes.
- Q. Nails shall not be used to support outlet boxes. Boxes must be accurately placed for finish, independently and securely supported by adequate wood backing or by manufactured adjustable channel type heavy-duty box hangers. Boxes with metal box hangers shall be attached to metal studs. Box hangers shall be securely tied or welded (where permitted) to metal studs. Paint weld with rust inhibitor. Boxes installed in masonry, tile, or concrete block construction shall be secured with auxiliary plates, bars or clips and be grouted in place.

**END OF SECTION 260535**

**SECTION 26 05 53**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART I - GENERAL**

1.01 DESCRIPTION

- A. Extent of electrical identification work is as outlined by this specification.
- B. Types of electrical identification work specified in this section include the following:
  - 1. Electrical power, control and communication conductors.
  - 2. Operational instructions and warnings.
  - 3. Danger signs.
  - 4. Equipment/system identification signs.

1.02 QUALITY ASSURANCE

- A. CEC Compliance: Comply with CEC as applicable to installation of identifying labels and markers for wiring and equipment.
- B. UL Compliance: Comply with applicable requirements of UL Std 969, "Marking and Labeling Systems", pertaining to electrical identification systems.
- C. ANSI Compliance: Comply with applicable requirements of ANSI Std A13.1, "Scheme for the Identification of Piping Systems".
- D. NEMA Compliance: Comply with applicable requirements of NEMA Std No's WC-1 and WC-2 pertaining to identification of power and control conductors.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's data on electrical identification materials and products.
- B. Samples: Submit samples of each color, lettering style and other graphic representation required for each identification material or system.

**PART II - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide electrical identification products of one of the following (for each type marker):
  - 1. Brady, W.H. Company
  - 2. Panduit Corporation
  - 3. or equal

## 2.02 ELECTRICAL IDENTIFICATION MATERIALS

- A. Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, provide single selection for each application.
  
- B. Color-Coded Plastic Tape:
  - 1. Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils thick by 1-1/2" wide.
    - a. Colors: Unless otherwise indicated or required by governing regulations, provide orange tape.
  
- C. Cable/Conductor Identification Bands:
  - 1. Provide manufacturer's standard vinyl-cloth self-adhesive cable/conductor markers of wrap-around type, either pre-numbered plastic coated type, or write-on type with clear plastic self-adhesive cover flap; numbered to show circuit identification.
  
- D. Plasticized Tags:
  - 1. Manufacturer's standard pre-printed or partially pre-printed accident-prevention and operational tags, of plasticized card stock with matte finish suitable for writing, approximately 3-1/4" x 5-5/8", with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording, e.g., DANGER, CAUTION, DO NOT OPERATE.
  
- E. Self-Adhesive Plastic Signs:
  - 1. Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings; of sizes suitable for application areas and adequate for visibility, with proper wording for each application, e.g., 208V, EXHAUST FAN, RECTIFIER.
  - 2. Colors: Unless otherwise indicated, or required by governing regulations, provide white signs with black lettering.
  - 3. Baked Enamel Danger Signs:
  - 4. General: Provide manufacturer's standard DANGER signs of baked enamel finish on 20-gauge steel; of standard red, black and white graphics; 14" x 10" size except where 10" x 7" is the largest size which can be applied where needed, and except where larger size is needed for adequate vision; with recognized standard explanation wording, e.g., HIGH VOLTAGE, KEEP AWAY, BURIED CABLE, DO NOT TOUCH SWITCH.
  
- F. Engraved Plastic-Laminate Signs:
  - 1. Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in sizes and thicknesses indicated, engraved with engraver's standard letter style of sizes and wording indicated, black face and white core plies (letter color)

except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.

2. Thickness: 1/8", except as otherwise indicated.
3. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.

## 2.03 LETTERING AND GRAPHICS

- A. General: Coordinate names, abbreviations and other designations used in electrical identification work, with corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturer or as required for proper identification and operation/maintenance of electrical systems and equipment. Comply with ANSI A13.1 pertaining to minimum sizes for letters and numbers.

## PART III - EXECUTION

### 3.01 APPLICATION AND INSTALLATION

- A. General Installation Requirements:
  1. Install electrical identification products as indicated, in accordance with manufacturer's written instructions, and requirements of CEC and OSHA.
  2. Coordination: Where identification is to be applied to surfaces which require finish, install identification after completion of painting.
  3. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.
- B. Conduit Identification:
  1. Where electrical conduit is exposed in spaces with exposed mechanical piping which is identified by color-coded method, apply color-coded identification on electrical conduit in manner similar to piping identification. Except as otherwise indicated, use white as coded color for conduit.
- C. Box Identification:
  1. After completion, using an indelible wide tip marker, indicate on the cover of each junction and pull box the designation of the circuits contained therein, i.e., A-1, 3, 5. Use a black marker for normal power circuits a red marker for critical circuits, an orange marker for life safety circuits, and a green marker for equipment circuits.
  2. All junction and pull boxes for wiring systems above 600V shall be identified with high voltage warning labels installed every 20 linear feet in accordance with OSHA standards. All boxes shall also be painted red, see Section 09 91 23 of the specifications.
  3. All junction and pull boxes for the fire alarm system shall be painted red. All raceway for the fire alarm system shall be labeled "Fire Alarm" in red letters on intervals not to exceed ten feet.



D. Cable/Conductor Identification:

1. Apply cable/conductor identification, including voltage, phase and feeder number, on each cable/conductor in each box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present, except where another form of identification (such as color-coded conductors) is provided. Match identification with marking system used in panel boards, shop drawings, contract documents, and similar previously established identification for project's electrical work. Refer to Section 26 05 19 of these specifications for color-coding requirements.

E. Operational Identification and Warnings:

1. Wherever required by OSHA or directed by the University, to ensure safe and efficient operation and maintenance of electrical systems, including prevention of misuse of electrical facilities equipment by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instruction or warnings on switches, outlets and other controls, devices and covers of electrical enclosures. Where detailed instructions or explanations are needed, provide plasticized tags with clearly written messages adequate for intended purpose. Request a meeting with the University prior to substantial completion to coordinate warning requirements.

F. Danger Signs:

1. In addition to installation of danger signs required by governing regulations and authorities, install appropriate danger signs at locations identified by the University as constituting similar dangers for persons in or about project. Request a meeting with the University prior to substantial completion to coordinate danger sign requirements.
  - a. High Voltage: Install danger signs wherever it is possible, under any circumstances, for persons to come into contact with electrical power of voltages higher than 110-120 volts.
  - b. Critical Switches/Controls: Install danger signs on switches and similar controls, regardless of whether concealed or locked up, where untimely or inadvertent operation (by anyone) could result in significant danger to persons, or damage to or loss of property.

G. Equipment/System Identification:

1. Install engraved plastic-laminate sign on each major unit of electrical equipment in building; including central or master unit of each electrical system including communication/control/signal systems, unless unit is specified with its own self-explanatory identification or signal system. Except as otherwise indicated, provide single line of text, ½" high lettering, on 1-½" high sign (2" high where 2 lines are required), white lettering in black field. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for each unit of the following categories of electrical work:
  - a. Electrical cabinets and enclosures.
2. Install signs at locations indicated or, where not otherwise indicated, at location for best convenience of viewing without interference with operation and

maintenance of equipment. Secure to substrate with fasteners, except use adhesive where fasteners should not or cannot penetrate substrate. Identification of flush mounted cabinets and panel boards shall be on the inside of the device.

3. Panel boards, individually mounted circuit breakers, and each breaker in the switchboards, secondary unit substations, and distribution panels shall be identified with an engraved plastic laminate sign. Plastic nameplates shall be multicolored laminated plastic with faceplate and core as scheduled. Lettering shall be engraved minimum ¼" high letters.
  - a. 480/277-volt normal power equipment shall be identified with white faceplate with green core.
  - b. 480/277-volt critical branch power equipment shall be identified with white faceplate with yellow core.
  - c. 480/277-volt life safety branch power equipment shall be identified with white faceplate with red core.
  - d. 480/277-volt equipment branch power equipment shall be identified with white faceplate with blue core.
  - e. 208/120-volt normal power equipment shall be identified with green faceplate with white core.
  - f. 208/120-volt critical branch power equipment shall be identified with yellow faceplate with white core.
  - g. 208/120-volt life safety branch power equipment shall be identified with red faceplate with white core.
  - h. 208/120-volt equipment branch power equipment shall be identified with blue faceplate with white core.
  - i. Equipment identification is to indicate the following:
    - 1) Equipment ID abbreviation.
    - 2) Voltage, phase, wires and frequency.
    - 3) Emergency or other system.
    - 4) Power source origination.

Example: Panel SLGHA1  
480/277V, 3 Ø, 4 W  
Life Safety System  
Fed by EM1
  - j. Submit complete schedule with the shop drawings listing all nameplates and information contained thereon.

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MAIN HOSP IT HUGS UPGRADE

**END OF SECTION 26 05 53**

**SECTION 26 27 16  
CABINETS**

**PART I - GENERAL**

1.01 SUMMARY

A. Section includes:

1. Electrical equipment cabinet and enclosures.

1.02 SUBMITTALS

A. Shop Drawings:

1. Submit in accordance with Division 1, showing basic construction including metal gauge, hinging, latch, keying, painting, and any special features such as plywood backboards and insulation.

- B. In accordance with OSHPD requirements for deferred approval items, provide structural calculations, drawings and details for all anchorage of all secondary unit substations not already detailed on the structural drawings. The design shall be performed by a California registered Structural Engineer in accordance with CBC Title 24, part 2, volume 2.

1.03 REFERENCE STANDARDS

A. Underwriters Laboratory

B. NEMA

**PART II - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

A. Circle AW

B. Hoffman

C. Or Equal

2.02 CABINETS

- A. Cabinets shall be constructed of code gauge steel sized as indicated on the plan or as required for the application. The cabinet shall not have factory machine knockouts.

- B. Cabinets shall be provided with barriers between signal voltage sections and power voltage sections. All power voltage sections shall have a dead front barrier over all terminals and live parts.

- C. Doors shall be hinged, latched and lockable. Recessed mounted cabinets shall have trims extending 1" beyond the backbox, surface mounted cabinets shall have trims flush with the backbox. Locksets shall be keyed alike.

- D. Trim shall be bonderized and painted with two coats of baked enamel ASA #61, light gray. Surface backboxes shall be painted to match. Recessed backboxes shall be galvanized.
- E. Line cabinets with 1/2" of non-flammable foam insulation where relays, contactors or any noise generating equipment are mounted in cabinets,

### **PART III - EXECUTION**

#### **3.01 INSTALLATION**

- A. Mount cabinets rigidly to structure. Cabinets shall not depend on conduit for support.
- B. Cabinets mounted on gypsum board and steel stud wall construction shall be supported from the studs.
- C. Installation shall comply with all applicable seismic requirements.

**END OF SECTION 26 27 16**

**SECTION 26 27 19**  
**SURFACES METAL RACEWAY (MOA)**

**PART I - GENERAL**

1.01 SUMMARY

- A. Section includes:
  - 1. Surface metal raceways.
  - 2. Fittings, devices and plates.
  - 3. Mounting supports

1.02 SUBMITTALS

- A. Product Data: Submit in accordance with Division 1.

1.03 REFERENCE STANDARDS

- A. UL
- B. NEMA
- C. ANSI

**PART II - PRODUCTS**

2.01 ACCEPTABLE MANUFACTURERS

- A. Wiremold, or equal.
- B. Wiremold numbers are used to identify sizes and types.

2.02 SURFACE RACEWAY TYPES

- A. The surface raceway types listed in this article refer to Wiremold nomenclature and shall be assembled with receptacles to be multi-outlet assemblies.
  - 1. Finish: Ivory.
- B. Legrand Series 2000 base and cover constructed of steel. Provide divider when used for communications and power.

2.03 FITTINGS AND ACCESSORIES

- A. Fittings:
  - 1. Raceway system with factory couplings, elbows, tees, corners, end fittings, panel connectors, conduit connectors, and device brackets.

- B. Devices:
  - 1. Devices shall be standard as specified in Section 26 27 26 – Wiring Devices. Mount at locations and spacing's as specified or shown on the drawings.
- C. Plates:
  - 1. Plates shall be stainless steel for raceways 2-<sup>3</sup>/<sub>4</sub>" wide or larger as specified in Section 26 27 26 – Wiring Devices. Install plates at all device locations.
- D. Mountings and Supports:
  - 1. All mounting clips, C-hangers, T-bar clips, and mounting supports shall be by the same manufacturer and shall be furnished where required.

### **PART III - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install surface raceway at locations shown on the drawings.
- B. Field cut raceway and cover to lengths required for finished installation.
- C. Secure raceway through the back with metal or wood screws, as the supporting structure dictates.
- D. Provide surface raceways with a green color insulated copper ground conductor. This conductor shall be connected to the supply panelboard ground bus and to each ground screw on each receptacle.
- E. Branch circuit feed to surface raceway shall be concealed behind raceway by direct conduit connection to base channel or outlet box where base channel will cover the entire box.

**END OF SECTION 26 27 19**

**SECTION 26 90 90  
ELECTRICAL EQUIPMENT ACCEPTANCE TESTING**

**PART I - GENERAL**

1.01 DESCRIPTION

- A. The work required under this section of the specifications consists of the start-up testing and inspection of the electrical equipment designated within. All labor and testing equipment which is required shall be provided under this section of the specifications.

1.02 GENERAL

- A. Perform the tests as outlined below to insure system acceptance and shall engage the services of approved testing organizations to provide start-up testing and inspection of the electrical equipment as specified in this section. The testing organizations may be an independent division of the manufacturer of the assembled products being tested. If an outside testing organization is approved, a representative of the manufacturer shall be under contract by the testing company. The representative shall be present during all testing to insure that the testing is performed properly and that any deficiencies discovered are promptly corrected.
- B. The testing organization shall be a full service company that employs factory trained test engineers capable of trouble shooting as well as identifying equipment problems. All work outlined shall be performed under the full time on-site supervision of a graduate engineer with a minimum of five years of field-testing experience. The test, plan, procedures, and report shall be reviewed and approved by one of the testing company's electrical engineers. Upon request, the testing company shall submit proof of its qualifications.
- C. The testing organization shall provide the equipment and technical personnel to perform such tests and inspections. Furnish any personnel necessary to assist in the testing and inspection.
- D. When the tests and inspections have been completed, a label shall be attached to all devices tested. The label shall provide the name of the testing company, the date the tests were completed, and the initials of the engineer who performed the tests.
- E. The tests shall insure that the equipment is operational and functioning within industry standards and manufacturer's tolerances. Forward all test reports to the University's Representative to least two weeks prior to the project final inspection for review. Reports shall be bound as required by Division 1 of this specification.

1.03 QUALITY ASSURANCE

- A. The testing and inspection shall comply with all applicable sections of the following codes and standards:
  - 1. American National Standards Institute – ANSI
  - 2. American Society for Testing and Materials – ASTM
  - 3. Association of Edison Illuminating Companies – AEIC



4. Institute of Electrical and Electronics Engineers – IEEE
  5. Insulated Power Cable Engineers Association – IPCEA
  6. International Electrical Testing Association – NETA Acceptance Testing Specifications
  7. California Electrical Code – CEC
  8. National Electrical Manufacturers Association – NEMA
  9. National Fire Protection Association – NFPA
  10. State and Local Codes and Ordinances
- B. The inspection and testing shall comply with the project plans and specifications as well as with the manufacturer's drawings, instruction manuals, and other applicable data for the apparatus tested.

#### 1.04 DIVISION OF RESPONSIBILITY

- A. Perform routine insulation-resistance, continuity, and rotation tests for all distribution and utilization equipment prior to and in addition to tests performed by the testing firm specified herein.
- B. Supply a suitable and stable source of electrical power to each test site. The testing firm shall specify the specific power requirements.
- C. Notify the testing firm when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.
- D. Supply a complete set of electrical plans, specifications, and any pertinent change orders to the testing firm prior to commencement of testing.
- E. Notify the University's Representative prior to commencement of any testing.
- F. Any system, material or installation which is found defective on the basis of acceptance tests shall be reported to the University's Representative.
- G. The testing firm shall maintain a written record of all tests and, upon completion of project, shall assemble and certify a final test report.

#### 1.05 SAFETY AND PRECAUTIONS

- A. Safety practices shall comply with applicable state and local safety orders as well as with the Occupational Safety and Health Act of 1970 (OSHA). Compliance with the Accident Prevention Manual for Industrial Operations of the National Safety Council shall be observed.
- B. Tests shall only be performed on apparatus which is de-energized. The testing company's lead test engineer for the project shall be a designated safety representative and shall supervise testing observations and safety requirements. Work shall not proceed until the safety representative has determined that it is safe to do so.

- C. Power circuits shall have conductors shorted to ground by a hotline grounded device approved for the purpose. Warning signs and protective barriers shall be provided as necessary to conduct the tests safely. Follow OSHA lockout/tagout standards.

#### 1.06 REPORTS

- A. The test report shall include the following sections:
  - 1. Scope of testing.
  - 2. Equipment tested.
  - 3. Description of test.
  - 4. Test results.
  - 5. Conclusions and recommendations.
  - 6. Appendix, including test forms.
- B. Each piece of equipment shall be recorded on a data sheet listing the condition of the equipment as found and as left. Included shall be recommendations for any necessary repair or replacement parts. The data sheets shall indicate the name of the engineer who tested the equipment and the date of the test completion.
- C. Record copies of the completed test report shall be submitted no more than 30 days after completion of the testing and inspection.

#### 1.07 TEST EQUIPMENT

- A. All test equipment shall be in good mechanical and electrical condition. All field instruments shall have been calibrated within six months of the testing date, and dated calibration labels shall be visible on the testing equipment. Submit calibration certification in the final report.

### **PART II - PRODUCTS**

#### 2.01 MATERIALS

- A. All materials are specified under other sections of this specification. All testing equipment required shall be provided under this section of the specifications.

### **PART III - EXECUTION**

#### 3.01 EQUIPMENT TO BE TESTED

- A. The following equipment shall be tested in accordance with the scopes of work which follow. The party responsible is identified in accordance with the following key: C = Contractor/Installer; M = Manufacturer; T = Testing Agency.
  - 1. Cables, Low Voltage, 600 Volts Maximum – C
  - 2. Security Systems – M

#### 3.02 CABLES - LOW-VOLTAGE - 600V MAXIMUM

- A. Visual and Mechanical Inspection:
  - 1. Inspect cables for physical damage and proper connection in accordance with single-line diagram.
  - 2. Test cable mechanical connections to manufacturer's recommended values using a calibrated torque wrench.
  - 3. Check cable color-coding with applicable specifications and National Electrical Code standards.
- B. Electrical Tests:
  - 1. Perform insulation-resistance test on each feeder on the riser diagram with respect to ground and adjacent conductors. Applied potential shall be 1000 volts dc for 1 minute.
  - 2. Perform continuity test to insure proper cable connection.
- C. Test Values:
  - 1. Evaluate results by comparison with cables of same length and type. Investigate any values less than 50 megohms.
  - 2. Provide a test report for each feeder which indicates the manufacturer's target values and actual test reading. Report shall indicate pass/fail for each feeder. Submit report to University's Representative for approval. Include test report in project maintenance manual.
- D. Feeder Cables:
  - 1. 600-volt feeder cables in the building and secondary service cables to the building shall be tested using a megohmmeter, to measure the insulation resistance of each conductor in the circuit.
  - 2. Disconnect all equipment switches, relays, buswork, transformers, etc.) from the cable being tested.
  - 3. Tests to be performed in a dry area.
  - 4. Clean and dry cable ends with a cloth moistened with a suitable solvent.
- E. Cable Values: Cable values shall be established and provided by the cable manufacturer. Provide target value insulation resistance (IR) in megohms, based on 1000 ft. at 60°F.
- F. Temperature Correction Factor: For temperatures above or below 60°F, a correction factor may have to be applied to determine the true IR value. However, if the measured IR of the system is equal to or greater than the calculated value, a correction factor is not needed.
- G. Correct insulation deficiencies which show an insulation resistance of less than one megohm.
- H. Test conductors with power off and impress a voltage of not less than 500 volts D.C.

- I. Perform continuity tests on all conductors.

**END OF SECTION 26 90 90**

SECTION 27 05 00  
COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes, but is not necessarily limited to, common standards and procedures for the Communications Work.
- B. This Section outlines areas of responsibility between Owner, Architect, and Contractor.
- C. Owner will assist with a collaborative process to determine the most cost effective and efficient means to reach the common goal of providing communications within the facility for the project, including assessing user needs and assessing required pathways. The Owner is available upon request to assist at no additional cost to the project. It is incumbent upon the construction team management to approach and engage the Owner at the appropriate times for collaboration.
- D. As part of the project, the construction team must design, engineer, and provide complete, all means of support, suspension, attachment, fastening, bracing, and restraint (hereinafter "support") of the Communications Systems; and provide engineering of such support by parties licensed to perform work of this type in the project jurisdiction.

1.2 ITEMS PROVIDED BY OWNER

- A. Registered Communications Distribution Designer (RCDD) support services
- B. IT project management
- C. Submittal approvals
- D. Network equipment
- E. 802.11 Wireless Access Point hardware
  - 1. Installation by construction team when wireless access point mounting requires seismic support or a construction activity such as screwing, drilling, or welding
  - 2. Owner will provide 802.11 design services
- F. Rack and Stack
- G. Plug Pack Distribution (Pre-terminated switch port cabling provided and installed by the Owner)
- H. Patch Cords and Patching
- I. IT UPS System (installation by construction team)
- J. PDU Power distribution Equipment
- K. VOIP Router, Voice Gateway, VOIP equipment
- L. Camera NVR/Server

- M. Overhead Paging Amplifier
- N. TV Distribution Amplifier
- O. Closet Cleaning postproduction

### 1.3 ITEMS PROVIDED BY CONSTRUCTION TEAM

- A. Building Drawings and Floor Plans
- B. Site Plans
- C. Furniture Plans
- D. As-Built Drawing Submittals
  - 1. As-built drawing per section 1.10
  - 2. Cabling Schedule
  - 3. Desktop Inventory Sheet
    - a. Spread sheet listing cable number and location for every cable installed
      - 1) Cable number; room number, wall (north, south, east, west)
- E. Attachments to structure
- F. In wall cabling
- G. In wall cabling supports
- H. Wireless Access point seismic support installation where required.
- I. Cabling test results
- J. Patch Panels
- K. Horizontal Wire Managers
- L. Vertical Wire Managers (installation by construction team)
- M. Racks for mounting cabling and equipment (installation by construction team).
- N. Horizontal cable, jacks, faceplates, surface mount boxes, cable trays, termination hardware, and all materials needed for a complete horizontal cabling plant as defined in the Section and associated Sections and the construction documents not otherwise listed for provision by the Owner.
- O. Fiber housing, cassettes, and splicing.
- P. Construction Clean Closet Cleaning

### 1.4 RELATED SECTIONS

- A. 27 05 29 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

- B. 27 05 41 FIRE-STOPPING SYSTEMS
- C. 27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
- D. 27 11 19 COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS
- E. 27 11 23 COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK
- F. 27 15 00 COMMUNICATIONS HORIZONTAL CABLING

#### 1.5 REFERENCES AND STANDARDS

- A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.
  - 1. UC Davis Health Telecommunications Standards
  - 2. American National Standards Institute (ANSI)
  - 3. Telecommunications Industry Association (TIA)
  - 4. Building Industry Consulting Services International (BICSI)
  - 5. American Society for Testing and Materials (ASTM)
  - 6. Institute of Electrical and Electronic Engineers (IEEE)
  - 7. National Electrical Manufacturers Association (NEMA)
  - 8. Underwriters Laboratories, Inc. (UL)
  - 9. Local Authorities Having Jurisdiction (AHJ)
- B. Codes: Perform Work executed under this Section in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
  - 1. United States Department of Labor (DOL) Regulations (Standards - 29 CFR)
  - 2. Part 1910, "Occupational Safety and Health Standards"
  - 3. California Code of Regulations (CCR) Title 24, California Building Standards Code Part 2, Basic Building Regulations and Part 3, California Electrical Code (CEC).
  - 4. 2022 California Building Code (CBC).
  - 5. 2022 California Fire Code (CFC).
  - 6. 2022 California Mechanical Code (CMC).
  - 7. National, State and any other binding building and fire codes.
  - 8. FCC Regulations:
    - a. Part 15 – Radio Frequency Devices & Radiation Limits
    - b. Part 68 – Connection of Terminal Equipment to the Telephone Network
  - 9. Underwriter's Laboratories (UL): Applicable listing and ratings, including but not limited to the following standards:
    - a. UL 444: Communications Cables
    - b. UL 497: Protectors for Paired-Conductor Communication Circuits.
    - c. UL 1651: Optical Fiber Cable

- d. UL 1690: Data-Processing Cable
  - e. UL 1963: Communications-Circuit Accessories
  - f. UL 2024A: Optical Fiber Cable Routing Assemblies.
10. ANSI/TIA/EIA-568.1-E Commercial Building Telecommunications Cabling Standard.
  11. ANSI/TIA/EIA-569-E Commercial Building Standard for Telecommunications Pathways and Spaces.
  12. ANSI/TIA/EIA-598-D Optical Fiber Cable Color Coding.
  13. ANSI/TIA/EIA-606-C Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
  14. ANSI/J-STD-607-D Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
  15. ANSI/TIA/EIA-758-B Customer-Owner Outside Plant Telecommunications Cabling Standard.
  16. EIA testing standards.
  17. Insulated Cable Engineers Association (ICEA):
    - a. ANSI/ICEA S-83-596-2016 Fiber Optic Premises Distribution Cable
    - b. ANSI/ICEA S-87-640-2023 Fiber Optic Outside Plant Communications Cable
    - c. ANSI/ICEA S-90-661-2021 Category 3, 5, & 5e Individually Unshielded Twisted Pair Indoor Cable for Use In General Purpose and LAN Communication Wiring Systems
    - d. ICEA S-104-696-2019 Standard for Indoor-Outdoor Optical Cable
  18. Telecommunications Distribution Methods Manual (TDMM)

#### 1.6 ABBREVIATIONS

- A. ADA Americans with Disabilities Act
- B. AFC Above Finished Ceiling
- C. AFF Above the Finished Floor
- D. BDF Building Distribution Frame – See Telecommunications Room (TR)
- E. BLDG Building
- F. CAT Category (Related to network cable types)
- G. DIV Division
- H. (E) Existing
- I. ER IT Equipment Room – See Telecommunications Room (TR)
- J. GE Grounding Equalizer – Part of the Telecom Grounding System
- K. HR Homerun
- L. ID Inside Diameter



- M. IDF Intermediate Distribution Frame – See Telecommunications Room (TR)
- N. IT UC Davis Health IT Department (also UC, UCDH, UCD IT, IT Facilities)
- O. LAN Local Area Network
- P. MAX Maximum
- Q. NIC Not in Contract
- R. OD Outside Diameter
- S. TBB Telecom Bonding Backbone – Part of the Telecom Grounding System
- T. TGB Telecommunications Ground Busbar
- U. TMGB Telecommunications Main Ground Busbar
- V. TR Telecommunications Room, TR may also be used interchangeably with ER, IDF, MDF, or Communications Room
- W. TYP Typical
- X. UCD UC Davis Health IT Department (also UC, UCDH, UCD IT, IT Facilities)
- Y. UFE University Furnished Equipment
- Z. UON Unless Otherwise Noted

#### 1.7 DEFINITIONS

- A. Telecommunications Room (TR) – An enclosed space for housing telecommunications equipment, cable, terminations, and cross-connects. The room is the recognized cross-connect between the backbone cable and the horizontal cabling. The minimum size of a TR shall be 10' x 16'
- B. Intermediate Distribution Frame (IDF) – See Telecommunications Room (TR)
- C. Entrance Facility (EF) (Telecommunications) – An entrance to the building for both private and public network service cables (including antennae) including the entrance point at the building wall and continuing to the entrance room or space. The minimum size of a TR shall be 10' x 16'
- D. Pathway – A physical infrastructure utilized for the placement and routing of telecommunications cable.
- E. Infection Control – Clinical Environment Infection Control or ICRA
- F. “Cabling”: A combination of cables, wire, cords, and connecting hardware [e.g., cables, conductor terminations, connectors, outlets, patch panels, blocks, and labeling].
- G. “Identifier”: A unique code assigned to an element of the telecommunications infrastructure that links it to its corresponding record.

## 1.8 QUALITY ASSURANCE

### A. Contractor Firm Qualifications:

1. All work for the Communications (low voltage) Infrastructure installation shall be self-performed by the Communications Contractor; subcontractors shall not be allowed under the Communications Contractor unless approved by UCDH.

### B. Communications Contractor shall:

1. Be a Panduit Corp. PCI (Panduit Certified Installer) Design and Installation Contractor or approved equal.
2. Be a firm which is regularly and professionally engaged in the installation and testing of the specified communications equipment and infrastructure.
3. Be licensed to install low voltage electronic cabling systems in the State of California where applicable (C7 License).

### C. Communications Contractor shall demonstrate experience in providing successful installation of data infrastructure systems:

1. Submit documentation for a minimum of three and a maximum of five successful low voltage communications infrastructure system installation projects completed within the past three years.

### D. Contractor Key Personnel Qualifications:

1. Provide key personnel who are regularly and professionally engaged in the business of the application, installation and testing of the specified low voltage communications systems, equipment and infrastructure. There may be one key person or more key persons proposed for this project depending upon how many of the key roles each has successfully provided.
2. Each of the key personnel shall demonstrate experience in providing successful low voltage communications systems, equipment and infrastructure within the past three years.

### E. A Registered Communications Distribution Designer (RCDD) shall be employed by the Design Builder and directly engaged in the project for all Communications Infrastructure design and installation efforts.

1. The RCDD shall be a direct employee of the Communications Contractor, within the Design Build team structure.
2. The RCDD shall be required to have oversight and supervision of the entire Communications Infrastructure installation process and quality control.
3. The RCDD shall be the Design Builder's Designer of Record for the Communications Infrastructure scope of work.
4. RCDD direct responsibilities shall include but may not be limited to: Thorough coordination with Owner regarding all design and installation efforts related to the project. A Pre-construction coordination meeting and site inspection with Owner prior to beginning any work. Oversight of Communications installation efforts, development of shop drawings and assembly of product data submittals. Quality control review and stamping of finalized Communications as-built drawings for submittal to Owner. Quality control review of Communications systems installation throughout the entire construction phase, to ensure all work is performed in compliance with approved construction drawings.

### F. Critical on-site quality control installation reviews to be conducted in conjunction with Owner technical staff shall include but may not be limited to:

1. Validation of design to conform with Infection Control guidelines required as it applies with the type of structure and services to be provided in each specific area.
  2. Verifying proper installation of all Communications cable tray, backbone conduits, device back boxes, conduit infrastructure and cabling pathways. Site inspection and sign-off must be performed prior to concealing conduit infrastructure and prior to the installation of any low-volt cabling.
  3. Verifying proper installation of all Communications cabling. Site inspection and sign-off must be performed prior to closing-up associated accessible ceilings.
  4. Verifying the layout and installation of all equipment and cabling within the Telecom Rooms, throughout the duration of the construction phase.
- G. Supervisors and installers assigned to the installation of this system or any of its components shall be Building Industry Consulting Services International (BICSI) Registered cabling Installers, Technician Level. Submit documentation of current BICSI certification for each of the key personnel. Submit documentation for a minimum of three and a maximum of five successful cabling system installations for each of the key personnel in an environment resembling that which is being bid upon.
1. In lieu of BICSI certification, supervisors and installers assigned to the installation of this system or any of its components shall have a minimum of three years' experience in the installation of the specified copper and fiber optic cable and components. The personnel on site performing work pertaining to this job shall be certified on the system being installed. They shall have factory or factory approved certification from each equipment manufacturer indicating that they are qualified to install and test the provided products.
  2. Submit documentation for a minimum of three and a maximum of five successful cabling system installations for each of the key personnel in an environment resembling that which is being bid upon. Documentation for each key person shall include at least two successful system installations provided that are equivalent in system size and in construction complexity to the telecommunications system proposed for this project. Include specific experience in installing and testing telecommunications systems and provide the names and locations of at least two project installations successfully completed using optical fiber and copper telecommunications cabling systems.
  3. All the existing telecommunications system installations offered by the key persons as successful experience shall have been in successful full-time service for at least 18 months prior to the issuance date for this project.
  4. Provide the name and role of the key person, the title, location, and completed installation date of the referenced project, the referenced project Owner point of contact information including name, organization, title, and telephone number, and generally, the referenced project description including system size and construction complexity.
- H. Indicate that all key persons are currently employed by the Communications Contractor or have a commitment to the Communications Contractor to work on this project. All key persons shall be employed by the Communications Contractor at the date of issuance of this project, or if not, have a commitment to the Communications Contractor to work on this project by the date that the bid was due to the Owner's Representative.
1. Note that only the key personnel approved by the Owner's Representative in the successful proposal shall perform work on this project's low voltage systems, equipment, and infrastructure. Key personnel shall function in the same roles in this contract, as they functioned in the offered successful experience. Any substitutions for the Communications Contractor's key personnel require approval from the Owner's Representative.
- I. Designated Supervisor: Designate which key person will serve as a designated supervisor for the project. This supervisor shall be present and responsible for the project site during all phases of

installation and testing of the Work in this Section. This supervisor shall be the same individual through the execution of the Work unless illness, loss of personnel, or other circumstances reasonably beyond the control of the Contractor intervene.

#### 1.9 SUBMITTALS

- A. All Submittals shall be provided electronically in PDF format. All Drawing Submittals shall be provided in PDF and AutoCAD (latest version) DWG format.
- B. Submittals shall be organized in a coordinated package complete with all information specified herein. Incomplete or uncoordinated submittals will be returned with no review action.
- C. Contractor shall submit the following items:
  - 1. Contractor Key Personnel and Certifications
  - 2. Complete Bill of Materials (BOM) List
  - 3. Manufacturer Product Data Sheets, as defined below
  - 4. Shop Drawings, as defined below
  - 5. Proposed Installation Schedule
  - 6. Cabling Certification Test Plan and proposed test equipment
- D. Manufacturer Product Data Submittals shall include:
  - 1. Submit product data sheets for all equipment being provided.
  - 2. Collate in sequence by Section Number, and clearly mark proposed product on data sheet. Include Safety Data Sheet, where applicable.
  - 3. Clearly identify any proposed product substitutions or known deviations.
- E. Precede each submittal book with a summary TOC. per example schedule below:
  - 1. Specification Section
  - 2. Drawing Reference
  - 3. Manufacturers Model No.
- F. The following is a general summary list of Submittal items required to be delivered at 30-day burn-in period.
  - 1. As part of project close-out activities, Contractor shall submit Record Documents for review and approval by the Owner.
  - 2. All Record Documents shall be provided electronically in PDF format. All Record Document Drawings shall be provided in PDF and AutoCAD (latest version) DWG format.

#### 1.10 CLOSEOUT SUBMITTALS

- A. Contractor shall submit the following items:
  - 1. Record As-Built Shop Drawings indicating the final, 'as-built' condition of all associated equipment, infrastructure, and work.
- B. Shop Drawing Submittals shall include:
  - 1. Drawing index/symbol/schedule sheet.
  - 2. Clearly indicate all new work versus existing work.

3. Site Plans, Floor Plans, and Reflected Ceiling (work 7' AFF+)
  4. Drawings shall be developed in AutoCAD .DWG format, utilizing most current architectural backgrounds available for the project.
  5. All drawings shall be properly scaled.
  6. Indicate all device locations and types. Include addressing for all network outlets.
  7. Indicate all cabling routes, types and quantities.
  8. Indicate all conduit routing, quantities, sizes, and wire fill. Indicate basket tray and J-hook routes.
  9. Indicate fire stopping requirements for all penetrations.
  10. Indicate 'cable bundle groups' no larger than:
    - a. CAT6A – 74
  11. When bundling low voltage cabling together the lowest common denominator determines the largest cable group allowed unless the cable is LP listed.
- C. Riser Diagrams indicating:
1. Backbone cabling and termination locations. Associated cabling pathways, sizes and cable fill. Telecommunications Grounding System.
- D. Enlarged Room Plans and Elevations indicating:
- E. Provide dimensioned drawings for all telecommunications rooms. Complete, dimensioned rack and wall elevations of all equipment. Consideration must be given to equipment heights within. Plywood backboards and grounding equipment.
- F. Racks, cabinets, cable tray, ladder rack, wire management. Termination equipment for all copper and fiber cabling. Conduit and cable entrance points and fire stopping. Electrical panels, power circuits and HVAC provisions.
- G. Ensure coordinated arrangement of equipment with other trades. Typical Device Installation Details indicating: J-hooks, conduit, cable tray, and associated support systems. Network outlet faceplate layout and wiring terminations. Device back box and conduit rough-in requirements.
- H. Details of other associated devices and equipment.
- I. The shop drawing package must be stamped and signed by a Registered Communications Distribution Designer (RCDD). Signatures by a Professional Engineer (PE) licensed in the project jurisdiction for work of this type as required by the AHJ.
- J. Cable Certification Test Results. Submit electronically in native format and include associated software license as applicable.
- K. Completed punch list reports.
- L. Manufacturer Operation and Maintenance (O&M) Manuals.
- M. Warranty information.
- N. Keys and any portable equipment.

## 1.11 WARRANTY SERVICE

- A. Closeout Submittals, Warranties and Guarantees, provide the following.
  - 1. Response Time: Provide a qualified technician familiar with the work at the project site within four hours after receipt of a notice of malfunction. Provide the Owner's Representative with telephone number attended 10 hours a day, five days a week, to be called in the event of a malfunction.
  - 2. Provide all Warrantees as defined in each Communication Systems Section.
- B. PanGen Structured Cabling Solutions System Warranty
  - 1. Contractor shall provide a Panduit Certification Plus System Warranty on all installed copper and fiber permanent links. Such warranty shall provide a complete system warranty to guarantee high end-to-end performance for all applications designed to operate over the class of cabling installed. The guarantee shall include all connectivity components and cable within the permanent link and cover the system for duration of 25 years.

## PART 2 - MATERIALS

### 2.1 COMMUNICATIONS SYSTEMS PRODUCTS SUMMARY

- A. The following is a general summary list of Communications Systems equipment, components, and cabling required for the project. This is not intended to be a comprehensive list of materials. See additional Sections for complete materials requirements.
- B. Racks: Seismic racks shall be RXL (# RXL-2823-BK80T). Standard racks shall be RXL (# RXL-2200-BK80T). Racks will be 8' high for new builds and remodels where space is available. 7' high racks will be used as an alternate where space is not available for taller racks.
- C. Wire Managers: Panduit PE2V Series full height vertical cable manager.
  - 1. 10" Wide Front/Back unless otherwise noted on plans
  - 2. 96 inch or 84 inch sized to match the racks being installed.
- D. Primary Bonding Busbar (PBB) & Secondary Bonding Busbar (SBB); CPI\_Mfg.Part:40153-012
- E. Data Patch Panels: Panduit CP48BLY
- F. Fiber Terminations: LC
- G. Modular Jack CAT6A
  - 1. Panduit Mini-Com CJ6X88TGVL
  - 2. Colored Icons as needed per UC service designation
  - 3. Icons are Panduit PAN\_CID(XX) (gray for cables in ceiling)
- H. Copper cabling, Category 6A (Data)
  - 1. High Speed, TIA Category 6A cabling, Plenum Rated
  - 2. General Cable GenSpeed 6A Part No. 7151855 Purple
- I. Copper cabling, Category 6A Shielded (VOIP Paging)
  - 1. High Speed, TIA Category 6A cabling, Plenum Rated

2. General cable GenSpeed 6A Part No. 7151855 purple
- J. Telecommunications Outlets (Workstation side)
1. Modular Furniture Surface Mount Box, Black
  2. Panduit CBX2BL-AY (2-port), CBX4BL-AY (4-port)
  3. Modular Surface Mount Box Attachment System - Mini-Com CBM-X magnetic
  4. Modular Surface Mount Box Blank Insert - Panduit CMB(BL)
- K. Faceplate (Workstation side)
1. Panduit Mini-Com Stainless Steel Faceplates Single Gang CFP {2,4,6} SY or Double Gang CFP {4,8,10} S-2GY
  2. Faceplate Blank Insert – Panduit CMB(WH)

### PART 3 - EXECUTION

#### 3.1 TELECOMMUNICATIONS SPACES

- A. Telecom Room (TR) minimum size 10' x 15'.
- B. UC Davis Health Telecommunications Standards do not include provisions for AV, unless otherwise indicated in the Design Criteria for the project. IT will be cooperative in assessing some parameters as they interact with IT support systems.
- C. Telecommunication Spaces are to use EZ-Path Fire-Rated Pathways systems for cabling access.
- D. Provide 36" of working clearance in front and back of racks and electronic equipment.
- E. A positive pressure type of HVAC system using hot and cold aisles.
- F. Walls shall be covered with fire-resistant treated plywood from 6" AFF to 8'6" AFF, and all surfaces sealed to mitigate airborne dust.
- G. IT uses a typical three-rack configuration with a B-line seismic for equipment and a standard 19" rack for cabling. Vertical wire management for planning shall be sized at 10" unless otherwise noted on the drawings.

#### 3.2 RACK COMPONENTS AND ELEVATIONS

- A. Owner will develop an equipment layout and rack elevation including the Telecom Room (TR) layouts. Typical components within the TR include, but not limited to:
  1. Network Equipment
  2. Fiber Termination Unit
  3. UPS/ PDU I Power distribution
  4. NM2/ NM4/ Horizontal wire management
  5. VOIP Router/Voice Gateway
  6. VOIP transition equipment
  7. Voice cabling

8. Distribution Patch Panels
9. Clinical Engineering Equipment
10. Plug Pack Distribution
11. Camera NVR /Server
12. Nurse Call Devices
13. Overhead Paging Amplifier

B. See related Sections for materials provided by the Owner and those furnished by the Contractor.

### 3.3 EXAMINATION

- A. Conditions: Verify conditions, provided under other sections, are acceptable for product installation in accordance with manufacturer's instructions.
- B. Pathways: Verify that pathways and supporting devices, provided under other sections, are properly and permanently installed, and that temporary supports, devices, etc., have been removed.
- C. Field Measurements: Verify dimensions of pathways, including length of pathways. For example, "true tape" the conduits to verify cabling distances.

### 3.4 FIELD QUALITY CONTROL

- A. Staffing: Provide a qualified foreman who is in charge of the Work and who is present at the job site at times Work is being performed. Supervise the work force executing the Work. Perform the installation within the restraints of the construction schedule.
- B. Project Management: Coordinate and attend weekly status meetings to review the overall progress and issues to be resolved throughout the course of construction. Prepare and distribute meeting agenda prior to and meeting notes after meetings in a format acceptable to the General Contractor.
- C. Scheduling: Prepare an overall construction schedule based on the results of the planning meetings with the General Contractor. Issue schedule to General Contractor for approval. Prepare and issue updated schedules whenever there are modifications.
- D. Inspection: Perform inspection after installation. Keep areas of work accessible and notify code authorities, or designated inspectors, of work completion released for inspection. Document completion, and inspection as required.

### 3.5 INSTALLATION

- A. Conform to applicable federal, state and local codes, and telephone standards.
- B. Attend one pre-construction meeting with the Owner to coordinate the requirements of the communications systems.
- C. Coordinate the entire installation with the General Contractor, and their subcontractors, to meet the construction schedule. Include coordination meetings as required to fulfill this requirement.
- D. Manufacturer's Instructions:



1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
- E. Maintain jobsite file and comply with Material Safety Data Sheets (MSDS) for each product delivered to jobsite.

### 3.6 REPAIR/RESTORATION

- A. Replace or repair work completed by others that you deface or destroy. Pay the full cost of this repair/replacement.
- B. Paint damaged areas to existing painted surfaces caused by Work.
- C. Punch List:
1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.
  2. Provide punch list to Owner for review prior to performing punch walk with Owner.
- D. Re-Installation:
1. Make changes to adjust the system to optimum operation for final use. Make changes to the system such that any defects in workmanship are correct and cables and the associated termination hardware passes the minimum test requirements.
  2. Repair defects prior to system acceptance.
- E. Cleaning
1. Clean daily. Remove temporary coverings and protection of adjacent work areas. Remove unused products, debris, spills, or other excess materials. Remove installation equipment.
  2. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.
  3. Repair or replace damaged installed products.
  4. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Legally dispose of debris.

### 3.7 DEMONSTRATION

- A. On completion of the acceptance test, schedule a time convenient with the Owner or Owner's Representative for instruction in the configuration, operation, and maintenance of the system.
- B. Provide 4 hours, minimum, of on-site orientation and training by a factory-trained representative. Document dates and times of training and submit a "sign in" sheet for individuals trained, as part of the close out documentation.

### 3.8 CERTIFICATION

- A. Provide to Owner or Owner's Representative a written form of acceptance for signature. Corrections must be completed before Owner or Owner's Representative and Engineer will give acceptance.

END OF SECTION

SECTION 27 05 29  
HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. The work covered under this section consists of the furnishing of all necessary labor, supervision, materials, equipment, and services to completely execute the provision of communications supports and cable hook system as described in this specification, including but not limited to:
  - 1. Cable hooks (J-hooks)
  - 2. Fastening hardware

1.2 SYSTEM DESCRIPTION

- A. Provide devices specified in this Section and related Sections for support of communications equipment specified for this project.
- B. Provide support systems that are adequate for the weight of equipment, conduit and wiring to be supported.

1.3 SEISMIC REQUIREMENTS

- A. Seismic design requirements criteria, as shown on all drawings related to the project, including architectural and structural, as defined below shall apply to all work defined within the following specification sections:
  - 1. SECTION 27 05 00 COMMUNICATIONS HORIZONTAL CABLING
  - 2. All support systems and termination apparatus associated with the telecommunications system.
- B. Contractor to install seismic restraints for all telecommunications racks and UPS systems. In accordance with construction documents. Include floor mounted items weighing more than 400 pounds and wall mounted or suspended items weighing more than 20 pounds.
- C. Installation according to engineered drawings and anchorage calculations provided by the structural engineer in accordance with California Code of Regulations, Title 24, 2007 California Building Code.
- D. Supports for such items, including racks, conduit, cable trays and similar shall provide support, bracing, and anchorage, designed by the structural engineer in accordance with CBC Chapter 16A.
- E. Supports to be sized to suit load and selected to match mounting conditions

1.4 REFERENCES

- A. Comply with References requirements of Section 27 05 00

- B. In addition to those codes, standards, etc., listed in Section 27 05 00, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:
  - 1. ASTM A 510 Specifications for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
  - 2. ASTM B 633 Specifications for Electrodepositing Coatings of Zinc on Iron and Steel, Sections SC2 and SC3.
  - 3. ASTM A 653 Specifications for Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process.
  - 4. ASTM A 591 Specifications for Electrodepositing Coatings of Zinc on steel wire or sheets.
  - 5. ASTM A 123 Specifications for Zinc (Hot Galvanized) Coatings on Iron and Steel.

## 1.5 RELATED SECTIONS

- A. 27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS
- B. 27 05 41 FIRE-STOPPING SYSTEMS
- C. 27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
- D. 27 11 19 COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS
- E. 27 11 23 COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK
- F. 27 15 00 COMMUNICATIONS HORIZONTAL CABLING

## 1.6 DEFINITIONS

- A. Definitions as described in Section 27 05 00 shall apply to this section.
- B. "Cable Hanger": A metal, most often steel, cable support device shaped (section view) similar to the letter J; alternately, a fabric strap. The device is available in different sizes supporting different quantities of cables and is also available with different attachment hardware to be supported by different methods (e.g., wire support, beam flange clip, etc.).
- C. Cable Runway or Ladder Rack: Overhead means to get cabling from point to point whether it be vertical or horizontal within Telecommunications Spaces such as TR's and the TER.
- D. "J-Hook": Another name for cable hangers.

## PART 2 - PRODUCTS

### 2.1 FASTENERS, STRAPS, AND BEAM CLAMPS

- A. Equal products by the following manufacturers will be considered providing that all features of the specified product are provided:
  - 1. Concrete fasteners
    - a. Hilti.
    - b. Phillips "Red-Head."

- c. Remington.
  - d. Ramset.
  - e. Simpson Strong-Tie.
  - f. Or approved equal.
2. Concrete inserts and construction channel:
- a. Unistrut Corp.
  - b. GS Metals "Globe Strut."
  - c. Thomas & Betts.
  - d. "Kindorf" Corp.
  - e. Or approved equal.
3. Conduit straps:
- a. 0-Z/Gedney.
  - b. Erico "caddy" Fastening Products.
  - c. Thomas & Betts.
  - d. "Kindorf" Corp.
  - e. Or approved equal.
4. Beam Clamps
- a. Cooper B-line.
  - b. SuperStrut.
  - c. Unistrut.
  - d. Or approved equal.

## 2.2 CABLE HANGERS

### A. Ceiling Hung J-Hooks

1. Specifically intended to carry the load of up to 74 communications cables without applying excess forces to cables at bottom of bundle.
2. Integral broad bottom edge to spread cable load with flat bottom and provide a minimum of 1-5/8" cable bearing surface.
3. Integral hanger rod attachment hardware at top. Load rated for application.
4. Incorporates smooth 90-degree radius edges to prevent snagging cable jackets on installation.
5. Designed so the mounting hardware is recessed to prevent cable damage.
6. Integral mechanical cable latch retainer to provide containment of cables within the hook. The retainer shall be removable and reusable.
7. Suitable for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions.
8. Multi-tiered cable hooks to be used where required to provide separate cabling compartments, or where additional capacity is needed.
9. Finishes: cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.

10. Cable hooks for corrosive areas shall be stainless steel, AISI Type 304.
11. Manufacturer:
  - a. Cooper B-Line series BCH21 (max 32 CAT-6A cables), BCH32 (max 50 CAT-6A cables), BCH64 (max 72 CAT-6A cables).
  - b. Caddy/Erico cablecat.
  - c. Or approved equal.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Comply with the Executive requirements of Section 27 05 00.

### 3.2 EXAMINATION

- A. Thoroughly examine site conditions for acceptance of supporting device installation to verify conformance with manufacturer and specification tolerances. Notify the University's Representative of conditions that would adversely affect the installation or subsequent utilization of the system. Do not proceed with installation until unsatisfactory conditions are corrected.
- B. Installer is responsible for the integrity of the structures to which the system is attached, including their capability of safely accepting the loads imposed as evaluated by a qualified engineer.
- C. The University's Representative reserves the right to request additional supports where in their sole opinion said supports are required. Any additional supports shall be installed at no additional cost to the University.

### 3.3 PREPARATION

- A. Prepare and maintain the following clearances from EMI sources (per BICSI Standards).
  1. Power cable (in grounded conduit) = 6 inches
  2. Power cable (unshielded) = 24 inches
  3. Fluorescent lights = 5 inches
  4. Transformers = 48 inches
- B. Provide all low voltage Communications Systems Pathways and Electronic Security and Safety System Pathways.

### 3.4 DISTRIBUTION PATHWAY VIA CEILING HUNG CABLE HOOKS (J-HOOKS)

- A. The cabling support system shall be installed in accordance with the manufacturer's instructions and as indicated on Contractor's submittal documentation, prior to final acceptance/approval by the University.
- B. Provide dedicated supports at sixty inches (60") separation, maximum, per a given route. Suspend wire or rod using components appropriate for the structure – e.g., powder-actuated clip fastener for wire, beam flange clip or angled flange clip for either wire or rod, or an embedded anchor for the threaded rod. Do not share support (wire/rod) with other trades. Do not support

the hanger on ceiling grid support wires. Do not support the hanger from ductwork, piping, or other equipment hangers.

- C. Provide independent pathways for each low voltage system (network, 800MHZ Radio, access control, DAS, BMS, etc.).
- D. Maintain minimum 6" clearance above suspended ceilings.
- E. Cable Tray cables are not to exceed a 25% fill when the project is complete. 25% fill is a visual fill of 50% of the cable tray.

### 3.5 CONDUIT

- A. Conduit used for pathway is to be designed with a maximum 40% visual fill.
- B. EZ path retrofit EZDR-400 or EZDR-200 will be provided on all conduits when required for compliance.

END OF SECTION

SECTION 27 05 41  
FIRE-STOPPING SYSTEMS

PART 1 – GENERAL

1.1 DESCRIPTION

- A. Section includes: Firestopping for the following.
1. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
  2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
  3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. Comply with California Code of Regulations - Title 24, CBC - Chapter 7, Fire Resistance Ratings and Fire Tests.
- B. Test Requirements:
1. ANSI/UL 2079 Tests for Fire Resistance of Building Joint Systems, 2020
  2. ASTM E-814 Standard Test Method for Fire Tests of Penetration Firestop Systems, 2017
  3. ANSI/UL 1479 Standard for Fire Tests of Penetration Firestops, 2015

1.3 RELATED SECTIONS

- A. 27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS
- B. 27 05 29 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS
- C. 27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
- D. 27 11 19 COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS
- E. 27 11 23 COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK
- F. 27 15 00 COMMUNICATIONS HORIZONTAL CABLING

1.4 SUBMITTALS

- A. Procedure: In accordance with Division 01 and the following:
- B. Data: Manufacturer product data, including UL Listing, for all materials and prefabricated devices and manufacturer's installation instructions. Submitted material must be approved by Campus Fire Marshal prior to installation.
- C. Shop drawings detailing location of installed through penetration devices.

1.5 QUALITY ASSURANCE

- A. Compatibility: Provide firestop systems compatible with one another and with substrates under conditions of application and service.
- B. Firestop system installation, must meet requirements of ASTM E-814, UL 1479, or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. All materials shall be new.

## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following, as required by condition of use:
  - 1. Specified Technologies, Inc.  
Somerville, NJ, telephone 800-992-1180

### 2.2 MATERIALS

- A. All through penetrations shall be labeled on both sides of the wall to indicate the appropriate UL system number, product used, installation date, hour rating installer, location number and telephone contact for the corresponding manufacturer. Material installed shall be as required for installation conditions and to achieve the required fire resistance.
- B. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.
- C. For penetrations by non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following materials are acceptable:
  - 1. EZ-Path retrofit device sized for the conduit being installed.
- D. For penetrations by combustible items (penetrants consumed by high heat aflame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems) the following materials are acceptable:
  - 1. EZ-Path Fire Rated Pathway
- E. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways the following materials are acceptable:
  - 1. EZ-Path Fire Rated Pathway
- F. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E-814 which is equal to the time rating of construction being penetrated.
- G. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.
- H. For work station conduits from accessible ceiling to outlet.
  - 1. STI SpecSeal putty.
- I. For pipe penetrations of cast in place concrete floors and concrete over metal decking the



following material is acceptable:

- a. EZ-path
- J. STI Radius Control module.
  - 1. Radius Control Modules snap into the ends of EZ-path pathways and provide a minimum bend radius for IT cabling.

### PART 3 – EXECUTION

#### 3.1 PREPARATION

- A. Verify conditions and measurements affecting the work of this Section at site. Make sure that detrimental conditions are corrected before proceeding with installation.

#### 3.2 INSTALLATION

- A. Install materials in compliance with their manufacturer's instructions and the printed instructions of UL Fire Resistance Directory.
- B. Install re-enterable, non-hardening, intumescent putty in work station conduits where required. Do not use fire caulk.
- C. EZ-path fire rated pathways shall be installed with Radius Control Modules.

#### 3.3 IDENTIFICATION

- A. Identify firestopping with pressure sensitive, self adhesive preprinted labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestopping installation where the labels will be visible to anyone seeking to remove penetrating items or firestopping. Include the following information on the labels:
  - 1. The words: "WARNING—FIRESTOPPING—DO NOT DISTURB. NOTIFY BUILDING MANAGEMENT OF ANY DAMAGE"
  - 2. Contractor's name, address and phone number
  - 3. Firestopping system designation of applicable testing and inspecting agency
  - 4. Date of installation
  - 5. Firestopping manufacturer's name
  - 6. Installer's name

END OF SECTION

SECTION 27 05 53  
IDENTIFICATION AND LABELING OF COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide all labor, materials, tools, and equipment required for permanent intelligible labeling for items including but not limited to communications cabling (structured and non-structured) innerduct, connectors, faceplates, jacks, receptacles, patch panels, and racks.
- B. All labels will be preprinted, or computer printed type. Handwritten labels are not acceptable.
- C. This section includes minimum labeling requirements for the following:
  - 1. Room designations
  - 2. Communications cabling
  - 3. Closet Hardware including patch panels, terminal blocks, protectors, and racks.
  - 4. Work Area Outlets
  - 5. Wireless Access Points
  - 6. Pathways and Spaces
  - 7. Grounding and Bonding

1.2 VISUAL APPEARANCE

- A. Clear plastic covers over faceplate labels are not permitted.
- B. Shall be preprinted or computer printed type, minimum 12pt. font.
- C. Black SMBs are to be labeled with white on black.
- D. Stainless will be labeled with black on white.
- E. White (if required) will be labeled with black on white.

1.3 LABELING STANDARDS AND REQUIREMENTS

- A. All new labeling is to reflect UCD labeling standards.
- B. Contact the University's Representative for a copy of the current standards prior to proceeding.
- C. Bring to the University Representative's attention any project conditions not described in these specifications and the University's current standards and conform to the direction received.
- D. Identification and administration work specified herein shall comply with the applicable requirements of:
  - 1. ANSI/TIA/EIA-606-C Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

#### 1.4 RELATED SECTIONS

- A. 27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS
- B. 27 05 29 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS
- C. 27 05 41 FIRE-STOPPING SYSTEMS
- D. 27 11 19 COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS
- E. 27 11 23 COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK
- F. 27 15 00 COMMUNICATIONS HORIZONTAL CABLING

#### PART 2 - PRODUCTS

##### 2.1 COMMUNICATION CABLING LABELS, GENERAL

- A. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
- B. Shall be preprinted or computer printed type, minimum 12pt. font. Handwritten labels are not acceptable.

##### 2.2 COMMUNICATION CABLING LABELS, INTERIOR

- A. Provide vinyl substrate with a white printing area and black print.
- B. If cable jacket is white, provide cable label with printing area which is either orange or yellow, such that the labels are easily distinguishable.
- C. Shall be flexible vinyl or other substrates to apply easy and flex as cables are bent.
- D. Shall use aggressive adhesives that stay attached even to the most difficult to adhere to jacketing.
- E. Manufacturers:
  - 1. Cable Type- 4 pair UTP /4 pair UTP Zero Skew - Panduit S100X150VAC or approved equal.
  - 2. Cable Type- 4 pair STP - Panduit S100X150VAC or approved equal.
  - 3. Cable Type- 25 to 100 pair copper - Panduit S100X650VAC or approved equal.
  - 4. Cable Type- 2 strand fiber - Panduit F100X300AJT or approved equal.
  - 5. Cable Type- 4-12 strand fiber - Panduit S100X150VAC or approved equal.
  - 6. Cable Type- RG-6 and RG-59 Coax - Panduit S100X150VAC or approved equal.
  - 7. Cable Bundles - Panduit UIHL12-XO or approved equal.
  - 8. Other Interior Cabling - Panduit S100X650VAC or approved equal.

##### 2.3 GROUNDING AND BONDING, PATHWAY, AND SPACE LABELS

- A. Panduit C200X100FJC or approved equal.

## 2.4 WORKSTATION LABELS

- A. Panduit - White C061X030FJC
- B. Panduit - White C750X050YIJ or approved equal.

## 2.5 LOCATION NAMEPLATES

- A. Provide laminated plastic nameplates for each equipment enclosure, rack, switch, and device, as specified.
- B. Comply with ASTM D 709.
- C. Each nameplate inscription shall identify the function and, when applicable, the position.
- D. Nameplates shall be melamine plastic, 0.125-inch thick, black with white center core.
- E. Surface shall be matte finish. Corners shall be square.
- F. Accurately align lettering and engrave into the core. Minimum size of nameplates shall be one by three inches.
- G. Lettering shall be a minimum of 0.25-inch-high normal block style for location nameplates or a minimum of 1-inch-high normal block style for rack nameplates.
- H. Panduit C300X100APT or approved equal.

## 2.6 COMMUNICATION CABLING LABELS, OUTSIDE PLANT

- A. Cable Tags in Manholes, Handholes, and Vaults
  - 1. Provide tags for communications cable or wire located in manholes, handholes, and vaults.
    - a. The tags shall be polyethylene.
    - b. Machine printed - Do not provide handwritten letters.
  - 2. Polyethylene Cable Tags
    - a. Provide tags of polyethylene that have an average tensile strength of 22.4 MPa (3250 pounds per square inch) 3250 pounds per square inch; and that are two millimeter (0.08 inch) 0.08 inch thick (minimum), non-corrosive non-conductive; resistive to acids, alkalis, organic solvents, and salt water; and distortion resistant to 77 degrees C 170 degrees F. For fiber optic cables provide Panduit PST-FO or equal. For Copper cables provide Panduit PST-1028 or equal.
    - b. Provide a one-piece nylon, self-locking tie for cable tags.
    - c. Ties shall have a minimum loop tensile strength of 778.75 N (175 pounds) 175 pounds. The cable tags shall have black block letters, numbers, and symbols 25 mm (one inch) one inch high on a yellow background.
    - d. Letters, numbers, and symbols shall not fall off or change positions regardless of the cable tags' orientation.
  - 3. Manufacturers:
    - a. Panduit
    - b. Brady

- c. Or equal.

### PART 3 - EXECUTION

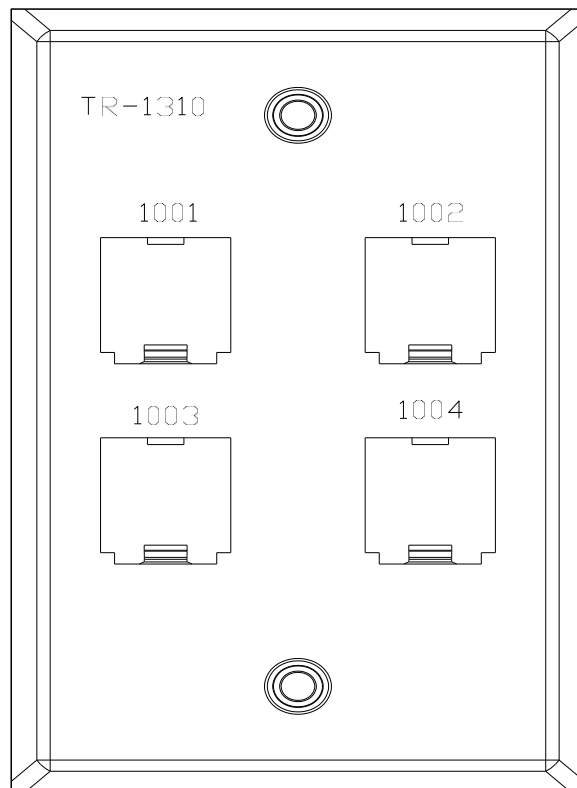
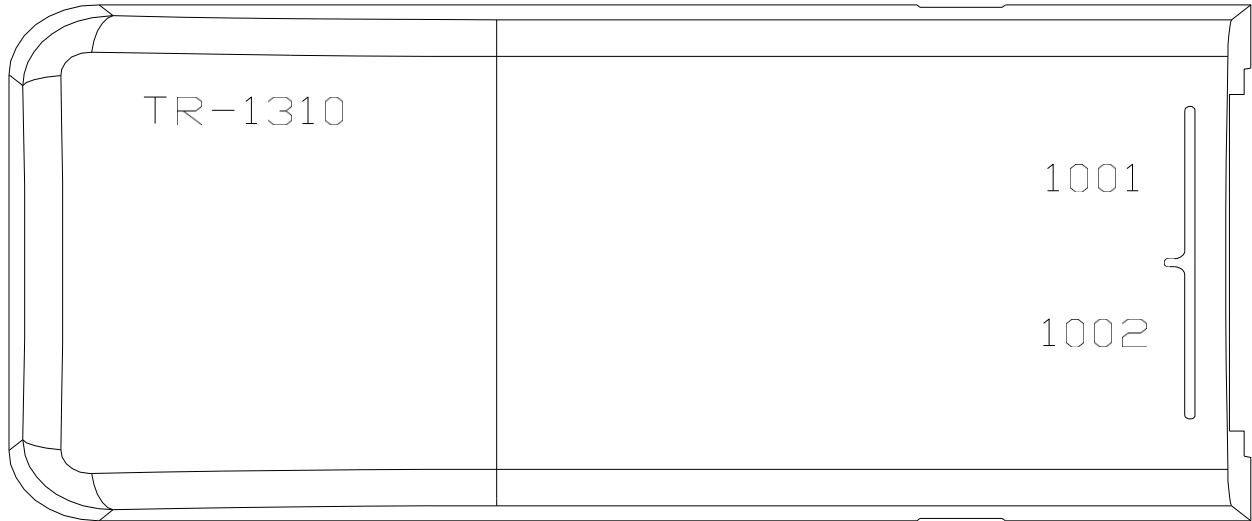
#### 3.1 GENERAL

- A. Verify all room numbers, racks, conduits, cable tray, cables, equipment housing, vaults and items within this document have been labeled.
- B. Contractor applied labeling shall reflect final space and Telecommunications structure designations.
- C. Accurate labeling shall be provided on the as-built shop drawing submittals.

#### 3.2 IDENTIFICATION AND LABELING

- A. Telecommunications Rooms
  - 1. Labels shall be affixed at the entry to all telecommunications rooms and spaces (Includes entrance facilities, telecommunications equipment rooms, communication equipment spaces and work areas).
  - 2. All IT rooms are numbered but not designated "equipment" due to security concerns.
- B. Cable Tray and Conduits
  - 1. Cable tray structured versus AV or analog systems pathway labeling and designations are the responsibility of the installer to designate the services that are to use the pathway or what portion of the pathway.
  - 2. Any permanent label that is clearly visible is acceptable.
- C. Rack and Cabinet Labeling
  - 1. Provide laminated plastic nameplates for each equipment enclosure, row and rack designations as shown on elevations provided by UCD IT.
- D. Copper Patch Panels – Horizontal
  - 1. Label with Jack numbers.
- E. Tie Cable Patch Panels
  - 1. Label the pair count at the top of the patch panel, separated from all others.
  - 2. Place the cable's identification text centered on the top label strip. (example:18CA75, TIE 1672A).
- F. 110 Blocks
  - 1. Not used other than MPOE, OSP installation.
  - 2. Label with University provided designation.
- G. Workstations
  - 1. Use adhesive type labels and affix labels to faceplate per diagram provided.

2. Provide sequential 4 or (Occasionally 5 digit) jack number (starting dependent on the floor designation) beginning with an X such as X056, X being floor# followed by the closet sequenced cable number. All faceplate labels shall contain the following items:
  - a. Building and Closet Designation such as 34-1100 (building#, IT closet#)
  - b. TR Designation such as TR1.1 or TR 1A (University established designation)
3. Under no circumstances are jacks to be installed with a drop/name or location number as a label or a matrix identifier.
4. See diagrams below:



H. Wireless Access Point (WAP) Labeling

1. The University's Representative will provide locations for Wireless Access Point installations with the University's assigned designated identifiers adhered to the Access Point itself.
2. Building Designation / room or area designation – AP / a,b,c (if multiple AP's within room).
3. WAP labeling consists of the Icon being a designated color at the device, Icon being a designated color in the patch panel, and a band being installed on both ends of the patch cord that connects the cable in the TR room.

I. Grounding and Bonding

1. Label the TMGB (telecommunications main ground busbar) with an adhesive label.
2. Label the TGB(s) (telecommunications ground busbar) with an adhesive type label(s).

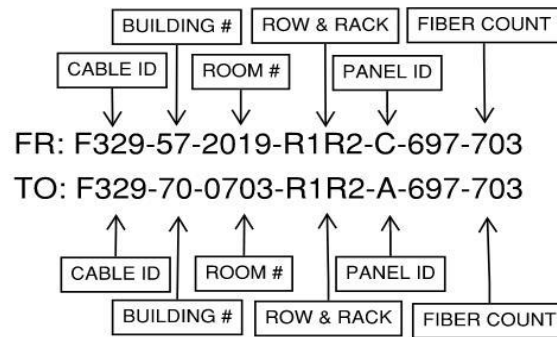
J. Other Cable Numbering

1. Other cabling types, such as Coax installed in a TR shall be numbered uniquely, such as C=Coax.
2. Cameras and AP's are Data Cabling, which falls into the Data Cabling labeling scheme.
3. Point to point Data Cables require independent numbering such as A1001 for items such as in room video distribution such as N-stream equipment.

K. Fiber Patch Panels

1. Fiber patch panels shall be marked using adhesive labels indicating the range of circuits installed to it. All fiber optic cable patch panels shall be labeled with the pair count of every fiber pair, the cable's assigned identifier, and the patch panel's assigned identifier.
2. Coordinate with IT before applying any labels
3. All labels shall consist of the following:

FIBER OPTIC INTERBUILDING (between buildings) LABELING CONVENTION



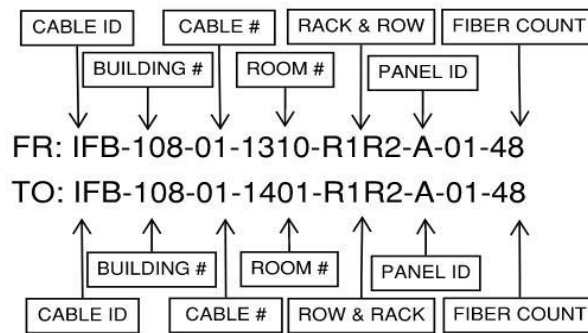
Example:

Origination (from): Label begins with fiber cable designation (fiber identifier such as F329) - followed by the building number (57) - room number (2019) - row & rack locations (R1R2) - fiber termination panel ID (A) - fiber count (697-708)

Destination (to): Label begins with fiber cable designation (fiber identifier such as F329) - followed by the building number (57) - room number (2019) - row & rack locations (R1R2) - fiber termination panel ID (A) - fiber count (697-708)

"From" and "To" will be reversed at the destination end.

FIBER OPTIC INTRABUILDING (within building) LABELING CONVENTION



Example:

Origination (from): Label begins with fiber cable designation (IFA=UCDH campus, IFB=off campus location) - followed by the building number (108) - intra-building cable number (01) - room number (1310) row & rack locations (R1R2) - fiber termination panel ID (A) - fiber count (01-48)

Destination (to): Label begins with fiber cable designation (IFA=UCDH campus, IFB=off campus location) - followed by the building number (108) - intra-building cable number (01) - room number (1401) - row & rack locations (R1R2) - fiber termination panel ID (A) - fiber count (01-48)

"From" and "To" will be reversed at the destination end.

L. Fire stopping

1. Each fire stopping location shall be labeled at each location where fire stopping is installed, on each side of the penetrated fire barrier, within 12 in. of the fire stopping material.
2. Labels shall adhere to the requirements set forth by the authority having jurisdiction (AHJ).

M. Indoor Communications Cables



1. Horizontal and Indoor Backbone cables shall be marked within 12 inches of each endpoint or to innerduct in which the cable is installed.
2. Label each end of each riser cable where the cable terminates.
3. Backbone cables shall be marked at each endpoint and at all intermediate locations, pull/access point or junction boxes through which the cable passes, as well as on each floor and in each room the cable is openly visible in.

N. Copper Riser Cabling.

1. Label all copper backbone cables of at least 25 pair construction to contain the following information:
  - a. Installation Date
  - b. University Assigned Cable ID: (Example: 70 Tie 0P609).

O. Fiber Riser cabling.

1. Label all fiber backbone cables to contain the following information:
  - a. Installation Date
  - b. University Assigned cable ID:(Example: IFA134)

END OF SECTION

SECTION 27 11 19  
COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install copper termination assemblies, including rack and cabinet mounted copper patch panels.
- B. Furnish and install fiber termination assemblies, including:
  - 1. Fiber connectors
  - 2. Rack and cabinet mounted fiber patch panels

1.2 RELATED SECTIONS

- A. 27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS
- B. 27 05 29 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS
- C. 27 05 41 FIRE-STOPPING SYSTEMS
- D. 27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
- E. 27 11 23 COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK
- F. 27 15 00 COMMUNICATIONS HORIZONTAL CABLING

1.3 SUBMITTALS

- A. Provide product data for the following:
  - 1. Manufacturer's data/cut sheets, product drawing/specifications and installation instructions for all products (submit with bid).

1.4 QUALITY ASSURANCE

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the owner or owner representative.
- B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated or a substitution is requested, equipment shall be equivalent in every way to that of the equipment specified. All substitutions are subject to the control and approval of the owner or the owner representative.
- C. Strictly adhere to all BICSI, and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.

## 1.5 WARRANTY

- A. The horizontal communications cabling system installed shall be eligible for coverage by a Limited Lifetime Warranty to the end user.
- B. Authorized Installer/Authorized Integrator shall provide labor, materials, and documentation in accordance with Panduit requirements necessary to ensure that the Owner will be furnished with a Limited Lifetime Warranty.
- C. Necessary documentation for warranty registration shall be provided to the manufacturer by the installer (within 10 days) following 100 percent testing of cables.

## PART 2 - PRODUCTS

### 2.1 COPPER CABLE TERMINATION DEVICES AND RELATED

- A. Copper patch panels
  - 1. Rack mount category 6A 8P8C
  - 2. Panduit CP48WSBLY
  - 3. Or approved equal.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. The contractor selected to provide the installation of this system shall be certified by the manufacturing company in all aspects of design, installation and testing of the products described herein.
- B. Contractor shall have a minimum of five (5) years of recent experience on structured cabling systems of similar type, size and quantities.
- C. Cable termination:
  - 1. Route cables in Telecom Rooms to patch panels in racks by routing across cable runway to top of rack and then down vertical cable management sections to back of patch panels or termination locations.
  - 2. Route cables in Telecom Rooms to wall mount cabinets and down through openings of top and/or bottom of cabinets to patch panels. Cabinet standoffs may be used to create additional and necessary pathway.
  - 3. Cables and Termination Hardware: Test 100 percent for defects in installation and verify cabling system performance under installed conditions.
    - a. Verify all pairs of each installed cable before system acceptance.
    - b. Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.
  - 4. Cables, Jacks, Connecting Blocks, and Patch Panels:
    - a. Verify all pairs of each installed cable before system acceptance.

- b. Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.

END OF SECTION

SECTION 27 11 23  
COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes provision of cable management for cabling installed under the work of this Project.
- B. Contractor to furnish and horizontal cable management.
- C. Install conduit, fire penetrations, and cable pathway suitable to support and manage the installation of fiber and copper data infrastructure per BICSI standards.
- D. Ensure proper maximum fill ratios for all pathways. Do not overfill pathways.
- E. Ensure proper EMI separation.
- F. Install innerduct where required.

1.2 RELATED SECTIONS

- A. 27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS
- B. 27 05 29 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS
- C. 27 05 41 FIRE-STOPPING SYSTEMS
- D. 27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
- E. 27 11 19 COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS
- F. 27 15 00 COMMUNICATIONS HORIZONTAL CABLING

PART 2 - PRODUCTS

2.1 J HOOK CABLE MANAGEMENT (CONTRACTOR FURNISHED AND INSTALLED)

- A. Provide and install according to Section 27 05 29.

2.2 HORIZONTAL WIRE MANAGER (CONTRACTOR FURNISHED AND INSTALLED)

- A. Install 2 or 4 RU assembly as indicated in Owner provided rack elevations.
- B. Panduit NM2 or NMF4 as shown on IT rack elevation drawings.

## 2.3 VERTICAL WIRE MANAGEMENT (CONTRACTOR FURNISHED AND INSTALLED)

- A. High density vertical wire manager to accommodate fiber and copper cross connecting patching cables in addition to providing power distribution power strip mounting surfaces and space.
- B. Contractor installed; refer to Owner provided rack elevation drawings for placement.
  - 1. Install according to construction documents.
  - 2. Do not put large sweeps or service loops in vertical cable managers.
- C. Provide Panduit PE2VD1096PT/N or equal.

## PART 3 - EXECUTION

### 3.1 GENERAL EXECUTION - PREPARATION

- A. UCDH IT is responsible for preliminary layout of the telecommunications room and shall provide requirements to Construction Team for the production of shop drawings.
- B. The cabling contractor in addition to the engineer is responsible for managing cable quantities and validation of the pathways provided for fill ratio and placement to ensure cable length and capacities are according to Owner requirements. If a determination is made that the pathway is deficient, the contractor shall construct additional pathways accordingly.
- C. Install products, components, accessories, hardware, etc., according to the manufacturer's instructions. Do not put service loops in vertical wire managers.
- D. The contractor selected to provide the installation of this system shall be certified by the manufacturing company in all aspects of design, installation and testing of the products described herein.

### 3.2 INSTALLATION

- A. Do NOT Tie Wrap cables to ladder rack.

### 3.3 J HOOK CABLE MANAGEMENT

- 1. Cables are to be consistently grouped together with like systems cabling (Fiber/AV/ Copper/Feeder, Etc).
- 2. Suspended cable runs (J-Hooks) shall be supported at intervals not exceeding every 5'. Cable installed on exposed surfaces or structural members shall be installed parallel and perpendicular to the surfaces unless a cable distance limitation arises. Cable distance and remaining within cable distance limits shall take priority. Surface contours shall be followed wherever possible.
- 3. Attaching cables to pipes, electrical conduit, mechanical items, existing cables, or the ceiling support system (grids, hanger wires, etc. – with the exception of ceiling support anchors) is not acceptable unless approved by the AHJ.
- 4. Cabling installed in J-Hooks or Stiffy's, shall not have a deflection of more than 3", as identified in the cable support details, in the drawings.

3.4 EXAMINATION AND ACCEPTANCE

- A. Perform walk thru with Owner representative to validate cable separation, cable routes and fill ratios.

END OF SECTION

SECTION 27 15 00  
COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provisioning, installation, termination, and testing of twisted pair, for horizontal cabling.

1.2 TYPICAL WORK AREA OUTLETS

- A. A typical work area outlet (per chair) or (Drop) shall consist of two (2) (Purple end to end) Category 6A Data cables, unless otherwise indicated.
  - 1. When re-cabling a building or office consideration shall be made to add Data Cables to support devices that will continue to be viable after a transition to a VoIP network such as fax machines, fire alarms, elevator phones, pay phones etc.
- B. A typical work area outlet shall have a slack loop of 10 feet at the field end of the run.
- C. Wireless Access Points
  - 1. A typical wireless access point (WAP) Outlet shall consist of two (2) (Purple end to end) Category 6A Data cables, unless otherwise indicated.
- D. Other outlet configurations as defined by and coordinated with Owner IT.
- E. All Outlet types listed above shall have a slack loop of 10 feet at the field end of the run.

1.3 RELATED SECTIONS

- A. 27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS
- B. 27 05 29 HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS
- C. 27 05 41 FIRE-STOPPING SYSTEMS
- D. 27 05 53 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
- E. 27 11 19 COMMUNICATIONS TERMINATION BLOCKS AND PATCH PANELS
- F. 27 11 23 COMMUNICATIONS CABLE MANAGEMENT AND LADDER RACK

PART 2 - PRODUCTS

2.1 COPPER CABLING, CATEGORY 6A

- A. High Speed, TIA category 6A Cabling, Plenum Rated
  - 1. General Cable GenSpeed 6A Part No. 7151855 Purple.
- B. Black Loom



1. Panduit loom CLT100F/CLT150F (choose size appropriate for cable installation quantity)
2. Thomas & Betts black liquid tight EFC150

## 2.2 TELECOMMUNICATIONS OUTLET COMPONENTS

- A. Modular Furniture Surface Mount Box, Black
  1. Panduit CBXQxBL-A Where x = number of ports
  2. Modular Surface Mount Box Attachment System Mini-Com CBM-X
  3. Modular Surface Mount Box Blank Insert Panduit CMB(BL)
- B. Faceplate
  1. Panduit- Mini-Com Faceplates (CFP (2,4,6)SY I CFP (4,8,10) S-2GY
  2. Coordinate finish with Architect prior to submittals
- C. Faceplate Blank Insert
  1. Panduit CMB(WH)
- D. Stainless Wall Telephone Outlet
  1. Leviton 40223-S (where specified)
- E. One Hole Wall Plate
  1. Leviton 84004-40 Stainless where requested.
  2. Leviton 80720-W White where requested.
  3. Coordinate finish with Architect prior to submittals.
- F. Black Loom
  1. Panduit loom CLT100F/CLT150F (choose size appropriate for cable installation quantity)
  2. Thomas & Betts black liquid tight EFC150
- G. Duplex In-Line Jack frame, one to four jacks (only where required, NOT standard installation)
  1. Panduit Mini-Com 106 Duplex Module Frame

## PART 3 - EXECUTION

### 3.1 CABLING RUN LENGTHS

- A. Distance limitation of the in-wall cabling shall be thoroughly reviewed and calculated to be less than 275' when including the anticipated plug pack cabling length in the telecommunications room (TR).
- B. Contractor to field verify the performance including cable length of the proposed installation in a mockup using the proposed cabling, jacks, raceway and test equipment prior to proceeding.
  1. Locate proposed cable pathway drawing for the upcoming cable run.
  2. Contractor to install One (1) typical copper work area outlet complete with jacks at both ends.
  3. Use the proposed pathway and cabling to the furthest location from the TR.

4. Install a cable simulating the cable length of the Plug Pack configuration.
5. The cabling contractor is to perform testing of these cables patched together to determine the true length of this mockup.
6. Test Results are to be inspected and reviewed by the University's Representative prior to proceeding with the rest of the installation.
7. Any deficiencies in the installation of the mockup are to be corrected by the Contractor and re-inspected by the University's Representative prior to proceeding with the rest of the installation.

### 3.2 MODULAR JACK COMPONENTS

- A. Category 6A Data Jacks performance shall meet requirements as defined in TIA standards.
- B. Follow manufacture's Installation procedures.

### 3.3 COPPER CABLING DATA VOICE/DISTRIBUTION

- A. Maintain the following clearances from EMI sources (Per BICSI Standards)
  1. Power cable – 6 in.
  2. Fluorescent Lights - 12 in.
  3. Transformers- 48 in.
- B. Monitor cable length limitations.
  1. All cable installations shall be continuous, un-spliced runs
  2. All wiring above ceilings shall be installed in cable tray or cable hangers.
  3. Cable in accessible ceilings shall be supported 5' on center (min) attached to building structure.
  4. Cable shall have no physical defects such as cuts, tears or bulges in the outer jacket.
  5. Cables jackets that are chaffed or burned exposing internal conductor insulation or have any bare copper ("shiners") shall be replaced.
  6. Limit cable bends to a minimum radius of 4 times cable diameter except where otherwise noted herein.
  7. Refrain from exceeding fill ratio on horizontal cabling installations
  8. Do not put large sweeps or service loops in vertical wire managers.
  9. Provide slack, which is to be no less than 2.5" and no greater than 5.0", in the station cable at the station outlet end. The Work Area Outlet shall provide enough slack to be serviceable without excess.
  10. Service loop at outlet locations: Provide a (10') Ten Foot Slack Loop for all horizontal cabling, supported on J-hook with wire above all drop locations.
  11. All data and voice station cable shall be terminated at the individual receptacle modules in accordance with ANSI/TIA-568-C, assignment T568B.

### 3.4 TESTING

- A. All system cabling and terminations shall be installed in accordance with manufacturer's instructions and as indicated on Contractor's submittal documentation, prior to final acceptance/approval by the University.

- B. Installation shall be performed and accomplished in a professional manner, by qualified personnel.

### 3.5 PERFORMANCE STANDARDS

- A. Horizontal (Station) category 6A Copper cabling - Permanent Link
  - 1. Testing shall commence while the University's equipment in the area of service is operational and creating worst case emissions associated with its operation while in good working order. Every effort shall be made to include worst case influence on the materials installed shall be taken.
  - 2. In accordance with the field test specifications defined in TIA-568-C.2 "Commercial Balanced Twisted-Pair Telecommunications Cabling and Components Standard", every horizontal station cabling link in the project shall be tested for:
    - a. Wire Map Length Insertion Loss NEXT Loss
    - b. PS NEXT Loss
    - c. ACR-F Loss
    - d. PS ACR-F Loss
    - e. Return Loss
    - f. Propagation Delay
    - g. Delay Skew
- B. Using the listed category 6A cable test set, test installed cabling using Permanent Link procedure and submit report demonstrating that the link meets the following:
  - 1. Each permanent link shall demonstrate a positive PSACR beyond 350 MHz to meet and exceed the bandwidth requirements of TIA-568-C.2 Category 6A standards.
  - 2. Each permanent link shall demonstrate 2 dB of cross talk headroom over TIA -568-C.2 Category 6A standard for NEXT, PSNEXT, ELFEXT and PSELFEXT bit error rate.
  - 3. Report whether tested link passes or fails.
  - 4. Note exceptions to required Category standards. Remedy and retest.
  - 5. Test and report on each intermediate cabling segment separately, including station cabling, horizontal distribution (each segment, if multiple) and telecommunications room wiring.
  - 6. Test each end-to-end cable link
  - 7. Submit machine-generated documentation and raw data of all test results on Contractor-provided, and University's Representative approved, forms; and in electronic format approved by the University's Representative.
  - 8. Test stations wire only after all pairs of station wire in a work area have been terminated at both ends, and no work of this Section or other Sections may cause physical disturbance to the wiring.
  - 9. Correct any and all transpositions found. Retest.
  - 10. If any conductor in a station wire tests either open or short, then the entire station wire is to be removed, replaced, and re-tested.
  - 11. The Contractor shall test all cables and submit all horizontal copper cable test result data in electronic format, with the resulting file formatted with one test result per 8.5"x 11" page. Export or Download the test results from the cable tester for submission in native format.

12. Data found to be altered from the manufacturers recommended settings may result in retention by the University of a 3rd Party Test Company to retest the installed cabling at the expense of the Contractor.
13. Events exceeding industry standards will cause the test result to be rejected. Direct review by UCD IT will be required to allow for an exception of a test result.
14. Data found to be incomplete may result in retention by the University of a 3rd Party Test Company to retest the installed cabling at the expense of the Contractor.
15. Contractor shall submit (1) copy of software capable of viewing the electronic test result files. Testing Results shall be reviewed and verified by the University before payments are remitted.

C. Test Equipment

1. Contractor shall provide all test equipment as required to perform the scope of work.
2. Test the communication systems cabling using at least one (1) each of the following test measurement devices or their functional equivalents:
  - a. Level IIIe field testers as defined in TIA-1152 - Fluke DSX-5000, or equal.
  - b. The tester including the appropriate interface adapter must meet the specified accuracy requirements. The accuracy requirements for the permanent link test configuration (baseline accuracy plus adapter contribution) are specified in Table 4 of TIA-1152
  - c. The RJ45 test plug shall fall within the values specified in TIA-568-C Annex C for NEXT, FEXT and Return Loss.
  - d. The tester interface adapters must be of high quality and the cable shall not show any twisting or kinking resulting from coiling and storing of the tester interface adapters.
  - e. In order to deliver optimum accuracy, permanent link interface adapter for the tester shall be used, which can be calibrated to extend the reference plane of the Return Loss measurement to the permanent link interface.
  - f. The contractor shall provide proof that the interface has been calibrated within the period recommended by the vendor.
  - g. To ensure that normal handling on the job does not cause measurable Return Loss change, the adapter cord cable shall not be of twisted-pair construction.
  - h. Site portable communications systems (walkie-talkie, cell phone, or similar to aid in communications between test device locations)

END OF SECTION