



**SESP CPU Water Upgrade
Project Number: 9557950**

ADDENDUM NO. 3 dated May 10, 2024

REQUEST FOR PROPOSALS

GENERAL

This addendum forms a part of the Contract Documents and modifies the original RFP Documents dated April 2024 and consists of pages AD3-1 thru AD3-6 and attachments. The following changes, additions and/or deletions shall be made to the following documents: all other conditions shall remain the same.

ITEM NO. I – CONTRACT DOCUMENTS

1. UCDH Facility Standards Architectural v1-240501
ADDED
2. UCDH Facility Standards Electrical v1-240501
ADDED
3. UCDH Facility Standards Mechanical-Plumbing v1-240501
ADDED
4. Infection Control Risk Assessment (sample)
ADDED

ITEM NO. II – CLARIFICATIONS

1. **Question:** *How will rates be evaluated? On previous UCDH proposals where rates were evaluated with the proposal, multipliers had been added to the rates and those multiplied rates were totaled and added to the overall pricing total which was used in the points per dollar scoring calculation. It is important to understand how these rates will be evaluated in order to properly price our proposal. Note that the previous project referenced was a progressive design-build RFP. The last Brief Design-Build RFP we participated in did not evaluate rates in the proposal.*

Answer: On this lump sum design-build delivery method, the hourly rates are just for reference, we assume they are included in the lump sum and won't be scored in any way.

2. **Question:** *On previous UCDH proposals where a lump or stipulated sum was agreed to, there was an allowance for off-hours cost. There is no way for us to quantify the number of off-shift hours that will be required for this work until the work is fully investigated and designed. Please clarify how to include off-hour costs in this proposal. We recommend an allowance.*

Answer: Proposers to include in the lump sum an Owner allowance of \$520,000 for premium shift work hours.



3. **Question:** *In Announcement to Prequalified Bidders Description of Work: This section says "The existing system will be decommissioned and removed. Future project will connect individual pieces of equipment to the new water supply". Addendum No.1 response to RFI 5 clearly states that new connections to all equipment is to be included. These two documents are in conflict. If the intent of this RFP is to include the equipment connections, decommission and remove existing equipment, please revise the RFP document to reflect in all locations it says otherwise. Announcement to Prequalified Bidders - Description of Work; Request for Proposals Page 1 - Project Overview; Request for Proposals Page 7 - Scope of Contracted Work.*

Answer: Please disregard statement "Future project will connect individual pieces of equipment to the new water supply" shown in the Description of Work of the Announcement to Prequalified Proposers, and in Sections 1.1 and 2.2 of the Request For Proposals documents, as this is meant to state that a future project (outside of this one) will be the replacement of all end-of-life sterilization equipment within the CPU department to be connected to this new RODI critical water system design and replacement. The Addendum 1 response to RFI 5 is for the connections to all existing sterilization equipment requiring RODI critical water.

4. **Question:** *RFI Addendum 1 response 25 says the Design builder is responsible for decommissioning and removal of existing RODI system. Please confirm if this includes the equipment. If so there will need to be coordination with the Equipment Vendor?*

Answer: Scope-of-work does not include decommissioning of existing equipment, as new RODI system is to connect to existing equipment.

5. **Question:** *Please confirm the liquidated damages clause (RFP item 2.3) is in reference to the 92 days that is for the RODI loop construction, and not for the phased decommissioning/removal of existing equipment, anchoring/install/hookup of new equipment, HCAI & CPHD approval portion of work. If schedule duration is extended due to additional scope, please confirm the listed liquidated damages clause will apply to all scope and new schedule durations?*

Answer: The replacement of existing sterilization equipment is not included in this scope-of-work – Connection of new RODI system is to be connected to existing sterilization equipment.

6. **Question:** *Please confirm the phased decommissioning/removal of existing equipment and anchoring/install/hookup of new equipment is not included in the allotted 92 days for construction in the RFP document. Please provide the new schedule duration for this scope of work after the RODI loop is complete?*

Answer: The replacement of existing sterilization equipment is not included in this scope-of-work – Connection of new RODI system is to be connected to existing sterilization equipment.

7. **Question:** *Please confirm if Vendor will provide the hook up of equipment or if the intent is to have the Contractor do this. If Vendor providing this, what time frame per equipment should we include?*



Answer: Awarded Design/Build GC is to perform equipment connections.

8. **Question:** *Please provide UCDH ICRA/Dust Mitigation requirements. We assume that all areas of construction will be considered ICRA Class II construction, please confirm?*

Answer: Actual ICRA Class designation to be determined, but anticipated as either Class III or IV, based on ICRA Permit Assessment form included in this Addendum.

9. **Question:** *Per RFI Addendum 1 response 19, is it okay to mount the piping on the wall in the corridors?*

Answer: No.

10. **Question:** *Per RFI Addendum 1 response 25, is it okay to abandon in place any piping that is above ceiling that is part of the RODI system? Please also confirm that the equipment is to be decommissioned and removed by GC as part of this project?*

Answer: the existing RODI piping being replaced is to be removed and decommissioned by the GC.

11. **Question:** *Per RFI Addendum 1 response 26, maximum allowable length of a dead leg for the new equipment hookups was not given. Please provide this length?*

Answer: Dead-legs are to be taken back to nearest connection point and lengths minimized as much as physically possible.

12. **Question:** *The Structural Criteria Document makes references to bringing up any existing utilities that are being modified to current code. We would suggest the Owner to define an Owner Allowance for all contractors to carry in case any existing utilities do need to be modified due to re-routing.*

Answer: Proposers to add Owners Allowance of \$3000,000 for any existing utility modifications required to meet current codes that are discovered.

13. **Question:** *Please provide the electrical load information for the new mechanical equipment being installed listed on P4.11JU.*

Answer: Design team to verify as part of design/build.

14. **Question:** *Please provide which pieces of equipment in Phase 1,2 and 3 that are being disconnected and reconnected along with their electrical load information?*



Answer: Phasing of equipment connections was only an option if required, but a full and complete change-over is the intended approach to be planned for.

15. **Question:** *Each faucet will require a DI at each sink. Please provide make and model of faucet we will need to provide.*

Answer: To be determined by design and submitted for approval.

16. **Question:** *We received a list of equipment that we are to design a pure water system around. Many times the equipment comes with different integrated options that we would not know what they are. We are requesting data cut sheets on the equipment that reflects the RO/DI water quality, pressures, gallons per cycle, gpm requirements, cycle duration, and temperature constraints. The equipment specs will tell us connection requirements. We are being asked to design a system without any literature which will not yield good results. Please provide this information as requested.*

Answer: UCDH does not possess cut-sheets for the existing equipment and expects design firm to obtain.

17. **Question:** *Please identify future demands we should plan for. An example of this is; provide 20% spare capacity from the design of the current system (if the future is not known). Or, It could also be a list of future potential equipment and cut sheets.*

Answer: Design with a 20% capacity safety factor for future equipment demands.

18. **Question:** *The utensil washers were identified as 2 cycles per hour in the addendum with all in use at one time. Please identify how many cycles the cart washers will be used in one hour and in one 12 hour period.*

Answer: Two cycles an hour - Every hour.

19. **Question:** *Please confirm a wall mounted DI/RO faucet can be used in cases where there is no convenient location at the sink to deck mount the faucet.*

Answer: This is an option if design necessitates.

20. **Question:** *A list of equipment was given to us in the addendum. This list only adds confusion as previously we believed the scope of work was to connect 5 sink faucets, 7 washers, and 2 cart washers. Please clarify that it is not the intention to add more equipment which is on that list. Please provide specific data sheets on for the equipment we are connection so we can make sure it is being fed in accordance with the manufactures criteria.*



Answer: The equipment list previously provided is an all-inclusive list of department assets and not all of this equipment connects to critical water. Only existing equipment that requires RODI supply connection is to be included in this RFP.

21. **Question:** *We assume the pipe drops to new faucets can be exposed if piped neatly and professionally. There is a precedence set for this at the medivators. The new piping will be stainless steel. Please confirm this is acceptable.*

Answer: This is acceptable.

22. **Question:** *Will concrete pads be required for any of the specific equipment? If so, please provide which equipment and what size pad will be required.*

Answer: Design/Build proposer to determine as design requirements dictate to meet current codes.

23. **Question:** *Please confirm it is acceptable to tee off the circulation RO/DI loop with a single supply pipe drop to each piece of equipment or faucet. The length of uncirculated piping will be minimized by keeping the recirculation line within approximately a foot of the vertical drops.*

Answer: Recommended method is acceptable to UCDH as long as approved by AHJ's.

24. **Question:** *The original RFI for item 26 was a request to clarify if the piping needed to be circulated to an extreme location at the equipment point of connection. However, for OSHPD equipment we need a flex connection and an isolation valve. We recommend we be allowed to run this single RO/DI pipe to the equipment or faucet as stated above (within 1 horizontal foot of the vertical drop).*

Answer: Recommended method is acceptable to UCDH as long as approved by AHJ's.

25. **Question:** *Please clarify that you agree with the following: Dead leg is defined as a leg of pipe that is capped at the end and not in use. All these legs will be removed as HCAI does not allow dead legs.*

Answer: Agree.

26. **Question:** *Please issue the UCDH Design Guidelines.*

Answer: UCDH design standards have been included in this Addendum.

27. **Question:** *Gripple or Griplock hanging systems are not allowed per the Design Guidelines. We are requesting they be not allowed. Please confirm they cannot be used.*



Answer: UCDH facility design standards to be followed per Section D-Hanger And Supports For Plumbing Piping And Equipment of Mechanical/Plumbing document.

28. **Question:** *Is JCI monitoring necessary? The Evoqua equipment can have a BacNET interface.*

Answer: This must be determined during design investigation.

29. **Question:** *Can we assume the DI/RO water at the sink will be diluted within the sink basin and we will not need acid resistant waste piping for the existing sinks?*

Answer: Correct.

30. **Question:** *Can we assume UCDH will clear obstacles from corridor space prior to construction. This includes boxes, equipment, and other materials currently in the corridor.*

Answer: Correct.

DocuSigned by:

Thomas Kaiser

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Thomas Kaiser
Project Manager
Facilities Design & Construction



UCDH FACILITY STANDARDS ARCHITECTURAL

SUMMARY OF UPDATES

Precast Architectural Concrete – 03 45 00

1. Added item A.3 to define design standard for quality. (04/02/24)

Metal Fabrications – 05 50 00

1. Added A.3 and A.4 to define general locations for coated (galvanized) and uncoated steel. (04/02/24)
2. Added A.5 and A.6 to define standard for material quality. (04/02/24)

Metal Stairs – 05 51 00

1. Added A.10 and A.11 to define general locations for coated (galvanized) and uncoated steel. (04/02/24)

Architectural Woodwork – 06 40 00

1. Added A.1.a to define requirements related to gaps with modular systems furniture. (04/02/24)
2. Added A.2.a to define edge banding requirements. (04/02/24)
3. Added B and all subsections of B to define requirements for cabinets. (04/02/24)
 - a. Subsections 1 & 2.
 - b. Subsections 3 & 4.
3. Added C and all subsections of C to define requirements for countertops. (04/02/24)
4. Added D and all subsections of D to define requirements for decorative paneling. (04/02/24)

Thermal & Moisture Protection – 07 00 00

1. Added A.2 to define preference for roof access. (04/02/24)

Thermoplastic Membrane Roofing – 07 54 00

1. Added language to A.1 to define physical properties of the roofing membrane. (04/02/24)

Flashing & Sheet Metal – 07 60 00

1. Added B to define requirements for copings and roof edge flashings. (04/02/24)

Specialty Doors and Frames – 08 30 00

1. Added D and all subsections of D to define requirements and locations for barn-type sliding doors.

Entrances, Storefronts and Curtain Walls – 08 40 00

1. Added F and all subsections of F to define energy performance requirements. (04/02/24)

Automatic Entrances – 08 42 29

2. Revised language in A.1 to define where automatic entrances shall be provided. (04/02/24)

3. Added A.2 to define a manufacturer. (04/02/24)

Aluminum Windows – 08 51 13

1. Added language to A.1 to clarify the type of finish. (04/02/24)

Door Hardware – 08 71 00

1. Added C.1 and all subsections of C.1 to define a manufacturer and products as well as related requirements. (04/02/24)
2. Added D.1 to define a manufacturer and product as well as related requirements. (04/02/24)
3. Added K.1 to define a manufacturer. (04/02/24)

Finishes – 09 00 00

1. Added A to provide an overview of finish requirements. (04/02/24)
2. Added language to B.1 to clarify requirements. (04/02/24)
3. Added B.3 to provide requirements related to light. (04/02/24)
4. Added B.6 and all subsections of B.6 to provide requirements related to reviewing materials and finishes and with what parties they are to be reviewed. (04/02/24)

Cement Plastering – 09 24 00

1. Added C, D, E, F, and G to define standard for material quality. (04/02/24)

Gypsum Board – 09 29 00

1. Added A to define locations for water-resistant gypsum board. (04/02/24)
2. Added B to define locations for cementitious backing board. (04/02/24)
3. Added D to define locations for wall protection. (04/02/24)
4. Added E and all subsections of E to define requirements of low-height walls. (04/02/24)

Tiling – 09 30 00

1. Added A.1 – A1.8 to define requirements for tiling. (04/02/24)

Acoustical Ceilings – 09 51 00

1. Added A and all subsections of A to define general requirements. (04/02/24)
2. Added B and all subsections of B to define code and design standard requirements. (04/02/24)

Resilient Flooring – 09 65 00

1. Added A.1 to define requirements related to sustainability. (04/02/24)
2. Added A.2 to clarify requirements related to slips, trips, and falls. (04/02/24)
3. Revised A.8 to clarify where to use quick set or peel and stick adhesive. (04/02/24)
4. Added B and all subsections of B to define requirements for resilient sheet flooring. (04/02/24)
5. Added C and all subsections of C to define requirements for resilient tile flooring. (04/02/24)

Resilient Flooring Accessories – 09 65 13

1. Revised A to clarify approval for thermoplastic vinyl (TV) base. (04/02/24)

2. Added A.2.a to define areas to receive covered base. (04/02/24)
3. Added A.3.a to clarify when quick set or peel and stick adhesive may be used. (04/02/24)

Fluid-Applied Flooring – 09 67 00

1. Added A.1 to clarify when fluid-applied resinous flooring may be used. (04/02/24)

Carpeting – 09 68 00

1. Added A.1 to clarify when broadloom carpet may be used. (04/02/24)
2. Added B and all subsections of B to clarify where walk-off carpet is to be used and provide requirements. (04/02/24)

Painting and Coatings – 09 90 00

1. Added A.5 to define a manufacturer. (04/02/24)

Toilet Compartments – 10 21 13

1. Revised A to clarify compartment material. (04/02/24)

Cubicle Curtains and Tracks – 10 21 23

1. Added B to define material requirements. (04/02/24)

Lockers – 10 51 00

1. Revised A to clarify material requirement. (04/02/24)
2. Added B to clarify requirement for sloped tops. (04/02/24)

Countertops – 12 36 00

1. Added A.1 and A.2 to define standards for material quality. (04/02/24)

Entrance Floor Mats and Frames – 12 48 13

1. Added B to reference related requirements. (04/02/24)

Furniture – 12 50 00

1. Added B and all subsections of B to clarify procurement and acceptable manufacturers. (04/02/24)
2. Added C to clarify design flow. (04/02/24)
3. Revised D to clarify with whom the coordination is required. (04/02/24)

Basis of Design (Or Equal) Products (Architectural) – Appendix B

1. Added in its entirety. (04/02/24)
2. Attachment added in its entirety. (04/02/24)



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HAZARDOUS MATERIAL ASSESSMENT

02 26 00

A. GENERAL

1. The University Representative can provide the most updated and/or project specific lead and asbestos abatement requirements, if any. Any variation from UC Davis Health's Standard Specifications must be reviewed and approved by UC Davis Health Environmental Health & Safety (EH&S). Records must be maintained for addressing protocols, monitoring, record keeping and manifesting of the waste.
2. Numerous other hazardous materials are found on the UC Davis Health campus and will be identified and addressed by the University Representative. These may be chemical, radiological, or biological and include, but are not limited to: mercury found in traps, drains and sumps and fluorescent light tubes; PCBs found in light ballasts, transformers, freons found in refrigerators and other refrigeration units, batteries found in smoke alarms and radioactivity found in exit signs, smoke detectors and as potential contamination in labs, radon, etc.
3. Prior to any significant earthmoving or grading activities, soil sampling shall be conducted by a third party to determine if naturally occurring asbestos (NOA) is present. Review Division 01 for specific sampling requirements. The sampling may take place at the same time as the geotechnical work, if required. If NOA is found at the site by method CARB 435, all site work must be conducted in accordance with the California's Air Resources Board's Asbestos Airborne Toxic Control Measure (ATCM) standards. Results shall be provided to the University Representative.
4. All hazardous materials must be disposed of in strict accordance with Federal, State, and UC Davis Health disposal requirements. Refer to project specific Geotechnical Report and Division 01.

DEMOLITION

02 41 00

A. GENERAL

1. When demolishing buildings up to six stories in height, all exterior surfaces of the building shall be wetted during demolition. Coordinate with the university representative for all demolition projects located in areas with highly sensitive air quality or infection control requirements.

CONCRETE GENERAL

03 00 00

A. CONCRETE FINISHES

1. Concrete finishes are reviewed on a project-by-project basis for quality and visual consistency. UC Davis Health seeks designs that unify UC Davis Health campus 'neighborhoods' in visual character and intuitive way-finding. The consistency of finishes and visual relationship to adjacent buildings are reviewed for contextual appropriateness.
 - a. Interior and exterior architectural concrete at locations where appearance is prominent, requires formwork design submittals and material mock-ups for review and approval by the University Representative.
 - b. Forms that are to be reused shall be carefully inspected after each use to ensure that they have not become damaged, distorted, disassembled, or otherwise be unable to perform as designed. Concrete forms and formwork shall remain leak-proof for each use.

B. QUALITY ASSURANCE

1. A quality assurance program shall be developed and implemented in accordance with the requirements of the CBC.

C. PROJECT CONDITIONS: Reference ACI (American Concrete Institute) standards

1. Hot-weather concreting that includes production, delivery, placement, curing and protection of concrete shall be in accordance with ACI 305.
2. Cold-weather concreting that includes production, delivery, placing, curing and protection of concrete shall be in accordance with ACI 306.
 - a. Use of calcium chloride as an accelerating admixture is prohibited.
3. Method of concrete curing shall be in accordance with ACI 308 and based upon the type of floor finishes and environmental conditions.
 - a. Curing compounds shall not be used on surfaces that are meant to receive additional concrete, paint, or tile that requires a positive bond, unless it has been demonstrated that the membrane can be satisfactorily removed before the subsequent application is made, or that the membrane can serve satisfactorily as a base for the later application.
 - b. Where finished flooring is to be installed over the curing compound, the Contractor shall test the compatibility of the mastic/adhesive from the flooring with the curing compound prior to applying the curing compound.
 - c. Items described above shall not be subjected to rusting or other deterioration.

D. SLABS ON GRADE

1. Excessive moisture in concrete can cause adhesion problems with flooring materials installed over concrete slabs, especially slabs on grade. Implement precautionary moisture control measures to ensure there will not be adhesion problems, deterioration, or other conditions that will limit the expected life span of the flooring or void the material and installation warranties or the warranties of adjacent installations.
2. At interior slabs to receive flooring, provide a minimum 15 mil under-slab vapor barrier. Project specific requirements may supersede or require greater moisture mitigation measures.
3. Review the geotechnical soils report for each project and confirm recommendations.

E. DESIGN OF FLOOR SLABS IN WET AREAS

1. In restrooms, showers, locker rooms, mechanical rooms above the first floor, or other areas subject to flooding or wash down, slabs shall be constructed with integral 6" curbs at perimeter and interior walls. Integral waterproofing system required unless otherwise approved by the University Representative.

F. WET LABS

1. Wet labs shall be provided with sleeves that extend 4” above the floor to prevent the migration of water down to the floors or under the slab on grade. Sleeves shall be sealed watertight.

CAST-IN-PLACE CONCRETE
03 30 00

A. GENERAL REQUIREMENTS

1. Concrete shall be designed and detailed to meet all applicable CBC requirements, including requirements for structural strength, stability, short- and long-term deformation and fire resistance.
2. Concrete elements shall also be designed for serviceability, including specific consideration of long-term deformations, crack control, durability of both concrete materials and other building components embedded in or in contact with concrete materials and vibration.
3. Concrete used in buildings, including slabs-on-grade, shall have a minimum compressive strength, (f'c) of at least 3,000 psi at 28 days. Higher strength concretes are permitted.
4. Concrete floors shall be designed to provide satisfactory vibration performance for each space type to achieve optimum performance for both occupant comfort and the operation of vibration - sensitive equipment, where applicable. Vibration performance shall be reviewed and confirmed in early design phases.
5. Concrete roof slabs, including concrete slabs placed on metal deck, shall be designed to support the weight and seismic mass of one (1) re-roofing without removal of the original roofing.
6. Concrete roof slabs, including concrete slabs placed on metal deck, shall be designed to support the weight and seismic mass of a rooftop photovoltaic array in all areas of the roof not occupied by other equipment or rooftop structures.
7. Clearly indicate requirements for crack control joints or other crack control measures in all concrete construction following recommendations by the American Concrete Institute (ACI), the Concrete Reinforcing Steel Institute, and other relevant industry standards.
8. Avoid thin concrete sections and unreinforced projections that could crack or spall over time. All concrete sections shall be reinforced.
9. Show all slab openings, depressions, curbs, and pads on structural drawings, clearly indicating reinforcing requirements and provisions for maintaining minimum structural section depth at all locations.
10. Show openings and penetrations through concrete walls and through or below concrete footings on structural drawings. Include locations of penetrations for pipes, conduits, ducts and other building components on drawings.
11. Provide requirements for shoring, reshoring, concrete pour joints and pour sequencing at all locations where these construction means and methods affect the short- or long-term structural performance or finished aesthetics of the construction.
12. Provide structural details that include scaled representations of all reinforcing steel including rebar configurations and other embedded items in enough detail to ensure constructability of the element including consideration of at least the following: constructability of formwork, flow of wet concrete through rebar and other embedded items.
13. Concrete placed in contact with soil shall be designed and specified for long -term durability in consideration of such soil-related effects as sulfate exposure, permeability of concrete, corrosivity and expansion potential of soils.

PRECAST ARCHITECTURAL CONCRETE**03 45 00****A. GENERAL**

1. Precast concrete may be used for exterior walls and other areas if approved by the University Representative. Construction of precast concrete will require tight tolerances to be maintained and double waterproofing at joints and seams. Mockup of precast panels shall be approved at the plant where the panel is manufactured.
2. Precast architectural concrete elements and their anchorage to the building frame or foundation shall be designed by a licensed California Structural Engineer considering all gravity and environmental loads. Should this design be performed by an engineer other than the Structural Engineer of Record (SEOR) of the building, the SEOR shall review all pre-cast concrete details and calculations for conformance with the design intent, including loads imposed on the structure, deformation compatibility (both vertical and lateral) with the structure, and coordination between precast elements, their connections and other structural and non- structural building components.
3. Precast architectural elements that are attached at more than one floor level or that attach to other building elements, including other pre-cast concrete elements shall be designed to accommodate the maximum inter-story displacement between floors. This requirement applies to both vertical (gravity) deflection and lateral (seismic and/or wind) drift between floors.
4. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, PCI Design Handbook - Precast and Prestressed Concrete, applicable to types of architectural precast concrete units indicated.

MASONRY**04 00 00****A. GENERAL**

1. For masonry finishes, where masonry is exposed to the exterior, utilize integral water-repellent admixtures in lieu of surface applied sealers. Use graffiti -resistant coatings where feasible to protect exposed finishes. Verify requirement for graffiti-resistant coating with the University Representative prior to specifying.
2. Seal exposed masonry and control joints inside and out before additional wall finish materials are applied. Pretest all surface-applied sealants and coatings by mock-up when integral mixtures are not used.

B. PROTECTION AND STORAGE DURING CONSTRUCTION

1. Protect all masonry materials including packaged mortar materials, sand, and related materials from weather conditions such as rain, snow, ice, etc. All materials for any project shall be kept in a manner consistent with the manufacturers' requirements and warranties.
2. Protect unfinished masonry from the elements a minimum of two feet on all sides. Do not apply construction loads that exceed the safe superimposed load capacity of the masonry.

C. QUALITY ASSURANCE

1. A quality assurance program shall be developed and implemented in accordance with the requirements of the CBC.
2. Establishment of the required compressive strength (f'm) of masonry shall be in accordance with CBC.

D. GROUTED MASONRY

1. All cells in the masonry units shall be fully grouted. Prior to grouting, clear the masonry cells of extraneous materials, mortar projections greater than ¼ inch, mortar droppings and other foreign materials.
2. Low-lift and high-lift grouting construction shall be in accordance with the CBC. High-lift grouting has the potential for block blow-out during grouting. Repair all blowouts during grouting procedures.

E. EMBEDDED CONDUITS, PIPES AND SLEEVES

3. Conduits, pipes, and sleeves of any material to be embedded in masonry shall be compatible with masonry and meet the following requirements.
 - a. Design shall consider the structural effects resulting from the removal of masonry to allow for the placement of pipes or conduits and shall not displace more than 2% of the net cross section.
 - b. Conduits, pipes, and sleeves in masonry shall be no closer than three (3) diameters on center.
 - c. Do not embed pipes that contain liquid, gas, or vapor at temperatures greater than 150 degrees F, water or liquids that are subject to freezing, or under pressure in excess of 55 psi. Do not embed any pipes that may require future maintenance or reconfiguration.

F. PROJECT CONDITIONS

1. When ambient air temperature is below 40 degrees F, implement cold weather procedures in ACI (American Concrete Institute) 530.
2. When ambient air temperature exceeds 100 degrees F or exceeds 90 degrees F with a wind velocity greater than 8 mph, implement hot weather construction as instructed by ACI 350.

CONCRETE UNIT MASONRY**04 22 00**

A GENERAL

1. Where CMU is exposed to view, utilize integral admixtures for water resistance, graffiti resistance, etc. Verify requirement for graffiti-resistant coating with the University Representative prior to specifying.
2. Design and detail CMU to meet all applicable CBC requirements, including requirements for structural strength, stability, short- and long-term deformation, and fire resistance. Design CMU for serviceability, including specific consideration of crack control, and durability of both CMU wall materials and other building components embedded in or in contact with the CMU walls.
3. CMU wall and wall opening dimensions shall be multiples of base CMU block unit dimensions to minimize cut masonry material, to the greatest extent possible.

4. Clearly indicate requirements for expansion joints, crack control joints or other crack control measures in all building and site CMU wall construction following recommendations by the American Concrete Institute, the Concrete Reinforcing Steel Institute, The Masonry Society, The Concrete Masonry Association of California and Nevada and other relevant industry standards.
5. Show all openings and penetrations through CMU walls on structural drawings. Include locations of penetrations for pipes, conduits, ducts, and other building components.
6. Maximum reinforcing bar size in CMU construction shall be #8.
7. All cells in CMU construction shall be fully grouted.

MASONRY VENEER

04 26 00

A. GENERAL

1. Masonry Veneer require Water/Graffiti Resistance
 - a. Where concrete facing brick is exposed to view, utilize integral admixtures for water resistance, graffiti resistance, etc.
 - b. Where face brick is exposed to view, utilize compatible topical coatings for water resistance, graffiti resistance, etc.
2. Masonry wall and wall opening dimensions shall be multiples of base masonry unit dimensions to minimize cut masonry material to the greatest extent possible.
3. Clearly indicate requirements for expansion joints, crack control joints or other crack control measures in all building and site masonry wall construction following recommendations of the Brick Industry Association (BIA) and other relevant industry standards.
4. Show all openings and penetrations through masonry walls on structural drawings. Include locations of penetrations for pipes, conduits, ducts, and other building components.
5. Masonry
 - a. Standard: Comply with TMS 602, except as modified by project requirements.
 - b. Defective Units: Do not use defective units that comply with referenced standards where such defects will be exposed in the completed work.
6. Adjustable Masonry-Veneer Anchors: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
7. Do not use calcium chloride in mortar or grout.

METALS

05 00 00

A. GENERAL

1. Metal fabrications are required to be detailed and coordinated with adjacent materials to ensure installation does not have long-term maintenance requirements. Steel may be exposed when approved by the University Representative.
2. All metals exposed to an exterior environment (including prefabricated items such as steel doors or stairs) require a protective finish coating. Exposed metals may be

either factory- finished with a corrosion and sulfate-resistant finish, stainless steel, hot-dip galvanized, or finished with a high- performance coating.

3. Architecturally Exposed Structural Steel (AESS) compliant mockup is required for all projects. The University Representative has the right to waive this requirement for smaller scopes of work as desired.
4. Interior metal shall be primed painted to a minimum thin-film thickness of two mils unless described in the respective project as unpainted. Some members or portions thereof may be designated as unpainted. Examples may represent metal that will be in contact and acting compositely with concrete and / or members that are to receive spray-applied fire protection materials.
5. All materials shall be identified with appropriate ASTM designations and fabricator's identification mark. Materials without minimum specification, or under a specification that is less rigorous than the applicable ASTM standard or without certified mill test reports shall not be used without the approval of the University Representative.

B. QUALITY CONTROL

1. Quality assurance program shall be developed and implemented in accordance with the requirements of the California Building Code.

STRUCTURAL STEEL FRAMING

05 12 00

A. GENERAL

1. Structural steel shall be designed and detailed to meet all applicable C.B.C. requirements including but not limited to requirements for strength, stability, deformation, and fire resistance. Steel systems shall also be designed for serviceability, including specific consideration of deflection, durability, and vibration.
2. Steel framed floors shall be designed to meet the vibration requirements for occupant comfort as described in Design Guide 11, latest edition, published by the American Institute of Steel Construction (AISC) as a minimum standard requirement. More stringent performance requirements shall be determined as needed per project-by-project type and specifically related to vibrationally-sensitive equipment requirements.
3. Steel-framed roofs shall be designed to support the weight and seismic mass of one re-roofing without removal of original roofing.
4. Steel-framed roofs shall be designed to support the weight and seismic mass of a rooftop photovoltaic array in all areas of the roof not occupied by other equipment or rooftop structures.
5. Steel framing supporting concrete-filled metal decks shall be designed to accommodate any excess weight or mass caused by over-pouring as may be needed to provide a slab meeting the project floor flatness and levelness requirements, taking into account deck and supporting beam pre-composite deflections and beam camber.
6. Structures shall be designed to accommodate the dimensional changes of steel material caused by temperature changes.
7. Exterior steel elements shall specify a material thickness of at least 1/4".
8. All details that include connections of steel to other materials shall include provision for field adjustment or leveling, including but not limited to base plate connections to foundations and steel beam/ledger connections to concrete and masonry walls.

METAL DECKING**05 30 00****A. GENERAL**

1. As standard use minimum 18-gauge deck.
2. Metal decking below concrete slabs shall be vented to promote consistent concrete curing.
3. Metal deck supported concrete slabs shall be designed to accommodate any excess weight or mass caused by over-pouring as may be needed to provide a slab meeting the project floor flatness and levelness requirements, taking into account deck and supporting beam pre-composite deflections.
4. Acoustical metal deck may be considered in exposed conditions when there is an acoustical concern. The specific type of deck shall be determined by the Acoustical Engineer to meet project requirements and approved by the University Representative.
5. Coordinate openings in metal decking with each design discipline. The cutting and reinforcing of openings will require SEOR review and confirmation adjacent areas are not negatively affected. Reinforcement executed by welding will need to comply with the American Welding Society (AWS) current requirements.
6. Requested modifications or any deviations of any metal decking originally specified for a project, such as vented decks, needs to be brought to the attention and reviewed by the SEOR and approved by the University Representative.

STRUCTURAL METAL STUD FRAMING**05 41 00****A. GENERAL**

1. Provide metal stud types designed for screw application of gypsum wallboard. Studs shall be fabricated by a manufacturer that belongs to the Steel Stud Manufacturers Association (SSMA) and shall meet requirements of the latest edition of the International Code Council Evaluation Service (ICC-ES) Evaluation Report #3064P.

B. METAL STUDS

1. Provide ASTM C645, non-load bearing type with punched webs; roll formed electro galvanized steel sheet in the following minimum gages:
2. 20ga (33 mil) typical framing (non-OSHPD projects).
3. 16ga (54 mil) typical framing (OSHPD projects).
4. 16ga (54 mil) for king and trimmer studs at door/window openings and wing wall ends.

METAL FABRICATIONS**05 50 00****A. GENERAL**

1. All provided metal fabrications will need to comply with the current C.B.C. and ASTM specifications applicable to these fabrications. Laboratory test results will need to be provided to confirm compliance with each project's specifications. All steel grades will need to be reviewed and confirmed for each project and for each use type. Steel tubing, piping, bolts, bars and woven wire meshes may require galvanization prior to installation. Field cut edges will need treatment applied if protective coatings are damaged or removed by the field installation process.

2. Dissimilar metals will need separation when in contact or in close proximity to non-compatible metals. Anchor bolts that fasten through metal fabrications shall be stainless steel.
3. Exterior Fabrications: Hot-dip galvanized steel, shop primed.
4. Interior Fabrications: Ferrous steel, shop primed.
5. Stainless Steel: Type 304. Type 316 for corrosive environments.
6. Aluminum: Alloy 6061-T6.

METAL STAIRS

05 51 00

A. GENERAL

1. Design by SEOR or review by SEOR for compliance to design loads for all interior monumental stairs.
2. Standard is metal stair fabrication with concrete-filled pan treads. Stair design and fabrications are both functional and aesthetic. Designs should create a “finished” appearance, to encourage use of all stairways serving the public (including egress stairs).
3. At a minimum, all soffits at stairs and landings shall conform to current code-required vertical clearances to the bottom of the finished soffit. Exposed metal fabrication is discouraged. Use of metal treads is NOT permitted, unless approved by the University Representative due to special circumstances for non-public use. Special focus should be paid to adequate coefficient of friction for safe walking surface.
4. Provide contrasting strip at EVERY tread, on exterior stairs to assist in visual acuity for navigating risers. UC Davis Health has standardized contrasting risers, regardless of stair type or location (applies to indoors, outdoors, public, private and egress stairs).
5. Coordinate floor finishes to extend from adjacent service area into landing at each stair. Provide finished materials at stairwells.
6. Stair design to comply with current C.B.C. requirements. The preferred rise and tread combinations are (6 1/2”, 11 5/8”) and (6 3/4”, 11 1/4”).
7. Stair fabrications require shop drawing review.
8. Provide at least one stairwell up to a roof containing air handling units, pumps, boilers, large exhaust fans and other equipment. (Ships ladders are not acceptable, unless approved by the University Representative under special circumstances).
9. Walkway canopies, handrails, guardrails, and similar assemblies should discourage climbing, skateboarding, roller-blading and similar nuisance activities.
10. Exterior Fabrications: Hot-dip galvanized steel, shop primed.
11. Interior Fabrications: Ferrous steel, shop primed.

METAL RAILINGS

05 52 00

A. GENERAL

1. Exterior guardrails and handrails shall be stainless steel or hot dipped galvanized steel with bolted connections. For both stainless steel and hot dipped galvanized, use SS316 bolts and mechanical fasteners at railing connections. Painted finishes are discouraged, as they do not stand up to heavy use and require regular ongoing maintenance. Interior handrails may be stainless or have a painted finish, with the approval from the University Representative.
2. Nonwelded connections that use mechanical fasteners require fasteners to be of the same metal and finish as the railings. Material compatibility is required for

supporting brackets, flanges, fittings, anchors, and inserts. When selecting non-welded fasteners, special attention to dissimilar metals is required. Where possible, use fasteners of the same material as metal fabrication, stainless steel, or provide neoprene separation between dissimilar metals.

3. Where railings are sheared or punched, surfaces shall be cleaned, and edges eased to a radius of 1/32." Design weep holes and water-directing devices into the system to prevent entrapment of water in assemblies.

B. HANDRAIL EXTENSION MEASUREMENT

1. Handrail extension, whether top of stair or bottom of stair shall be measured to the near side / inside material diameter to handrail extension material thickness meets or exceeds code minimum extension relative to stair tread.

C. GRAB BAR SIZE

1. When selecting and documenting grab bars, provide the next longer size, particularly at side reach, to ensure that code minimum reach range are met (for example in lieu of 42" select 48").

WOOD, PLASTICS AND COMPOSITES

06 00 00

A. GENERAL

1. Use of wood in UC Davis Health buildings is generally limited to casework and rough carpentry. Due to the lack of durability and a high degree of maintenance involved with exterior uses, wood is discouraged for most project types on the UC Davis Health campus.
 - a. Engineered wood systems can be considered for strategies to reduce embodied carbon footprint in new construction.
 - b. CLT or panelized wood systems will be considered on a project-specific basis for appropriateness and with approval from the University Representative.
2. Provide wood products conforming to the Forest Stewardship Council Guidelines for certified wood building components.
3. For use in building interiors, composite wood and agrifiber products (including core materials) shall not contain added urea formaldehyde resins. Adhesives used in field and shop-fabricated assemblies containing these products shall not contain urea-formaldehyde.

ROUGH CARPENTRY

06 10 00

A. GENERAL

1. Form release agents used on wood concrete forms shall be biodegradable to enable the wood to be recycled.
2. Provide preservative-treated wood in conjunction with roofing (nailers, curbs, etc.) and for any wood in contact with masonry, cement, or the earth. Provide material safety data sheets for all wood preservative for review and approval by the University Representative and EH&S.

3. Provide plywood backboards with a minimum ¾" fire treated CDX for all wall-mounted boxes and boards in mechanical or electrical rooms. Alternate support details for boxes and boards will be considered on a project-by-project basis and with approval by the University Representative. Each project will need to confirm use of rough carpentry for compliance of each project's construction type.
4. Provide products that have Health Product Declaration (HPDs) and Environmental Product Declarations (EPDs) available.
5. Wood construction used to support structural loads shall be designed and detailed to meet all applicable structural provisions of the CBC including all requirements for strength, stability, short- and long-term deformation, and fire resistance. Wood elements shall also be designed for serviceability, including specific consideration of durability wood and connector materials.
6. Lumber grading rules and wood species shall conform to Product Standard PS – 20 -70 and West Coast Lumber Inspection Bureau (WCLIB) requirements.
7. Wood-framed roofs shall be designed to support the weight and seismic mass of one re-roofing without removal of the original roofing.
8. Wood-framed roofs shall be designed to support the weight and seismic mass of a rooftop photovoltaic array in all areas of the roof not occupied by equipment or other rooftop structures.
9. Wood stud walls and partitions adjacent to shower or toilet rooms or a room with other similar sources of water shall bear on concrete curbs extending at least 6" above finished floor.
10. Exterior wood walls shall bear on concrete curbs extending at least 6" above finished floor.
11. Use 6" minimum nominal framing for all structural wood stud walls.
12. Provide specific details to describe the conditions that allow wood studs and plates to be notched or cored for piping and conduit within walls.

FINISH CARPENTRY

06 20 00

A. GENERAL

1. Materials, workmanship, and installation shall be "Premium Grade" in accordance with Woodwork Institute's Architectural Woodwork Standards, current edition.
2. Wood fabricated from old growth timber is not permitted. Provide sustainably harvested wood, certified or labeled.
3. Where feasible, shop finish carpentry and casework fabrication, rather than site finish.
4. Wood shall be pressure-treated and/or fire-resistant, where required by CBC or other applicable codes.
5. Avoid wood finishes in locations that are subject to high traffic, or impact damage.

ARCHITECTURAL WOODWORK

06 40 00

A. GENERAL

1. The UC Davis Health encourages the use of modularity and systems furniture in place of built-in casework for uses such as nurses' stations, reception desks, etc. The flexibility and reconfiguration possible by use of modular design allows adaptability as space needs and workflow changes.

- a. When utilizing modular systems furniture within patient care settings, gaps between furniture systems and flooring are not acceptable and shall be mitigated.
2. For built-in woodwork, materials, workmanship, and installation shall be “Premium Grade” in accordance with Woodwork Institute’s Architectural Woodwork Standards, current edition.
 - a. Specify polyvinyl chloride-free edge band products, when possible, for furniture and casework. Verify minimum yardage requirements with the vendor.

B. CABINETS

1. Cabinets shall be made of moisture resistant particle board panels with NAF, MR10 rating.
 - a. Custom Grade is acceptable but only with UCDH prior approval.
 - b. Melamine interior is acceptable
2. Upper cabinets shall have sloped top when ceiling height is over 18” above cabinet.
3. Base Cabinets:
 - a. Drawer slides have a capacity of 150 lbs. preferred.
 - b. Loose toe kicks with plywood bases will be used.
 - 1) Provide a 4-inch, top-set resilient base where casework meet the floor and at the casework toe space. Always provide a toe space where standing or queuing occurs.
 - a) As required per code or operations, provide a 6-inch base.
 - c. At sink locations, cabinet to have a sloped skirt for accessibility.
4. Hardware:
 - a. Self-closing hardware. A magnet catch is not required.
 - 1) Manufacturer: Blum or equal.
 - b. Exposed hardware finish to be Satin Stainless Steel.
 - c. Shelf rests/clips shall be plastic institutional shelf supports.
 - d. Manufacturer for Keyed Cabinet Locks: Olympus or equal.
 - e. Manufacturer for Drawer Slides: Accuride or equal.

C. COUNTERTOPS

1. All countertops shall be solid surface regardless of use.
2. Provide splashguards on countertops at all locations where printers are adjacent to sinks.
3. Sinks:
 - a. Public sinks shall be solid surface with an under-mount installation.

- b. Non-laboratory(clinic) sinks shall be stainless steel with a top-mount installation.
4. In laboratory locations, refer to Section 12 35 53 Laboratory Casework within the Campus Design Guidelines for additional requirements.
 - a. Countertops shall be solid surface epoxy resin, phenolic resin, or other equivalent solid material. Do not specify plastic countertops.
 - b. Cabinets shall be resistant to heat, chemical, impact, and bacteria. Provide manufacturer's data sheet to University Representative for review.
 - c. Sinks shall be top-mount with color matched silicone for easy sink replacement.

D. DECORATIVE PANELING

1. The use of decorative paneling as accents for portals, walls, and/or ceilings is acceptable within main entries and public lobbies. Minimize the use of wood panels in areas prone to damage from carts, gurneys, wheelchairs, strollers, or other equipment.
 - a. Use finished sealed wood to mitigate the potential adverse impacts to indoor air quality and patient health.

THERMAL & MOISTURE PROTECTION

07 00 00

A. GENERAL

1. The principles and criteria in this division are critical in developing thermal and moisture protection designs that will prevent serious problems over time.
2. Roof access ladders and stairways to roof shall not be alternating tread type.
3. Elevator access is preferred for roof access.
4. Provide 18-gauge sheet metal flashing at roof locations that are accessible to building occupants to prevent damage and vandalism.
5. All rooftop-mounted equipment shall be mounted on platforms (curbs). Coordinate curb heights with top of roofing elevations so that minimum base flashing heights and roof warranties are maintained.
6. All platforms (curbs) shall be a minimum of 8" in height from the finished roof surface. Walk pads shall be provided from roof access points to and around all rooftop equipment. Walk pad installation shall be fully adhered to roofing to avoid restricting storm water pathway to drains. Walk pads shall be installed with 1" gap and between walk pad placement and valley lines.
7. All conduits and piping shall be elevated to a 4" minimum height and all conduit and piping supports shall be from a manufactured composite rubber base pipe support system. No pipe supports may breach roof warranties. Additional roof membranes or coatings may be necessary at pipe support locations.
8. Below-grade foundation walls, retaining walls, above-grade concrete or masonry planters, and any other structures subject to hydrostatic pressure shall receive an appropriate waterproofing system. Perimeter drainage shall be equipped with cleanouts located in planter areas for future maintenance.
9. Each building design shall be carefully analyzed to locate conditions that require waterproofing, including retaining walls, basement walls, on-grade slabs, plaster walls, elevator pits and any other sub-grade conditions where the passage of water can create a problem.

10. For renovation projects: When rooftop equipment is removed and not replaced in the roof area, all associated components shall be removed as well, including the complete removal of any curbs, supports, piping, conduits, electrical lines, blocking, etc. All roof areas touched by this removal shall be patched and repaired to maintain all existing warranties.

DAMPPROOFING AND WATERPROOFING
07 10 00
A. GENERAL

1. Provide testing and inspection as required by Air Barrier Association of America standards. ICC- ES AC38 – Acceptance criteria for Water-Resistive Barriers. Refer to ICC-ES AC148 Acceptance Criteria for Flexible Flashing Materials.

SHEET WATERPROOFING
07 13 00
A. GENERAL

1. Prior to installation of any product below grade, all areas shall be clean and have an approved primer applied per manufacturer's specification. All non-exposed areas shall be a minimum of 60mil self- adhering sheet, composed of butyl rubber-based adhesive, and backed by a layer of protection board, separating it from contact with soil or other damaging elements.

WATER REPELLENTS
07 19 00
A. GENERAL

1. All exterior exposed masonry and concrete (that will not be receiving additional finish) shall be treated with a clear, penetrating water repellent.
2. Concrete masonry units with integral dry block additives do not require additional waterproofing sealers.

ROOFING AND SIDING PANELS
07 40 00
A. GENERAL

1. All exterior masonry and concrete (that will not be receiving additional finish) shall be treated with a clear, penetrating water repellent.
2. Concrete masonry units with integral dry block additives do not require additional waterproofing sealers.

METAL ROOF PANELS
07 41 13
A. GENERAL

1. Standing seam roofing system shall consist of integral self-locking seams with a minimum seam height of 1 ¾". Standing seam roofing system shall have no exposed fasteners. Panels shall have clips designed to allow for thermal expansion and contraction. Design metal roof system to accommodate both wind load and any future PV system or infrastructure, to be confirmed by the University Representative.

2. Use a minimum of 30lb felt underlayment or 30-mil roof underlayment or better. All underlayments at metal roof shall have a high-heat performance capability. For special applications, consult the University Representative. Sealants shall be gunnable grade single component polyurethane caulk or gunnable grade butyl. Tape Sealant shall be Butyl.
3. The completed metal roof and flashing assembly shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling; producing excess stress on structure, anchors or fasteners; or reducing performance ability. System design shall not rely on deformation of any element to allow for expansion/contraction.
4. Manufacturer shall provide a standard 25-year coating performance warranty. All installations shall be in accordance with specified manufacturer guidelines.

THERMOPLASTIC MEMBRANE ROOFING

07 54 00

A. GENERAL

1. Polyvinyl Chloride (PVC): PVC sheet ASTM D4434, Type III, fabric-reinforced and optional fleece-backed, 80 mil thickness, Single-Ply Membrane Roofing System (SMR) is the standard thermoplastic membrane roofing system for low-sloped applications. Thermoplastic Olefin (TPO) membranes are NOT approved.
2. Single Ply Membrane Roofing (SMR) systems shall be fully adhered or mechanically fastened and qualify for a UL Class A Roof Covering with Factory Mutual 1-90 Windstorm Classification as needed to meet the current code requirements for the ultimate design wind speed designated for the building classification. The SMR system shall be covered by the material manufacturer's 20-Year Total System warranty covering all roofing components installed above the roof deck upon completion and acceptance of work.
3. Roof systems shall comply with NRCA (National Roofing Contractors Association) Roofing and Waterproofing Manual, current edition. Designs shall provide minimum roof slope of ¼ inch per foot, including valleys at crickets. Provide greater slopes if possible.
4. All roofing systems shall meet ASTM standards per their respective systems. Roofing materials shall meet ASTM D4434, minimum 80 mil thickness and have a Solar Reflectance Index (SRI) as required below for a minimum of 75 percent of the roof surface. (Product shall meet current CA Title 24 Requirements for reflectivity.)

Roof Type Slope SRI

Low-Sloped Roof ≤ 2:12 78

Steep-Sloped Roof > 2:12 29

5. For special applications, consult the University Representative. All installations shall be in accordance with manufacturer recommendations.
6. Materials and adhesives shall be selected to comply with UC Davis Health Sustainability Initiatives, Code, and performance standards while also being no - or low-VOC.

FLASHING & SHEET METAL
07 60 00
A. BASE FLASHING / SPRING-LOCK COUNTER FLASHING

1. At all areas, base flashing shall extend 8" minimum above the highest point of the roof system and be continuous and level all around the entire perimeter of the roof. Roofs shall generally have a spring - lock counter flashing to accommodate future re-roofing without destroying the balance of metal flashing system. Designs shall conform to SMACNA standards (Sheet Metal and Air Conditioning Contractor's National Association).

B. COPINGS AND ROOF EDGE FLASHINGS

1. Copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be NRCA listed or shall provide other evidence acceptable to University Representative as able to fabricate required details as tested and approved.

ROOF SPECIALITIES AND ACCESSORIES
07 70 00
A. GENERAL

1. This applies to all roof hatches that are in addition to the minimum required (one per stair to roof).

B. ROOF HATCHES

1. Standard roof hatch size is 30" x 36" inches. Roof hatches that are larger than the standard size shall require hydraulic or spring-loaded hinges. Special applications or sizes shall be reviewed and approved by the University Representative.
2. Roof hatches shall be designed to comply with Cal OSHA Title 8 Section 3212 and to provide safe egress and ingress through roof and access hatches.
3. Roof hatches shall be designed such that opening and closing of the roof hatch can be done with three points of contact on the ladder at all times.
4. Consideration shall be given for the safe exit and approach to the hatch and ladder. The roof hatch shall be located such that there is sufficient clear space directly in front of the ladder at the roof level. Shop drawings shall be reviewed with the University Representative prior to construction.

C. EXTERIOR FIXED LADDER

1. Where buildings don't provide a roof hatch, an exterior fixed ladder that complies with Cal OSHA Title 8 section 3277 shall be provided. Lighting at the roof hatch shall be no less than 5' candles, switched in the room.

ROOF FALL PROTECTION
07 72 60
A. GENERAL

1. All areas that expose workers to a fall of 6' or greater shall be protected by parapet walls or permanent guardrails that comply with Cal OSHA Title 8 section 3209. When guardrails or parapets are not feasible, provide one of the following:

- a. Horizontal Lifelines as part of a complete fall arrest system that is compliant with Cal OSHA Title 8 section 1670 designed by a “Qualified Person” as defined by ANSI/ASSE Z359.0- 2007- 2.109.
 - b. Anchorages that comply with Cal OSHA Title 8 section 1670 as designed by a “Qualified Person” as defined by ANSI/ASSE Z359.0-2007-2.109.
 - c. All fall protection systems shall comply with Federal OSHA and Cal OSHA Title 8 requirements, of which the most stringent shall apply.
2. Whenever possible, projects shall be designed in such a way that specialty equipment and/or personal protective equipment shall not be required for fall protection.
 3. Compliance may be a combination of 42” parapets, guardrails, or low-profile anchorage points. No exceptions shall be made unless authorized by the University Representative.
 4. When an alternative fall protection system is agreed by the University Representative, the project shall strictly adhere to the following requirements for all permanently installed fall protection equipment, including anchors, horizontal lifelines, vertical lifelines, fall arrest, restraint, or positioning, ladder safety systems, and other active fall protection systems in accordance with the latest revision of the ANSI 359.6 Standard.

B. DESIGN REQUIREMENTS

1. Identify where fall protection is required and review with the University Representative on all projects are required.
2. Define the type of fall protection system being designed (fall arrest, restraint, or positioning).
3. Shall meet CAL OSHA requirements.
4. Provide dedicated fall protection drawings showing the layout of the system.
5. The structural engineer shall provide calculations for the following:
 - a. Minimum required strength of anchorages.
 - b. Sizes and minimum breaking strengths.
 - c. Maximum arrest load (MAL).
 - d. Maximum loading on all components demonstrating that the fall protection equipment/system will meet the lb.-f requirements as designed and defined in Table 1 below.
 - e. Detail drawing and additional requirements to meet project needs.
 - 1) Provide necessary specification.
 - 2) Require Contractor to provide shop drawing and calculations.
 - 3) Fall protection design can be a deferred submittal. Consult with the University Representative to identify submittal requirements.

C. INSTALLATION REQUIREMENTS

1. Identify fall protections system s (i.e., anchors, horizontal lifelines, vertical lifelines, fall arrest, restraint, or positioning, ladder safety systems, and other active fall protection systems).
2. Provide documentation illustrating ANSI Z359.6 compliance.
3. Demonstrate compliance with design requirements.
4. Show number of workers and provide minimum/maximum forces the system is designed to support in the event of a fall to include the following:

- a. Maximum arrest force (MAF).
 - b. Deployment of energy absorbers.
5. Provide the manufacturer, make/model and serial numbers of all system components being installed.
 6. Provide shop drawing with supporting details and calculations.
 7. Provide for horizontal lifelines to include the following data.
 - a. Sag, deflections, elongation and fall arrest.
 - b. Harness effect and D-ring slide.
 - c. Temperature impacts.
 - d. Clearance requirements given these factors.
 8. Provide additional items to meet ANSI and project specific requirements for acceptance.
 9. Provide the manufacturer's instructions for inspection and maintenance. Verify whether the system requires installation by certified installers.
 10. Certify compliance with ANSI Z359.6 and submit certification for acceptance.

JOINT SEALANTS

07 92 00

A. GENERAL

1. All materials used shall be top-of-the line available and suited for the conditions being sealed while also in compliance with the following VOC requirements. Comply with current CAL Green Chapter- 4 requirements.
2. Generally, horizontal joints shall be made watertight by mechanical connections. Sealants shall be used on vertical joints.
3. Limit width to depth ratio of 2:1 with maximum hourglass depth of 0.375 inch and provide sealant backer. Sealants shall be compatible with the materials and the expected movement where they are being applied.

B. FIRE AND SMOKE PROTECTION

1. Systems and products shall be tested and approved by Underwriter's Laboratories in accordance with applicable codes. Fire-stopping and smoke-stopping materials are subject to approval of the UC Davis Health's Fire Marshal and shall carry a UL Listing.

METAL DOORS AND FRAMES

08 11 00

A. DOOR SIZES

1. Door sizes shall be based upon functional use. Standard sizes are listed below. Door widths and heights may exceed these minimums with approval from the University Representative.
 - a. 36" wide when serving staff employees.
 - b. 42" wide when serving public access.
 - c. 48" wide when serving hospital gurneys or beds.
 - d. The door height standard is 7'-0" typical but may be modified for project specific requirements.

B. DOOR TYPES

1. The standard for doors is SDI (Steel Door Institute) Level 2 Heavy Duty, shop primed, 1-3/4" thickness. Door reinforcing for hardware to per ANSI / SDI A250.6 typical.

C. FRAMES

1. Projects requiring OSHPD approval.
 - a. Extra Heavy Duty. Fully welded with mortar boxes for all hardware. Frames for all exterior openings and interior openings that are 4' wide or wider shall be 14-gauge steel. Interior frames shall be 16-gauge steel with hospital stops. Exterior frames shall be galvanized.
2. Educational and Office-Buildings
 - a. Interior Knock-down (KD) type included with mortar boxes for all hardware. 18 -gauge steel with applied casing.
 - b. Exterior doors are 14-gauge galvanized Extra Heavy Duty fully welded with mortar boxes for all hardware.
3. For remodel projects confirm with the University Representative on whether to match existing building standards or modify for newer standards.

D. DOOR / SIDELIGHTS

1. Door vision lights shall be a minimum 6" x 24" at all double, dual egress, and single doors where door swing could cause injury.
2. Sidelights are encouraged at doors to offices, classrooms, and general -purpose rooms.

E. DOOR PROTECTION

1. Doors subject to high traffic of carts, equipment, and other items that could damage the door surface shall have a 48" high by full door width stainless steel or polyethylene terephthalate glycol (PETG) armor plate. Plate shall be included as part of certification labeling.
2. Doors subject to medium traffic and wheelchair use shall have a 12" high x full door width stainless steel or PETG kick plate. Plate shall be included as part of certification labeling.

F. DOOR LABELING / CERTIFICATION

1. All doors and frames shall have rating labels from Underwriters Laboratory or Warnock Hersey. Provide recertification for altered doors and frames.
2. Fire rated glazing assemblies shall be used at rated wall openings for fixed windows or glazing in rated doors.

WOOD DOORS**08 14 00****A. GENERAL**

1. Wood doors should generally only be used for light duty areas such as offices, conference rooms, and cross-corridor doors on hold-open devices. Wood doors shall be permitted only with approval from the University Representative.
2. Wood doors to comply with or exceed Woodwork Standards Section 9 for premium grade wood doors. Selection of wood doors shall consider fire rating requirements.
3. When closers are used that may conflict with the maximum opening force of 5 lbs. per the CBC, auto door openers shall be considered. Wood doors shall not be used for exterior conditions.

B. DOOR / SIDELIGHTS

1. Door vision panels shall be a minimum 6" x 24" at all double, dual egress, and single doors where door swing could cause injury.
2. Sidelights are encouraged at doors to offices, classrooms, and general-purpose rooms.

C. DOOR PROTECTION

1. Doors subject to high traffic of carts, equipment, and other items that could damage the door surface shall have a 48" high by full door width stainless steel or polyethylene terephthalate glycol (PETG) armor plate. Plate shall be included as part of certification labeling.
2. Doors subject to medium traffic and wheelchair use shall have a 12" high x full door width stainless steel or PETG kick plate. Plate shall be included as part of certification labeling.

D. DOOR LABELING / CERTIFICATION

1. All doors and frames shall have rating labels from Underwriters Laboratory or Warnock Hersey. Provide recertification for altered doors and frames. Fire rated glazing assemblies shall be used at rated wall openings for fixed windows or glazing in rated doors.

SPECIALTY DOORS AND FRAMES**08 30 00****A. FIBERGLASS REINFORCED POLYESTER DOORS**

1. Fiberglass reinforced polyester (FRP) doors are recommended for use in areas with excessive moisture or corrosives. Core material shall be foam urethane with a minimum of 5 lb/ft³ density, free of chlorofluorocarbons (CFC) and hydrofluorocarbons (HCFC). Color shall be permanently bonded through the full thickness of the fiberglass door faces.

B. DOOR & FRAME SIZES

1. Door frames subject to excessive and consistent moisture or corrosives shall be fabricated of 304 stainless steel. Refer to Design Guidelines Section 08 11 00 for frame requirements.

C. ACCESS DOORS

1. Access doors and panels shall be factory primed and painted at wet areas, doors and panels shall be stainless steel. Doors shall be secured by either screw turn or key lock. Minimum size to be 24" x 24". Rated access doors shall be selected to meet wall or ceiling construction rating typical.

D. BARN (SLIDING) DOORS

1. Door leaf shall have sill guide activated acoustic door bottom.
2. Manufacturer: AD Systems or equal.
3. Locations: Exam rooms.

COILING DOORS

08 33 00

A. GENERAL

1. Loading dock doors shall be overhead coiling, electric motor operated with manual opening device for use in case of power or motor failure.
2. If overhead or coiling doors/grilles are used in public spaces special consideration is required for lockdown procedures and emergency function.

ENTRANCES, STOREFRONTS AND CURTAIN WALLS

08 40 00

A. ALUMINUM DOORS

1. Aluminum and glass entrance doors shall be constructed with wide stiles and top rails with ¼" hardware reinforcement and insulated glazing. Finish shall be clear anodized or high performance (Kynar or equal) color coated. Colors and finishes shall be reviewed by the University Representative.
2. Minimum acceptable component dimensions:
 - a. Metal thickness: 3/16"
 - b. Head rail size: 6-½" x 1-¾"
 - c. Stile size: 5-½" x 1-¾"

B. BOTTOM RAIL

1. Size: 12-½" x 1-¾"

C. STOREFRONTS AND CURTAINWALLS

1. Storefront and Curtainwall systems shall be a minimum nominal size of 6" x 2" and accommodate a minimum of 1" insulated glazing units. Systems shall be designed for structural, wind and seismic requirements which may require larger nominal system profiles.
2. Finishes shall be selected from the manufacturer's premium finishes. Consult the University Representative prior to selecting custom colors or finishes.

D. WARRANTY

1. Provide a full product ten-year warranty at no extra cost covering materials, installation, and workmanship for repair or replacement due to defects; warrant against air and water infiltration from any source.

E. PROVIDE SET UP FOR WINDOW/CURTAIN WALL WASHING.

F. ENERGY PERFORMANCE

1. Thermal Transmittance (U-factor) - Fixed Vision Glazing and Framing Areas: U-factor as determined in accordance with NFRC 100.
 - a. Maximum U-Factor: As indicated on Drawings, comply with building energy performance model for this project.
2. Thermal Transmittance (U-factor) - Fixed Spandrel Glazing, Metal Panels and Framing Areas: U-factor as determined in accordance with NFRC 100.
 - a. Maximum U-Factor: As indicated on Drawings, comply with building energy performance model for this project.
3. Solar Heat Gain Coefficient (SHGC) - Fixed Glazing and Framing Areas: Solar Heat Gain Coefficient as determined in accordance with NFRC 200.
 - a. Maximum SHGC: As indicated on Drawings, comply with building energy performance model for this project.
4. Air Leakage:
 - a. Air leakage for the system of not more than 0.06 cfm/sf (0.30 L/s/sm) at a minimum static-air-pressure differential of 6.24 lbf/sf (300 Pa) when tested in accordance with ASTM E 283.
5. Condensation Resistance: Condensation resistance as determined in accordance with NFRC 500.
 - a. Fixed Glazing and Framing Areas: No condensation allowed under design conditions indicated.

AUTOMATIC ENTRANCES

08 42 29

A. GENERAL

1. Provide automatic doors at main entries and public multi-stall restrooms of every new building on the UC Davis Health campus.
2. Manufacturer: Gildor Sliding Doors or equal.
3. The preferred type of automatic door is non-telescoping, by-pass, sliding type. Automatic doors shall be activated by hardwired interior and exterior push pads at two (2) levels or vertical bar type actuators. Both upper and lower push device shall activate the door operation.

4. At specific employee and emergency entry doors, operation may be sensors, radio frequency remote control (for handheld transmitter), card access or a preferred combination reviewed and approved by the University Representative.

ALUMINUM WINDOWS

08 51 13

A. GENERAL

1. When operable windows are selected, sensor shall be installed connecting to the BMS. Finishes shall be anodized or high performance (Kynar or equal) color coating, as selected.
2. All aluminum frames shall be thermally broken and accept a minimum of 1" dual glazed windowpane.

DOOR HARDWARE

08 70 00

A. GENERAL

1. Door hardware shall match manufacturers make and style as specified, submitted, and approved for all doors in project scope. Provide a hardware submittal from the aluminum entrance and storefront manufacturer for review by the University Representative.

B. CODE REQUIREMENTS

1. Doors from rooms that do not have panic bar shall have lever-type handles that do not require any special knowledge or effort to operate. All locks, electrified or otherwise, may not restrict egress.
2. Hardware for labeled openings, such as locks, latches, butts, door closers, coordinating and exit devices, etc. shall be to carry State Fire Marshal and Underwriters Laboratories, Inc. (UL) listed and approved for opening classification.

C. EMERGENCY KEY CABINETS

1. Provide emergency key cabinets / Knox Box(es) at the main entrance(s) for all new buildings. The University Representative shall coordinate locations as determined by the Campus Fire Marshal.

D. LOCKS AND KEYING

1. Lock functions and finishes shall be furnished as indicated in the hardware schedule, or equal. The contractor shall provide the specified locksets with temporary 6-pin construction cylinder and keys. Provide temporary cylinders only in locations where it is necessary to secure the project during the construction process. In addition, provide five (5) sets construction keys to the University Representative. Upon acceptance of the building or space, UC Davis Health shall provide permanent keys and Schlage EF Keyway lock cylinders to replace the construction cylinders. The Contractor shall verify that all doors and locksets easily accept permanent cylinders with no extra effort or modification. Construction lock cylinders shall be returned to the contractor. When replacing existing locksets, the cylinders shall be tagged and returned to the University Representative (then returned to Lock Shop).
2. Install hardware after doors are finish painted.

3. Door strike lip plates shall be curved and comply with ANSI 4-7/8" for all cylindrical locks. Exterior locks, latches, and deadlocks shall have wrought boxes.

E. FASTENERS AND ANCHORS

1. Thru-bolts for door closers attached to wood doors are to be avoided. Specify doors with closer reinforcement for surface fastening. Hardware fastened to concrete, or masonry shall be installed with machine screws and "star" type double expansion shields, or for screw sizes less than 1/4", fasten with wood screws and plastic anchors. Do not use lead shields or tamp-ins.
2. Door hardware mounting heights throughout a project shall be uniform. Renovation and remodel project hardware placement shall match that of the existing doors throughout the building. This shall be field verified and approved by the University Representative.

F. HINGES

1. Hinges types shall be selected for each door type performance, use and location. Pivot, swing- clear or standard butt hinges are to be listed in each hardware group. Butt hinges shall have five (5) knuckles typical with non-removable pins.
2. Standard hinge properties include 3/16" thick, 1-1/2" widths. The hinge pin shall have a continuous machined surface and use concealed, stainless steel ball bearings. Hinge fasteners shall be either stainless steel or silicone bronze. Hinge pins may be in contact with swaging of the door leaf.
3. Hinge spacing and quantity is based upon door leaf size. 36" wide doors require three (3) hinges. Any doors wider than 36" require a minimum of four (4) hinges.
4. Hinges on aluminum and glass type storefront doors, fiberglass reinforced polyester (FRP), and heavy lead shielded doors shall be geared continuous hinges.

G. CLOSERS

1. Door closer cylinder construction to provide low wear operating capabilities of internal parts throughout the life of installation. All door closers shall be tested to American National Standards Institute (ANSI)/ Builders Hardware Manufacturers Association (BHMA) A156.4 test requirements by BHMA certified testing laboratory. All closers shall be fully hydraulic and have a full rack and pinion action. Universal type closer are preferred. Handed closers shall be avoided. All closers shall be non-sized to provide a full range of closing power for all sizes of door. For barrier-free applications, closer spring power shall be adjustable to provide less than 5 lbs. opening force for doors 36" to 48" wide. Fire-rated doors shall be adjustable to 15 lbs. maximum force. All closers shall utilize temperature stable fluid that is capable of withstanding temperature ranges from 120°F to -30°F without requiring seasonal adjustment of closer speed to properly close the door.

H. POWER ASSISTED OPERATORS

1. Single, double, or dual egress doors that serve areas of high cart or patient bed/gurney traffic shall have power-assisted operators installed to mitigate door damage and injury to staff.

I. AUTOMATIC DOOR OPERATORS

1. Manufacturer for Interior Doors: Stanley Access Technologies or equal.

2. The door shall have the ability to function as an automatic door or, in an emergency, via manually operated break-out swing panels.
3. Door operators shall be surface-mounted and enclosed in an extruded aluminum case extending the full width of door frame. Access to the operator shall be obtained by removing the casing. All wiring for the automatic entrance components shall be concealed. Exposed conduit, wire-mold or electrical pathways are not permitted.
4. A keyed shut off switch keyed to the UC Davis Health master key system shall be provided to shunt power to auto door openers after normal hours of operation. Access to the building after normal hours of operation shall be provided by either a handheld radio frequency remote control or card access system. A locked door motor protection circuit shall be supplied that will shut off current to the motor when the door is locked or otherwise prevented from opening.
5. Coordinate door operation with security devices, such as card key entry systems. Locate sensors at correct distance from the door for safe clearances and proper travel time. If the door encounters an obstruction, the master control unit shall provide immediate reversal of door motion without undue strain on the drive train by providing stepped voltage to the motor. The opening and closing speed shall be between four (4) and six (6) seconds. The master controller unit shall allow fine tune adjustments in close times, delays, and expiration of signal to doors. The opening force shall be able to be adjusted without affecting the opening speed. The opening and closing force, measured 1” out from the lock stile of the door and shall not exceed 15lbs force in either direction.

J. DOOR OPERATORS FOR EXTERIOR DOORS

1. Refer to design standard Automatic Entrances 08 42 29 above for specific functional requirements

K. MANUFACTURERS

1. The manufacturer shall have a minimum of five (5) years' successful experience in the fabrication of automatic operators of the type required for the project.

L. EXIT DEVICES

1. Panic Rim: All devices shall be ANSI A156.3, 2001, Grade 1 certified and have a 3-year manufacturer's warranty.
2. Panic w/ vertical rods: Surface external rods are preferred, and internal concealed rods are to be avoided. Provide only top vertical rods and bottom fire bolts.
3. All moving parts shall be easily removable for repair and maintenance; moving parts that are riveted or swaged in place are not acceptable.
4. All wide stile devices shall have dead latching latch bolts to ensure safe and secure opening.
5. All devices shall use durable compression spring design. De vices, latches, trim or controls, incorporating tension springs are not acceptable.
6. Incorporate a dampener type mechanism to decelerate the push bar on its return stroke eliminating noise associated with the device's operation.
7. Devices shall be ANSIA156.3, 2001, Grade 1 certified and have a three-year manufacturer's warranty. Surface external rods or internal concealed rods are to be evaluated per project.
8. Brass or moving parts made of die-cast "pot" or "white" metals are not permitted.

M. PUSH AND PULL PLATES.

1. Plates to be stainless steel.
2. Pull plates shall be without screw holes and when used with pulls. Pulls shall be bolted through the door under the push plate at the grip only.

N. SURFACE AND FLUSH BOLTS.

1. Flush bolts shall have a lever arm that is not friction-operated, connected to the bolt mechanism and mechanically fastened, not press fitted. Face plates shall be shaped to match the door edge. The operating mechanism for the bottom flush bolt shall not be more than 12" from the floor; the top flush bolt shall not be more than 72" from the floor. All surface or flush bolts shall have dustproof strikes where engaging the floor, threshold, or curb.
2. Flush bolts that require the top and bottom corners of wood doors to be mortised out are not acceptable.

O. STOPS AND HOLDERS

1. Provide door stops for each door leaf. If stops are wall mounted, provide backing in the wall for proper mounting installation.
2. Floor Stops are preferred. Wall stops are acceptable when floor stop is not appropriate. Overhead stops may be used in limited instances when floor or wall stops are inadvisable. If an overhead stop is used, pair it with heavy duty hinges, or continuous hinges. Do not provide hold open stops when using overhead style.
3. Ives, Glynn Johnson, or equal are the standard of quality for stops.

P. SILENCERS

1. Provide silencers for all interior doors, except on weather stripped or smoke sealed doors.
2. Single doors shall have three (3) silencers each, located on stop and at strike side of the frame. Double doors shall have one (1) silencer per door leaf at frame head, plus three (3) each on astragal.

Q. SMOKE AND WEATHER DOOR SEALS

1. Where required, provide adhesive jamb weather-strip.

R. FINISHES

1. All hardware finishes shall conform to BHMA product standards, materials, and finishes. UC Davis Health's standard is 626 Satin Chrome. Finishes for hardware in existing facilities shall be as listed above or to match existing.

S. HARDWARE INSTALLATION

1. Center lever hardware is at 38" above finished floor. Locate top hinge 5" below the head of the frame, and the bottom hinge at 11" above the finished floor. Place intermediate hinges equally between top and bottom hinge.

GLAZING
08 80 00
A. BASIS OF DESIGN

1. The basis of design for fire rated glazing is TGP or equal.

B. EXTERIOR GLASS

1. Determination of light transmittance, visibility, color, and performance requirements is unique to each project, and the specific functional requirements. The general guideline is to provide the best thermal performance, while as the same time offering the best visibility and transparency into the building.
2. Performance requirements must meet Title-24 requirements.
3. Exterior glazing shall be 1" insulated units with a low-e coating.

C. INTERIOR GLASS

1. Safety Glass: Provide where required by codes.
2. Door Glazing: Refer to Design Guidelines Section 08 11 00 for vision lights.

D. MIRRORS

1. Minimum ¼" thick. Provide smooth round safety edge.
2. ASTM C-1503-01 for silvered flat glass mirror.
3. Attach to walls with mechanical cleat-type anchors to metal studs or solid backing and apply mirror adhesive.

E. GLAZING ACCESSORIES

1. Provide reglets, spacers, gaskets, trim, and applied stops with caulking to secure glazing in place.

FINISHES
09 00 00
A. OVERVIEW

1. The design guidelines for finishes focuses on the materials and finishes appropriate for UC Davis Health Facilities. These components enable project teams and operations staff to build and maintain sustainable buildings and manage risks to the organization, including cost, safety issues, legal and regulatory compliance, and functionality.

B. GENERAL

1. Provide low-maintenance finishes and design low-maintenance details. Finishes must stand up to the rigorous abuse of classrooms, offices, laboratories, outpatient and inpatient facilities over the life of a building. Given the extended life cycles of buildings and the infrequent facility refreshes, it is advisable to specify only the most durable materials and finishes.
2. Exterior finishes shall be durable and designed to a 70-year standard without extensive maintenance, and with no deferred or anticipated maintenance for the

first 20 years. Painting of exterior Surfaces shall be kept to a minimum, and if provided, must be a high-performance system.

3. Prevent vision impairment by specific surface reflectance values that improve task and overall illumination. Provide color contrast, lighting levels, and matte/non glare finishes on ceilings, painted walls, work surfaces, and floors. Avoid bold patterns with dominant contrast, as they can be misperceived as obstacles or objects to avoid.
4. Submit EPDs and HPDs for all finish materials.
5. All architectural finishes selected for use in ISO Classrooms within UC Davis Health sterile compounding facilities shall comply with ISO 14644-1 airborne contamination requirements, USP 797 and/or USP 800 cleaning requirements, and all State Board of Pharmacy requirements.
6. Review project materials, finishes, and colors with the FP&D Interior Design Manager, Plant Operations & Maintenance (PO&M), Workplace Safety, Infection Prevention, and Environmental Service departments during the design process to ensure appropriate selections.
 - a. Working with these departments ensures that building maintenance, repair, safety, and replacement concerns are included in the design process.
 - b. Regular routine cleaning of the Health Care Facilities premises can be carried out more efficiently if the design of the building has fully addressed surface finishes appropriate to the functional use. For example, unnecessary horizontal, textured, moisture retaining surfaces or inaccessible areas where moisture or dust can accumulate should be avoided, where possible.

CEMENT PLASTERING

09 24 00

A. LATH AND PLASTER

1. Avoid lath and plaster systems as a primary exterior cladding material for new projects. The system's lack of longevity is a key reason to opt towards more durable finishes.

B. CEMENT PLASTER

1. Cement plaster shall be a traditional 7/8" three-coat system consisting of a Portland cement scratch coat, Portland cement brown coat and acrylic modified sand finish coat. Scratch coat shall contain "fiber mesh" type glass fiber reinforcing to control cracking. Finish coat shall be integrally colored, and colorant shall not be waived in lieu of surface painting. Surface painting is required over finish coat. Integral plaster color shall best match surface paint color. Well-designed control joints of areas not to exceed 100 square feet shall be clearly documented to limit cracking and repair maintenance work.

C. MATERIALS

1. Portland Cement: ASTM C 150, Type I; except Type III may be used for cold-weather construction.
2. Hydrated Lime: ASTM C 206, Type S.
3. Sand Aggregate: ASTM C 897.
4. Reinforcing Fiber: Alkaline-resistant glass or polypropylene, 1/2 in (12 mm) long, free of contaminants, manufactured for use in Portland cement plaster.

5. Water: Potable.

GYPSUM BOARD

09 29 00

A. WATER RESISTANT GYPSUM BOARD

1. Specify water-resistant gypsum board at walls exposed to light moisture (examples: lavatories, drinking fountains, urinals, eyewash stations, and hand wash stations).

B. CEMENTITIOUS BACKING BOARD AT WALLS AND CEILING

1. Specify cementitious backing board at walls and ceilings with moderate to heavy moisture or humidity (examples: showers, hydrotherapy rooms, central sterile, and cart wash areas).
 - a. Gypsum board and water-resistant gypsum board are not appropriate for these areas as they can swell and de-laminate in wet conditions, fail to provide a firm backing for ceramic or other tile installations and can be a source of microbial growth.

C. GYPSUM BOARD FINISH LEVELS

1. Level 1: Not used.
2. Level 2: Concealed spaces, such as shafts and above -ceiling areas, and areas where Gypsum board is used as a substrate for tile.
3. Level 3: Medium Texture: Unoccupied areas, such as storage and mechanical rooms
4. Level 4: Light Texture: Occupied spaces and surfaces exposed to public view.
5. Level 5: Smooth finish for areas receiving markerboard wallcovering or as approved by the University Representative.

D. WALL PROTECTION

1. Use wall protection in areas prone to abrasion and heavy scuffs. For example, equipment and cart traffic.

E. LOW HEIGHT WALL LOCATIONS

1. At low-height wall locations, the wall shall be capped with a durable and impervious material that can be easily cleaned and maintained.
 - a. Solid surface material is preferred.

TILING

09 30 00

A. GENERAL

1. Provide tile as required per CBC code sections 1209 & 1224.4.11.
2. Both mortar-set and thin-set tile systems may be used where appropriate. System selection shall be based both on the suitability of the material and the project requirements and approved by the University Representative. When using mortar-

- set systems, recess floor slabs to maintain level and accessible surfaces between rooms. Porous materials may not be used.
3. Use of ceramic (porcelain) tile is acceptable in areas with excessive water and/or cleaning, such as restroom floors and walls. The grout used for ceramic floor tiles shall be sealed with a VOC compliant sealer. Provide epoxy and/or epoxy hybrid grout at tile in wet areas.
 - a. Specify full-height tile in shower areas.
 4. Provide marble or solid surface thresholds at entrances to rooms with ceramic tile floors.
 5. Ceramic tile may not be used in shower floors because the grout breaks down creating an infection control problem.
 6. Floor tile, tested, both wet and dry, shall have a minimum static coefficient of friction of 0.60 for level surfaces, and 0.80 for ramps, in accordance with ASTM C1028.
 7. Coordinate tile locations with equipment and accessories.
 - a. If equipment, accessories, and signage is to be installed on tile, ensure tile face is adequate and acceptable to install items.
 8. Refer to Tile Council of North America (TCNA) for installation methods.

ACOUSTICAL CEILINGS

09 51 00

A. GENERAL REQUIREMENTS

1. Suspended acoustical ceilings shall be installed in accordance with the provisions of ASTM C 635 (materials) and ASTM C 636 (installation). Provide heavy-duty exposed tee suspension system.
2. Tegular and square lay-in edge profiles for ceiling tiles are acceptable. Concealed spline systems are not acceptable. Clean rooms and other infectious controlled environments such as kitchen preparation & storage areas and staff or patient occupied areas as noted per code, require a mylar coated ceiling tile, or similar. Children's areas can have tiles with decorative embossed themes. Provide white tiles and suspension grids unless approved otherwise by the University Representative.
 - a. Where the disruption of particle matter may interfere with infection control, acoustic and/or lay-in ceilings should be avoided.
3. Recommend specifying biophilic inspired ceiling visuals within Imaging Rooms to dissipate the confined feeling and enhance the patient experience.
4. Manufacturer: Armstrong Ceilings or equal.

B. CODES AND STANDARDS

1. Ceiling design shall comply with CBC Section 1613.1 Earthquake Loads. Every structure and portion thereof, including non-structural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance

with ASCE 7, excluding Chapter 14 and Appendix 11A. Determine the seismic design category for the structure in accordance with Section 1613 or ASCE 7.

2. In accordance with ASCE 7-10 Chapter 13, acoustical tile or lay-in panel ceilings in Seismic Design Categories D, E and F shall be designed and installed in accordance with ASTM C 635, ASTM C 636 and ASTM E580, Section 5-Seismic Design Categories D, E and F as modified by this section.

RESILIENT FLOORING

09 65 00

A. GENERAL

1. Specify a commercial grade flooring in accordance with UC Sustainable Practices Policy. Projects should strive to eliminate the specification of products which contain Polyvinyl chloride (PVC).
2. All materials shall meet or exceed the stringent codes related to slips, trips, and falls.
3. Areas where liquids are used, stored, or have chance of spillage shall have watertight flooring system with heat or chemical welded seams with at least a 4-inch continuous coved base. Weld method to be approved by the University Representative. Provide a cant strip for support under the coved base with metal trim at the top. Use a commercial grade sheet flooring with a welded coved base. VOC compliant poured flooring systems will be considered, especially in food preparation areas or shower rooms.
4. Areas void of liquid spills can use sheet flooring with a topset rubber base and a variety of materials and manufactures are acceptable.
5. Sheet products are to be unbacked, nonlayered, polyurethane-coated, homogeneous vinyl with a wear layer. Color and pattern detail shall be dispersed uniformly throughout the product.
6. Patient areas – shall have flooring products with good sound absorption, easy maintenance, and appropriate slip/fall coefficient. Rubber flooring is preferred and will maintain well if the finish process described by the manufacturer is followed carefully after the product is installed and prior to occupancy.
7. Projects with fresh concrete subfloors intended to receive resilient flooring products shall be tested for moisture and PH with the current standard test method. Provide test results to the University Representative for review and approval prior to any flooring material being installed. Consult with flooring manufacturer for appropriate adhesive for moisture and PH levels of concrete.
8. In projects with tight schedules and/ or for ease of phasing in occupied spaces, use a quick set or peel and stick adhesive that meets current VOC requirements.
9. Aerosol adhesives shall not exceed the VOC limits specified in the Green Seal Standard GS-36- Current Version.
10. Non-aerosol adhesives and primers shall not exceed the VOC limits specified in the South Coast Air Quality District Rule 1168, current version.
11. Flooring at Permanent Cabinets: Resilient flooring is required under fixed floor cases and cabinets.

B. RESILIENT SHEET

1. Resilient flooring is required to be installed under fixed/ permanent floor cases and cabinets.
2. If floor cases and cabinets are existing to remain, resilient flooring can be installed to cabinet edge with appropriate wall base and not installed underneath cabinet.

C. RESILIENT TILE

1. Specify luxury resilient tiles and/ or plank tile systems (concrete/ wood-looks) within areas void of liquids to achieve an upgraded appearance in public spaces (corridors/waiting areas), administrative office settings, and patient care areas for design-focused and oriented projects with moderate budgets. Flooring shall have a coefficient of friction of 0.7 or greater.
2. Installation of resilient tiles over existing VCT flooring should be avoided as much as possible. However, if there is asbestos in the existing mastic and the flooring is in stable condition, it may be an option on a case-by-case assessment by University Representative and PO&M approval.
3. In areas with heavy rolling equipment such as loading dock, rubber floor tiles may be specified.

RESILIENT FLOORING ACCESSORIES
09 65 13

A. GENERAL

1. Wall Base: Rubber base preferred for durability and sustainability. Thermoplastic rubber (TR) or thermoset vulcanized rubber (TS) shall be used as standard. Thermoplastic vinyl (TV) base only to be used with the University Representative's approval and concurrence by the Interior Design Review Committee.
 - a. Use 6" base in patient areas and 4" in administrative areas. Use only topset base, straight base may not be used.
 - b. In areas requiring sheet flooring with a coved base, provide a concealed cant strip for support and metal trim at the top.
 - 1) Specify at all clinical areas, food preparation areas and other areas subject to frequent wetting due to cleaning methods. Ensure wall base is installed tightly sealed against the wall and constructed without voids.
 - c. Adhesives
 - 1) Quick set or peel and stick adhesive the meets current VOC requirements may be specified due to compacted project schedules.
 - 2) Aerosol adhesives shall not exceed the VOC limits specified in the Green Seal Standard GS- 36, current version.
 - 3) Non-aerosol adhesives and primers shall not exceed the VOC limits specified in the South Coast Air Quality District Rule 1168, current version.

RESILIENT TILE FLOORING
09 65 19

A. GENERAL

1. Refer to Section 09 65 00 Resilient Flooring.

FLUID-APPLIED FLOORING
09 67 00
A. GENERAL

1. A fluid-applied resinous flooring can only be specified and installed with the approval of both the University Representative and concurrence from the Interior Design Review Committee.
2. Resinous flooring material may be used in high-traffic areas with or are subject to extreme water usage, such as operating rooms, tub rooms, food preparation areas, waste collection sites, staff showers and decontamination/disinfection areas.
3. Fluid applied (epoxy) floors shall be non-slip and meet any additional requirements of the facility, such as conductivity.
4. Resinous flooring system to be comprised of: Bisphenol-A Epichlorohydrin condensate type resin formulation consisting of bond coat, base coat, texture coat, and finish coat, 1/4" total thickness; flexibilized with a reactive diluent; other additives consisting of an inert color pigment, curing agent, and high SiO₂ filler.

B. INSTALLATION ACCESSORIES

1. Divider Strips shall be: 1/4" wide heavy top strip and made of zinc.
2. Antimicrobial chemical additive shall be used to prevent growth of most bacteria, fungi, algae, and actinomycetes and applied as recommended or approved by flooring manufacturer.

C. FINISH SURFACE

1. Finish Surface shall be: Semi-gloss, dense, nonporous, smooth texture, unless specified otherwise and approved by the University Representative.

CARPETING
09 68 00
A. GENERAL

1. Specify carpet tiles. Broadloom carpet shall only be specified upon approval by Facilities Services.
2. Carpet tiles shall be a commercial grade multi-colored, non-directional patterned loop or tip- sheer to hide soil. Cut pile carpets may be used in high-end administrative areas if desired. Colors and shades selected shall be of medium intensity (not so light as to easily show soiling or so dark as to show dust and lint). Solid color carpet shall not be used.
3. Wear Rating: Heavy or Extra Heavy Commercial: Vetterman Drum wear test- Rating of 3 or better DIN 54323- ISO-TR 10361.
4. Face Weight:
 - a. 20 oz. minimum.
5. Face Yarn:
 - a. 100% first quality bulk continuous filament (BCF). Acceptable specifications include type 6,6 nylon, type 6,6 Antron nylon combined with polymer made from renewable resource or type 6 with inherent stain resistance by means of cationic dye process.

6. Acceptable Commercial Fiber Shapes for optimum soil-hiding capability
 - a. Fiber identification at AATTCC 20 test method
 - b. Modification ration of 1.7 or less
 - c. Dye Method: 100% Solution Dyed
 - d. Gauge: 1/8" min
 - e. Construction: Tufted
 - f. Surface/Style: Level Loop or Multi Level Loop
 - g. Color: To be approved by the University Representative
 - h. Density Factor: 5,000 min.

7. Stain Resistance: Stain resistance properties MUST be inherent. Topical Stain resistance treatment will not be acceptable. Stain Resistance properties must be permanent and cannot be removed by commercial cleaning or abrasive wear. Must pass the AATCC 175 red dye 40 tests. Carpet is required to retain permanent stain protection against acid type spills for the life of the carpet as measured by General Services Administration (GSA) test for permanence SIN 31-8.
8. Edge Ravel: Limited lifetime Warranty against Edge Ravel. Preference will be given to carpet manufacturers that do NOT require the edges of the carpet to be seam sealed to guarantee 20 years of edge unraveling.
9. Tuft Bind: Wet: Limited Lifetime Warranty against zippering
10. Color fastness-light/color: Carpet is required to resist color loss from light exposure for 10 years. Manufacturer is required to provide a 10-year warranty for colorfastness after exposure to light as measured by AATCC Test Method 16E- International Gray scale rating after 160 AFU's should be 4 or better.
11. Colorfastness-ozone: Carpet will resist color loss from Atmospheric Contamination for 10 years. Carpet manufacturer is required to provide a 10-year warranty for colorfastness after exposure to atmospheric contaminates as measured by AATCC Test Method 129- Ozone minimum shade change rating after five cycles shall be no less than International Gray scale rating of 4 or better.
12. Colorfastness-crocking: Rating shall be 4 or better (wet and dry) AATCC transference scale AATCC 165.
 - a. Carpet is required to resist color transfer from wear for the life of the carpet. Carpet shall exhibit permanent colorfastness (wet or dry) for the lifetime of the installation as measured by AATCC Test method 8, minimum stain rating of 4 or better compared to AATCC color transference scale.
 - b. The carpet shall also exhibit permanent wetfastness for the lifetime of the installation as measured by AATCC Test Method 107, minimum shade change should be no less than International Gray Scale rating of 4 or better. water: 4 or better AATCC transference scale AATCC 107

13. Flammability NBS smoke:
<450 Flaming Mode NFP258
14. Flammability Radiant Panel: Class 1 fire rated ASTM E-648.
15. Class A fire rated per ASTM E-84.
16. Carpet shall be certified by the California Gold Sustainable Carpet Standard at the Gold or Platinum level. Carpet tile systems shall not exceed the target emissions factors of the Carpet and Rug Institute's following programs:
 - a. Carpet: Green Label Plus Program and Testing Procedures.
 - b. Carpet Cushion: Green Label Program and Testing Procedure
 - c. Carpet Adhesive: Green Label Program and Testing Procedure.

B. WALK-OFF CARPET TILES

1. Specify walk-off carpet at all building entrances. Install carpet flush with adjoining floor surface and meet ADA requirements.
 - a. Install walk-off a minimum of twelve feet in length in the direction of path of travel.

PAINTING AND COATING
09 90 00

A. GENERAL

1. Materials shall be “best” commercial quality products by firms with over 5 years manufacturing experience with a full product line. Prime coats and finish coats for any 1-paint system shall be the products of the same manufacturer.
2. Architectural coatings shall comply with the Green Seal Standards GS-11 and the most current LEED Requirements, whichever is more stringent.
3. Visible surfaces behind vents, grilles, etc., shall be painted flat black.
4. Inside wood surfaces of all drawers, shelves inside cabinets, and other wood surfaces where scheduled or noted, shall be given one coat of clear gloss lacquer, or clear polyurethane-base varnish.
5. Manufacturer: Dunn Edwards or equal.

VISUAL DISPLAY UNITS
10 11 00

A. GENERAL

1. Provide support backing in the wall for both furnished and future visual display boards.

SIGNAGE
10 14 00

A. SIGNAGE CONSULTANT

1. will be retained either by UC Davis Health or the Architect of Record to develop signage documents and schedules based on the UC Davis Health’s signage standards. These documents might be incorporated into the bid documents or bid separately. The University Representative shall determine how the signage consultant will be retained for the project and how the signs will be bid.

B. EXTERIOR SIGNAGE

1. Regulatory signs required for projects shall adhere to the current California Uniform Traffic Control Devices or (MUTCD) standards. Regulatory signs include “Stop” signs, and street directional signs such as “No Right Turn” etc. Regulatory signs shall have a high intensity prismatic sheeting (HIP) applied.
2. Regulatory Signposts: 2” OD round extruded aluminum with 1/8” thick wall thickness, alloy 6063 with cap at the top. Poles will be either anodized aluminum or painted silver with a DTM paint. Posts shall be set in concrete footings a minimum of 12 wide x 18” deep with a through bolt through the post to prevent the sign from turning. The top of the sign, when installed on the post, shall be 75” above the footing.

TOILET COMPARTMENTS
10 21 13
A. TYPE

1. Type: Floor-mounted, overhead braced, through-color solid phenolic, privacy (zero gap) partitions.

B. CONSTRUCTION

1. Construction: Interlocking doors and stiles, maximum height doors (72") and panels, floor clearance between 1" – 4"

C. ADA

1. ADA accessible toilet compartments must be made wide enough to accommodate the UC Davis Health's choice of tissue dispensers and surface mounted sanitary napkin disposals where required.

D. HIGH-ABUSE-RESISTANT

1. If the Project Program indicates a need for high-abuse-resistant design, provide institutional hardware for partitions, including extra-heavy-duty hardware, concealed attachments, and concealed screws on doors.

CUBICLE CURTAINS AND TRACK
10 21 23
A. CUBICLE CURTAINS

1. In hospital settings, cubicle curtains shall be required around every patient bed and shall be approved by the University Representative. Disposable Privacy Curtains are the UC Davis Health's standard, unless otherwise approved by the University Representative.

B. TRACK

1. Aluminum tracks and barrel type hooks.

PATIENT BED SERVICE WALLS
10 25 13
A. PATIENT BED SERVICE WALLS

1. Patient bed service walls shall be modular systems, with field customization options. Finishes and surfaces shall be bleachable and high impact.

WALL AND DOOR PROTECTION
10 26 00
A. HOSPITAL CORRIDORS

1. Hospital corridors shall have wall protection as a typical; including crash rails, handrails, or a combination of both with the crash rail located just above the wall base.

- a. In high-abuse patient areas, provide sheet wall protection between the handrail and crash rail.
- b. In hospital corridors the hand and crash rails often match the base color and patient room door frame color to create a continuous line down a corridor.
- c. Provide corner guards on hospital corridors and any area subject to high abuse, especially from carts and gurneys. Corner guards shall be full height starting from top of wall base.

B. OTHER BUILDING TYPES

1. In other building types, provide corner guards at outside corners of all high -traffic circulation typical.

TOILET ACCESSORIES

10 28 13

A. STANDARDIZATION

1. The following categories of restroom accessories are those for which UC Davis Health requires standardization from project to project.
 - a. Roll Hand Towel Dispenser: Wall Mount ADA compliant with touchless feature.
 - b. Hand Soap Dispenser: Surface mount or counter mount, touchless design
 - c. Toilet Tissue Dispenser: Dimensions must be a four-roll vertical coreless bathroom tissue dispensing system. Dispenser must hold up to 6,000 2 -ply or 12,000 1-ply sheets. Dispenser must have a dependable roll advancing system; dispenser must facilitate full roll usage.
 - d. Sanitary Napkin Dispenser: Surface mounted feminine napkin/tampon vendor; stainless steel; \$0.50 coin mechanism.
 - e. Mirrors: Mirrors shall be 1/4" thickness with solid backing. Frames shall be 1/2 inch by 1/2 inch by 1/2-inch heavy-duty stainless-steel angle, with all corners mitered and welded. Tilt mirrors shall be stainless steel with tilt built into frame.

B. TOWEL DISPOSAL UNITS

1. Towel disposal units are not required in any new or remodel work. These units will be freestanding, provided by UC Davis Health.

FIRE EXTINGUISHERS

10 44 16

A. GENERAL

1. Fire extinguishers shall be provided at locations as required by current edition of California Building Code and as approved by the University Representative. Recessed, lockable stainless-steel cabinets shall be provided for fire extinguishers in corridors and other public places. Extinguishers shall be refillable.

LOCKERS

10 51 00

1. Lockers shall be phenolic with heavy-duty hinges. Lockers shall be securely attached to backing plates in the walls.

2. Lockers shall have a sloped top.

WINDOW WASHING EQUIPMENT

11 24 23

A. GENERAL

1. Tie-off anchors shall be designed and installed on all new roofs per ANSI/IWCA I-14.1.
2. A minimum of 10% of the tie-off anchors shall be tested on site using load cell apparatus in accordance with manufacturer's recommendations. Tests shall be conducted by an independent agency, and test reports shall be sent to the University Representative.
3. All anchors relying upon chemical adhesive fasteners shall be 100% tested on site at the test load as recommended by the SEOR, using load cell apparatus in accordance with manufacturer's recommendations. Tests shall be conducted by an independent agency in the presence of the UC Davis Health's assigned special inspector, and test reports shall be sent to the University Representative.

LABORATORY FUME HOODS

11 53 13

A. GENERAL FUME HOOD REQUIREMENTS

1. Published specifications, standards, tests or recommended methods of trade, industry or governmental organizations shall apply to all work in this section.
 - a. NFPA 45 - Standard on fire protection for laboratories using chemicals. Chapter 6: Ventilating System, Chapter 9-2.8: Laboratory Hoods.
 - b. NFPA 56C - Safety standard for laboratories in health-related institutions, chapter 3-3.5: Fume hoods.
 - c. ASHRAE 110, Method for Testing Performance of Laboratory Fume Hoods.
2. Requirements of Regulatory Agencies
 - a. Flammable liquid storage cabinets shall conform to all certification requirements as specified by the Campus Fire Marshall and NFPA 30.
3. Fume Hood Design shall comply with the following Standards.
 - a. Scientific Equipment and Furniture Association (SEFA), latest edition.
 - b. ASHRAE Handbook - HVAC Applications: Chapter 16 - Laboratories: Part 16.3: Fume Hoods
 - c. ANSI Z 9.5 Laboratory Ventilation Standard
 - d. National Sanitation Foundation (NSF) Standard 49
 - e. Guidelines for Design and Construction of Health Care Facilities - Facility Guidelines Institute; Part 6 Ventilation of Health Care Facilities - Sections 410: Laboratory Ventilating Systems and Hoods.
 - f. Balance, test, and certify each fume hood in accordance with the latest edition of ASHRAE 110 Testing Requirements. Fume hood field tests shall be performed by a qualified independent testing company on each hood to determine face velocity, containment, response time (for hoods installed on a VAV/lab airflow control system), cross drafts, and air flow patterns. Test results shall be submitted to the University Representative.

4. General Design Issues

- a. Fume hoods shall be operated 24 hours a day. No user-controlled shut-off switch is allowed.
- b. Fume hood ducts may be ganged onto exhaust plenum w/ multiple fans, with the exception of hot-acid, radioactive, or other special use hood.
- c. Full by-pass fume hoods shall be used for constant volume applications. Variable air volume (VAV)hoods (partial by-pass) shall be used in conjunction with a VAV general ventilation system (e.g., Phoenix Controls, or equal).
- d. Ductless or auxiliary air hoods are not acceptable.
- e. Only removable baffles with three fixed horizontal slots or perforated baffles shall be provided. If slots are to be provided, they shall be continuous across the back of the fume hood. Engineered perforations are acceptable. Operator adjustable baffles and monolithic rear panels are not acceptable.
- f. The manufacturer's standard tissue screens shall be provided to prevent tissues from entering mechanical systems.

B. CHEMICAL FUME HOODS

1. General Product Requirements

- a. All chemical fume hoods shall be reviewed and approved by the University Representative.
- b. Shall have been in commercial production and usage for a minimum of 5 years.
- c. Shall be tested using most current American National Standards Institute (ANSI)/ASHRAE 110 method.
- d. Noise generated by the functioning hood within 6 inches of the plane of the sash and by- pass opening in any position shall not exceed 60 dBA.
- e. Unused holes (interior and exterior) shall be plugged or blanked.

2. Sash

- a. Sashes shall be vertical-type or frameless. Vertical-type: ¼-inch thick laminated safety glass, complete with ¼-inch deep stainless steel metal channels on sides, top and bottom.
- b. Combination sashes shall be approved by the University Representative.
- c. Mechanical stops (not friction) shall be provided to ensure that sash work opening is 18 inches, as measured from the top of the fume hood work surface to the bottom of the sash.
- d. A manual override shall be required to allow the vertical sash to be raised above the maximum opening to allow lab apparatus to be installed or removed.
- e. Operating face velocity at 18 inches shall be set between 100-120 fpm.

3. Provide a fume hood air flow indicator/alarm. The hood shall be prepared at the factory to receive the specified alarm/monitor. As a minimum, the alarm shall accommodate the following:

- a. The Safety Monitor/Alarm System shall monitor face velocity and provide audible and visual alarm if face velocity drops below 90 fpm or rises above 125 fpm. Audible alarm shall pulse at 80 dBA.

- b. The monitor shall be UL listed, with all alarm circuit electric components, external tubing, restrictors and manifolds furnished complete. Monitor shall have light emitting diode display, which provides clear indication of airflow conditions. Safety monitor shall be tamperproof.
 - c. Alarm signal(s) shall have an audible pulsating signal and a visual, large flashing red light emitting diode.
 - 1) The alarm system shall provide a silence push button, which temporarily overrides the audible alarm for a period no longer than 5 minutes and shall be accessible on the front of the Safety Monitor.
Note: Teaching laboratory hood alarm override shall not exceed a one-minute period. Once the “unsafe” operating condition has been corrected, the audio alarm shall automatically reset.
 - 2) During a temporary silence of audible alarm, the visual alarm shall remain activated until the alarm condition is corrected.
 - 3) When the alarm condition is corrected and face velocity and volume is return to specified levels, the safety monitor shall automatically reset and begin routine monitoring. Test circuit shall be provided to verify proper safety monitor operation.
 - d. Test circuit shall be provided to verify proper safety monitor operation.
 - e. Electrical Rating: Maximum 15 VDC and maximum current rating of 200 MA.
 - f. Connect between fume hood and the filter or damper.
 - g. Flow tube device (floating indicators), magnehelic, or ribbons hanging in the air stream are not acceptable airflow indicators.
4. Electrical Items
- a. All electrical items shall be pre-wired, and accessible for service from outside the hood. No fan switches shall be located at the fume hood.
 - b. Run internal electric wiring in conduit. Do not run conduit through hood interior or across hood front.
5. Utilities (gas, air, water, steam, and vacuum)
- a. Utilities controls shall be located outside of hood interior for convenient access and use. No plumbing utilities may run through the hood interior or across the front of hood.
 - b. When cold water is required, provide vacuum breaker.
 - c. Access panel to service utilities shall be gasketed with gasket material specific to use.
 - d. Pre-plumb all utilities.
6. Duct Work
- a. Materials shall be non-reactive, acid resistant and compatible with intended usage.
 - b. Include trim damper in duct above fume hood.
 - c. Duct outlet shall be round. Provide a square-to-round transition when equipment manufacturer system uses square profile.
7. Fan: Use only acid-resistant metallic fan protected by an inorganic coating.

8. Flammable storage cabinets shall be UL listed and/or NFPA approved.
 - a. Flammable liquid storage cabinets do not require venting. If flammable liquid storage cabinets are vented, they shall be vented separately from the fume hood exhaust. The vent may be connected at the point where the fume hood exhaust duct enters the general fume hood exhaust manifold. Cabinets shall not be vented directly into the fume hood or through the fume hood work surface. Vents shall be stainless steel. All equipment subject to review and approval from Campus Fire Marshall.
 - b. Acid storage cabinets are approved for under-fume hood storage. Acid/corrosive storage cabinets do not require venting. If acid/corrosive storage cabinets are vented, they shall be separate from the fume hood exhaust. The vent may be connected at the point where the fume hood exhaust duct enters the general fume hood exhaust manifold. Cabinets shall not be vented directly into the fume hood, through the fume hood work surface. Vents shall be PVC, polypropylene, or other appropriate material.

C. ACID FUME HOODS

1. Additional Product Requirements for Acid Fume hoods (Perchloric, other hot inorganic acid digestions, etc.)
 - a. Constant volume hood with by-pass feature.
 - b. Perchloric acid and other hot acid digestion hoods shall be on a dedicated system and have an automatic wash down system. High use solvent extraction and solvent use hoods (ether, other flammable solvents, etc.) shall be on a dedicated system designed for their intended purpose.
 - c. Under fume hood storage cabinets: Flammable liquid storage cabinets are not approved for installation under acid fume hoods.

D. HYDROFLUORIC (HF) ACID FUME HOOD

1. HF acid fume hoods shall be a constant volume hood with bi-pass feature and shall be on a dedicated system.
 - a. Flammable liquid storage cabinets are not approved for installation under HF acid fume hoods.
2. Sash
 - a. Sashes shall be a polycarbonate resin (Lexan) or similar. Glass is not acceptable. Contact the University Representative for project specific information.
 - b. No combination sashes shall be allowed.
3. The lens on light fixture(s) shall be polycarbonate resin (Lexan).

E. OTHER SPECIALTY HOODS AND LOCAL EXHAUST

1. Histology hoods, specimen hoods, and other local exhaust specialty hoods shall have a minimum operating face velocity of 100 fpm with a range of 100-120 fpm. An audible/visual flow alarm may be required depending on use.
2. Glove Hoods (Glove Boxes)

- a. Glove hood (box) may be required for special applications using highly toxic, extremely reactive or California Occupational Safety and Health Act (Cal OSHA) regulated chemical carcinogens.
- b. Glove hoods shall be a totally enclosed, ventilated cabinet of leak-tight construction with operations in the cabinet conducted through attached rubber gloves. The cabinet shall be maintained under negative air pressure of at least 0.50 in. w.g. (120 Pa). Glove hoods shall meet ANSI standard Z9.5, “Standard on Lab Ventilation” and the American Glove Box Society Standard, “Guidelines for Glove Boxes.”

BIOLOGICAL SAFETY CABINETS

11 53 53

A. GENERAL

1. All Biological Safety Cabinets (BCS) shall meet the specifications within the most recent edition of the National Sanitation Standard 49 – Class II (Laminar Flow) Biosafety Cabinetry.
2. The BSC make and model must be on the National Sanitation Foundation (NSF) website of certified BSCs.
3. Do not provide any class/type of biosafety cabinet other than Class II Type A2 without prior authorization from the University Representative.
4. Biosafety cabinets shall not be connected to laboratory gas lines.

HEALTHCARE EQUIPMENT

11 70 00

A. GENERAL

1. An equipment list showing all items of equipment necessary to operate the facility shall be included in the contract documents. This list will assist in the overall coordination of the acquisition, installation, and relocation of equipment. The equipment list should include the classifications OFOI, OFCI, etc. and whether the items are new, existing to be relocated, owner provided, or not-in-contract.

WINDOW TREATMENTS

12 20 00

A. SOLAR

1. Solar roller shades are preferred for light filtering and reducing glare.

B. MOTORIZATION NEW CONSTRUCTION

1. Motorization used in new construction for patient rooms, which eliminates ligature risk.

C. MOTORIZED SHADES – CONFERENCE ROOMS

1. Motorized shades at conference rooms – dual shades with blackout and light filtering combination.

LABORATORY CASEWORK
12 35 53
A. CASEWORK

1. Casework shall be provided as detailed in the Project Program. Construction of laboratory tops, stainless steel fabrications, laboratory wood casework, laboratory metal casework, special purpose cabinets, and miscellaneous laboratory furnishings shall be in accordance with the Project Program Requirements.

B. MATERIALS

1. Materials used for the construction of laboratory casework shall be the best of their respective kinds for the purpose intended including specialized materials, finishes and special forms conforming to product characteristics identified in the Project Program requirements.

C. SHELVING

1. Seismic rods shall be provided for all open shelving.

COUNTERTOPS
12 36 00
A. GENERAL

1. Provide solid surface countertops at high use areas for durability and infection control.
 - a. Solid Surface Material: Homogeneous-filled plastic resin complying with ISFA 2-01.
 - b. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of polymers, resins, and pigment and complying with ISFA 3-01.

ENTRANCE FLOOR MATS AND FRAMES
12 48 13
A. ENTRYWAYS

1. Follow Cal Green standards for entrance floor mats - install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors.

B. CARPETING COORDINATION

1. Coordinate with requirements in Section 09 68 00 Carpeting.

FURNITURE
12 50 00
A. INTERIOR

1. All interior furnishings listed below shall be "Owner Furnished/Owner Installed" (OFOI), including but not limited to:
 - a. Systems workstations.

- b. Visual display units.
- c. Metal file cabinets, bookcases, and storage cabinets.
- d. Task seating.
- e. Waiting area seating.

B. PURCHASING AGREEMENT

1. University of California Office of the President (UCOP) has entered into a system wide agreement with following furniture vendors and their local vendor/installer to provide and install product types listed above:
 - a. Steelcase | One Workplace
 - b. MillerKnoll | MTA or KBM Hogue
 - c. Kimball | Seats and Stations

C. OTHER MANUFACTURERS

1. In conjunction with UCDH Furniture Project Manager, the design professional shall coordinate design efforts with UCDH selected furniture vendor. The vendor shall provide furniture plan shop drawings to the design professional in PDF and CAD formats to be incorporated into the design drawings.

D. DESIGNER COORDINATION

1. The design professional shall coordinate design efforts with appropriate vendor. The furniture vendor shall provide furniture plan shop drawings to the designer in PDF and CAD formats to be incorporated into the design drawings.

E. DESIGN RESPONSIBILITY

1. The design professional shall be responsible to provide anchorage structural calculations and details for all furniture items needing non-structural seismic anchorage as required by building codes.

F. STATIONARY WORKSTATIONS

1. Stationary workstations in the office/laboratory setting follow ergonomic principles by providing height adjustable work surfaces, openings adequate for leg and knee clearances and sufficient overhead space to allow adjustments to vertical equipment placement. The ANSI/HFES100 (current version) "Human Factors Engineering of Computer Workstations" shall be reviewed by the Design Professional.

INTERIOR PUBLIC SPACE FURNISHINGS
12 93 00

A. TRASH RECEPTACLES

1. Provide built-in trash receptacle at all public, staff and patient restrooms. Trash receptors at all other areas as well as recycle bins will be the responsibility of UC Davis Health. In high-traffic areas (including restrooms), UC Davis Health may add additional trash receptacles as needed. Recycle bins are multi- purpose receptacles for cardboard, mixed paper, bottles and cans, and trash.
2. Compost collection compartments shall be required in 20 22 by code.

B. IN CORRIDOR

1. In Corridors, all trash receptacles and recycle bins proposed to be in any corridors shall be reviewed and approved by the Fire Marshal.

C. PROPER SIGNAGE

2. Proper Signage Proper signage is required, ideally at eye level or on the lid or opening, to avoid contamination. Verify with the University Representative for current signage requirements.

D. HOSPITAL GRADE

1. Hospital Grade Trash receptacles shall be hospital grade.

SPECIAL CONSTRUCTION
13 00 00

1. Special construction covers a wide range of items from aquatics, animal handling, clean rooms, cold rooms, engineered structures, building modules and radiation Protection. Projects on the UC Davis Health campus may not always contain such specialty equipment. When special equipment is identified in the program, the Design Build partner will coordinate with the University Representative to further define specialized requirements, in consultation with FP&D and PO&M.

CONVEYING EQUIPMENT
14 00 00

A. ELEVATOR TYPES

1. Elevator types may include but are not limited to pedestrian, patient, service, helistop -type elevators. Specific requirements for each elevator use such as in capacity, speed, roping platform size and inside clear size are further described in the project requirements.

B. LOCATIONS

1. Provide elevators in buildings two (2) stories and greater in height. Provide elevator service to each floor including basements, mechanical rooms, and roof top mechanical penthouses. Where elevators extend to the roof, provide an exit path to a code -required egress stair.

C. PASSENGER ELEVATORS

1. Passenger elevators shall be non-hydraulic, energy efficient and electric traction style unless otherwise approved.

D. CONTROLLERS

1. Select only non-proprietary elevator system controllers with a microprocessor, SCR-DC devices, or variable frequency AC drive. Elevator control systems may not be used if they require proprietary interfaces, diagnostic tools, devices, or test equipment to maintain or trouble shoot. Connect components directly to the control system without any unique manufacturer's protocol or "black box"- type equipment.

E. SYSTEM DESIGN

1. System design to comply with regulatory requirements of ASMEA17.1, "Safety Code for Elevators and Escalators" and current CBC code.

F. HYDRAULIC ELEVATOR TYPES

1. For hydraulic elevator types, neither hydraulic pump nor motor can be submersible. Equipment arrangement will need to be confirmed at the early design stages as to provide adequate space for all supporting equipment. The elevator machine room shall be located adjacent to elevator. A hook-up phone line in machine room will be needed. Remote hydraulic stations are not permitted. If a remote station is required, obtain written approval from the University Representative. Biodegradable oil may be used, but it must be submitted for approval by the University Representative.

G. HOISTWAY PITS

1. Hoist way pits must be waterproof. Special attention to detailing of pits and below grade joints are required.

H. MACHINE ROOM EQUIPMENT

Arrange machine room equipment to allow a minimum of 30" working clearance around all equipment. In the case of controllers, electrical switches etc. working clearances shall be in accordance with CEC.

I. STANDBY POWER

Provide standby power of the same voltage characteristics via normal electrical feeders to run one (1) elevator at a time in each elevator group, and single elevator unit, at full-rated car speed. Provide standby single-phase power to group controller, and each elevator controller for lighting, exhaust blower, emergency call bell, intercom amplifier. Building announcement speakers. Firefighters Telephone Jack.

J. MEDICAL EMERGENCY SERVICES

1. Medical Emergency Services will need to have controls to call Elevator Numbers directly to any floor and allow an attendant to operate for medical emergency purposes.

K. CARD KEY ACCESS SYSTEMS

1. When appropriate to the project requirements, provide cardkey access systems to limit access to individual floors.

L. SIGNALING EQUIPMENT

1. Provide signaling equipment for each elevator or group of elevators. Signaling to consist of illuminated hall-call and car call buttons that remain lit until the call function has been fulfilled.

M. TELEPHONE AND ALARM SYSTEM

1. Provide each car with code required telephone and alarm system.

N. PHOTO EYE DETECTION

1. Provide each car with photo-eye detection devices for user safety.

O. CAR EQUIPMENT

1. Car and counterweight safeties: instantaneous type for car speeds of 150 fpm or less and type B, flexible guide clap for speeds of 150fpm or more.
2. Provide work lights and GFI convenience outlets on top and bottom of the elevator car.

P. ENTRANCE EQUIPMENT

1. Doors of passenger and service elevators are to be equipped with 1 ½ hour fire rating.
2. Frames, doors, and sight guards to be stainless steel construction typical.

DUMBWAITERS**14 10 10**

A. DESIGN

1. Design of dumbwaiters will be reviewed on a case-by-case basis. The design and installation of systems are to be coordinated through the manufacturer of the system and approved by the University Representative. No proprietary equipment is permitted.

B. SELF-SUPPORTING

1. Select dumbwaiter units that are self-supporting, with a structural steel hoist way framing designed for vertical-load support at the base of hoist way and lateral support at landing levels. Locate machine components inside the shaft, at the bottom of the hoist way.

C. CONTROL SYSTEM

1. Provide fully automatic Control Systems for dumbwaiters with a call-and-send control system that responds to momentary push-button signals at each landing. Provide signaling equipment at each landing.

D. FINISHES

1. Dumbwaiter finish to be Stainless Steel satin finish typical. Car construct on to be formed, reinforced and sound-deadened steel sheets with welded joints or metal-clad plywood on all sides.

E. DESIGN SPEED

1. Design Speed: 50 ft/min.

ELECTRIC TRACTION ELEVATORS

14 21 00

A. NOISE LEVEL

1. To help minimize noise and control vibration, mechanically isolate elevator equipment (including hoist machines, deflector sheaves, power-conversion units, and support equipment) from the structure, electrically isolate controllers, machine motors, and power conversion units. Noise level relating to elevator equipment and its operation should be limited to no more than 50 dBa in elevator cars under any condition including door operation and exhaust blower on highest speed.

B. GEAR HOIST MACHINES

1. For geared hoist machines use worm gear motor, brake, drive sheave and deflector sheave mounted on a common structural frame. Locate in machine room.

C. GEARLESS MACHINES

1. For gearless machines use direct drive type motor with integral sheave.

D. GUARDS

1. To prevent injuries to service personnel, provide guards around hoistway cables, sheaves and/or any cable pinch points. Install lighting and convenience outlets in elevator pits and machine rooms.

E. ISOLATION

Mechanically and electrically isolate elevator equipment from the building structure.

HYDRAULIC ELEVATORS

14 24 00

A. USE

1. To help minimize noise and control vibration, mechanically isolate elevator equipment.

B. SPECIFIC PROVISIONS

1. Hydraulic elevators will be considered only after thorough evaluation of all other options.
2. Provide manufacturers standard single -acting under-car hydraulic plunger-cylinder unit for each elevator with electric pump-tank-control system equipment in machine room.

PNEUMATIC TUBE SYSTEM

14 58 00

A. GRAPHIC USER INTERFACE

1. Provide a centrally located station control panel with Graphic User Interface for monitoring movement of system records and traffic flow.

B. AIR POWER UNIT SYSTEM

1. If an Air Power Unit (APU) system is selected provide energy conservation controls to automatically turn-off during periods of non-usage Provide an Automatic Station Shutdown for each station on the network.

C. SOUND ATTENUATION CONTROL

1. When designing a pneumatic tube system, design sound attenuation control providing, proper clearances from other systems including partition studs, building systems, and other devices wherever sound would be transmitted through physical contact.

D. SMOKE DETECTORS

1. Provide smoke detectors for exhaust air lines at each APU to provide immediate shutdown and system alarm.

APPENDIX A ABBREVIATIONS & DEFINITIONS

ACI	American Concrete Institute
ADA	Americans with Disabilities Act Accessibility Guidelines
AESS	Architecturally Exposed Structural Steel
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BHMA	Builders Hardware Manufacturers Association
BSC	Biological Safety Cabinets
CAL OSHA	California Division of Occupational Safety and Health
CBC	California Building Code
CCCPD	Chancellors Committee on Campus Planning and Design
CCR	California Code of Regulations
CSI	Construction Specifications Institute
DPP	Detailed Project Program
DSA	Division of the State Architect
EDP	EXECUTIVE DESIGN PROFESSIONAL: The Design Professional contracted by the University to prepare Construction Documents for a particular project. In this document, the term “Executive Design Professional” may refer to an architect, landscape architect, planner, interior designer, or an engineer of record.
EH&S	Environmental Health & Safety
EIR	Environmental Impact Report
ENR	Engineering News Record
ER	Entrance Facility Room
ESR	Evaluation Service Report – developed by ICC – product approval for adherence to code standards
FD&C	Facilities Design and Construction
FRP	Fiberglass reinforced polyester
FSC	Forest Stewardship Council



GA	Gypsum Association
GFCI	Ground Fault Circuit Interrupter
HDPE	High Density Polyethylene
ICC	International Code Council
ICC-ES	ICC Evaluation Service
LRDP	Long Range Development Plan for UC Davis Health
NFPA	National Fire Protection Association
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NOA	Naturally Occurring Asbestos
OSHPD	Office of Statewide Health Planning and Development
PCB's	Polychlorinated biphenyls – manmade chemicals banned by the USEPA in 1979 widely used in electrical equipment like capacitors and transformers
PETG	Polyethylene terephthalate glycol
PO&M	Plant Operations & Maintenance
PPG	Project Planning Guide
PSI	Pounds per Square Inch
SDI	Steel Door Institute
SFM	State Fire Marshal
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSMA	Steel Stud Manufacturers Association
UBC	Uniform Building Code
SDI	Steel Door Institute
TS	Telecommunications Spaces
TR	Entrance Facility Room
UNIVERSITY REPRESENTATIVE	The person designated by UC Davis Health to represent the University to the Contractor, Design Professionals, and/or Project Engineers.
UPC	Uniform Plumbing Code
VOC	Volatile Organic Compound - organic chemicals that have a high vapor pressure at ordinary room temperature.

APPENDIX B BASIS OF DESIGN (OR EQUAL) PRODUCTS (ARCHITECTURAL)

1. Basis of Design (Product Standard): UC Davis Health has selected certain products and systems to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered, provided deviations are minor and comply with the requirements of the Contract Documents.
2. Refer to the attachment that follows.



UCDH FACILITY STANDARDS MECHANICAL/PLUMBING

SUMMARY OF CHANGES

Common Motor Requirements for Plumbing Equipment – 21 05 13

1. Clarified general requirements for VFDs.

General Duty Valves for Plumbing Piping – 22 05 23

1. Clarified general requirements for shut off valves.
2. Clarified general requirements for isolation valves.

Hangers and Supports for Plumbing Piping and Equipment – 22 05 29

1. Clarified requirements for horizontal cast-iron soil pipe hangers or supports.
2. Clarified requirements for hanger nuts.
3. Clarified that gripple type cable hangers are not permitted for gravity loads.

Facility Drainage Piping Cleanouts – 22 05 76

1. Clarified requirements on cleanout accessibility.
2. Clarified types of cleanout bodies.
3. Clarified requirements for finished floor cleanouts.

Facility Water Distribution – 22 11 00

1. Clarified requirements for building domestic water meter.
2. Clarified requirements for domestic water service inside building for potable hot water systems.
3. Clarified requirements for exterior hose bibbs.
4. Clarified requirements for domestic cold water underground piping.
5. Clarified requirements for copper tubing fittings.

Facility Sanitary Sewage – 22 13 00

1. Clarified requirements of floor drains for toilet rooms.

Commercial Plumbing Fixtures – 22 42 00

1. Clarified general requirements for sink and lavatory risers.
2. Clarified requirements for mop sinks.

Design Criteria for Mechanical – Division 23

1. Clarified general requirements for air distribution design fire/smoke damper access panels.

HVAC Insulation – 23 07 19

1. Clarified requirements for piping insulation.

Commissioning of HVAC – 23 08 00

1. Clarified reference to Owner Project Requirements for Commissioning.



Instrumentation & Control for HVAC – 23 09 00

1. Clarified requirements for critical room pressure monitoring.

Hydronic Piping and Pumps – 23 21 00

1. Clarified requirements of above ground piping, joints and fittings for chilled and heating water.
2. Clarified requirements of valves for underground direct-buried chilled and heating hot water.
3. Clarified requirements for labeling of piping and ceiling.

HVAC Air Distribution – 23 30 00

1. Clarified that gripple type cable hangers are not permitted.
2. Clarified requirements for dampers.
3. Clarified campus standard requirements for fire smoke dampers.
4. Clarified requirements for labeling of equipment.

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FIRE SUPPRESSION
21 00 00
A. FIRE SUPPRESSION
21 00 00
1. Referenced Standards

- a. NFPA (National Fire Protection Agency) current edition, with California amendments
- b. California Fire Code, current edition

2. Hydraulically Designed System

- a. All hydraulically designed sprinkler systems shall be provided with a minimum of a 10% safety margin on either the supply or pressure side of the design graph.
- b. All sprinkler systems shall be designed to provide the appropriate density based upon a hazard occupancy classification specified by NFPA 13. In those cases where NFPA 13 does not specifically identify the hazard occupancy classification, the UC Davis Health's Campus Fire Marshal's office shall determine the hazard classification.
- c. The water supply requirement for sprinklers only shall be calculated from the density curves in NFPA 13.
- d. Submittals having inaccurate hydraulic calculations, content which is illegible, incomplete, or unclear, shall be returned without review or approval.

3. Materials
a. Underground Piping

- i. See Section 33 11 19 Fire Suppression Utility Water Distribution Piping and 33 11 00 Water Distribution, for requirements on underground piping.

b. Above Ground Piping

- i. Insulate water-filled supply piping in areas exposed to freezing, such as under eaves, cold rooms, passageways, etc. per NFPA standard.
- ii. Sprinkler piping shall be American Society for Testing and Materials (ASTM) Schedule 40 black steel pipe with UL and FM listed fittings. Schedule 10 grooved piping is allowed for pipe sizes 2-1/2" and larger.
- iii. MRI rooms shall use nonferrous copper piping. All joints for copper fire sprinkler piping shall be brazed. Copper piping shall be ASTM B88. Alternatively, Schedule 40 stainless steel with cast stainless steel listed fittings may be used in MRI rooms.
- iv. Automatic air vents shall be provided at high points in the system to help eliminate air to reduce corrosion.
- v. Sprinkler contractor shall provide welding certifications.
- vi. Provide means to flush piping per NFPA 13.
- vii. Provide injection port for central microbiological and/or corrosion control.
- viii. Preaction systems shall be used for data centers and TER rooms unless accepted otherwise as a wet pipe system by UCD representative.
- ix. Central Plant main electrical rooms shall be provided a clean agent suppression design such as Tyco SAPPHIRE system as well as preaction system, or equal.
- x. All dry pipe systems shall include a Nitrogen generation system to inhibit corrosion.
- xi. Piping subject to corrosion or exposed to the elements shall be stainless steel or galvanized piping.
- xii. O ring style drop nipples are not permitted.
- xiii. Provide a means of testing the standpipe system. This shall include a 4" drainage pipe riser with 2 1/2" tees and valves at each floor. The 4" riser shall terminate to an appropriate sewer drain.

- c. Main Drain
 - i. Manufactured by AGF, or equal, Test and Drain model 1011A, 400 psi rated with 175 psi rated pressure relief valve.
 - ii. Comply with applicable and current NFPA codes.
- d. Sprinkler Heads
 - i. Sprinkler Heads
 - ii. Sprinkler heads shall be UL listed or FM approved. **Concealed** heads are required as a standard due to frequent discharges throughout the campus caused by accidental contact.
 - iii. For exterior and corrosive atmospheres, provide wax-coated sprinkler heads.

DESIGN CRITERIA FOR PLUMBING
DIVISION 22

1. Refer to Division 1 for substitutions of products.
2. Renovation and remodel projects shall employ strategies that use 20 percent less water in aggregate than the water use baseline calculated for the building (not including irrigation), after meeting the California Green and California Plumbing Code fixture performance requirements.
3. These guidelines shall be implemented into project designs. Where code or local jurisdiction conflicts with the guidelines, the codes shall govern.
4. The project designer shall incorporate an exception to the Design Guidelines listing standards that cannot be adhered to and reasoning compliance cannot be met. Obtain approval of exceptions from UCD.

A. COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT 22 05 13

1. Combination magnetic starters shall have circuit breaker disconnects with trip size of breaker as required for motor size.
 - a. Motor starters shall be provided by the mechanical equipment supplier where they are readily available as a standard option. These motor starters shall be specified by the mechanical engineer and installed by the mechanical contractor.
 - b. Where motor starters are not available from the equipment manufacturer they shall be sized and specified by the electrical engineer and provided and installed by the electrician. The mechanical engineer shall coordinate and provide adequate information to the electrical engineer for sizing each motor starter.
 - c. Where motor starters are to be included in a motor control center (MCC) they shall be specified by the electrical engineer and installed by the electrician. Mechanical engineer shall coordinate the motor sizes and full load amps with the electrical engineer.
 - d. There may be conditions where a motor starter cannot be used due to seismic certification requirements. An OSP certified variable frequency drive (VFD) can be used as a substitution for any motor starter. When a VFD is provided for mechanical equipment, it shall be specified by the mechanical engineer, installed by the mechanical contractor, and wired to and from the device by the electrician.
 - e. Coordinate BAS control of all motor starters and VFD's.
2. Shaft grounding shall be provided on all VFD assemblies with operating motors 5 HP and above. Provide factory-installed shaft grounding devices, either by motor or equipment manufacturer. All motors driven by VFD's shall be inverter-rated. Where ceramic bearings are utilized and manufacture does not recommend shaft grounding, they may be omitted. Follow shaft grounding device manufacturer's specific installation literature, specifications, and recommendations. Field-installed shaft grounding systems shall be tested for proper conductive path to ground and shall pass manufacturer's published test procedure. Motor shall be grounded to the common earth ground with drive.
3. For motors operating at 100 horsepower or more: Follow shaft ground manufacturer's recommendations. Often it is required by the manufacturer that two shaft grounding devices be installed.
4. Provide VFD's with 3 contactor bypass (not electronic bypass). VFD's shall have ultra-low harmonics (THD of 3% maximum). Provide ABB ACH 580 ULH or equal. If 3 contactor bypass is not available due to OSP availability, provide with electronic bypass.
5. If motor is subject to contaminants, debris or moisture, special shaft ground systems and/or seals shall be required. Follow manufacturer's applicable recommendations.

6. Motor bearing(s) shall be guaranteed from electrical bearing fluting damage during the motor warranty period. Motor or bearing(s) shall be replaced at no additional cost to UC Davis Health.
7. All motors 1 HP and over that are used at least 1,000 hours per year shall be premium efficiency with no shaded pole motors on fractional horsepower motors 1/20 HP and larger.
8. Electronically Communicated Motors (ECM) are not allowed except where approved by UCD representative.

B. METERS AND GAGES FOR PLUMBING PIPING

22 05 19

1. All new buildings shall be provided with water meters connected to BAS. Water meters shall be included for domestic water and irrigation water. City required meters that are not remotely readable thru BAS do not satisfy this metering requirement for UCD. Where it occurs, it shall be necessary to have two meters in series to achieve BAS goals.
2. Pulse Totalizer water meters are allowed. Meters shall be non-resettable and connected to a readable by the BAS. Provide Xylem Omni R2 water meter or equal.
3. Provide meters for the following:
 - a. Hydronic make-up water (i.e. chilled water, heating water). Used for detecting leaks. Alarm BAS if there is water volume of 5 cubic feet or more.
 - b. Cooling tower or other evaporative condensing equipment make up water.
 - c. Cooling tower blowdown piping.

C. GENERAL DUTY VALVES FOR PLUMBING PIPING

22 05 23

1. General Requirements
 - a. Provide shut off valves on piping serving each floor including, but not limited to, cold water, hot water, hot return, chilled water, heating water, soft water, RO water, plant air, etc.
 - b. Provide isolation valves at restrooms serving multiple water closets and multiple lavatories. Men's and Women's rooms do not require separate isolation (one isolation valve can shut off both restrooms).
 - c. Provide isolation valves for each fixture (except toilet rooms or bank of adjacent fixtures, where one isolation valve can shut off the group). An example is each exam room sink or back-to-back exam sink is to have an isolation valve located above the ceiling adjacent to the sink. In addition, each sink has a wall stop. Fixture isolation ball valves do not require a valve tag but do require ceiling label to identify the valve location.
 - d. Provide isolation valves upstream and downstream of balance valves.
 - e. Provide bypass loops and valves around all major pieces of equipment.
 - f. Provide water hammer arrestors with stainless steel access doors at fast acting valves where required by the California Plumbing Code and where required to control water hammer. Access doors shall be stainless steel 12 inches x 12 inches. Contractor shall coordinate the location of the access doors to not conflict with the restroom partitions, obstructions, and ADA access grab bars.
 - g. Valves shall be located in accessible areas. Locate a maximum of 3'-0" above ceiling grid or access panel.
 - h. Valves shall be lead free for potable systems.
 - i. Valves that are concealed shall be accessible via clearly marked access panels when located above or behind new or existing finished surfaces. Access panel size shall be a minimum of 24

inches x 24 inches, except where otherwise approved by the university representative.

2. General Purpose Shut-off Valves: All isolation valves through 2 ½" size shall be IPS full port ball valves and valves 3" and above shall be butterfly valves. Ball valves shall be two-piece bronze body.
3. Pressure Reducing Valves shall be lead free. Provide isolation valve and strainer at inlet of pressure reducing valves. Pressure reducing valves for hot water systems shall be rated for the temperature they serve.
4. Fixture Shut-off Valves shall be all brass, quarter-turn angle stops, IPS threaded inlet only. Each fixture shut off shall have a lock shield and loose key regardless of concealed or exposed.
5. Check Valves shall be all brass swing check or spring check type, threaded or flanged connection (depending on application). Spring checks shall be used for water hammer reduction applications.
6. Bench Valves (i.e. laboratory) shall be quarter turn, chrome plated, with index button identification of gas served. Materials shall be compatible with gases served.
7. Laboratory Valves (air, gases, and vacuum) shall be 2 piece or 3 piece full port valves with materials compatible with gases served.

D. HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT 22 05 29

1. Fasten all piping securely to building construction with hangers, supports, guides, anchors, or sway braces to maintain pipe alignment, to prevent any sagging, and to prevent noise or excessive strain on the piping due to uncontrolled movement under operating conditions. Relocate hangers and/or add as necessary to correct unsatisfactory conditions that may become evident when system is put into operation. All piping shall be independently supported from the building structure. No piping shall be used to support other piping. Provide seismic bracing per current code requirements.
2. Provide hangers to supports sized to support the weight of the pipe, weight of fluid, and weight of the pipe insulation with a minimum factor of safety of five based on the ultimate tensile strength of the material used. This is to prevent unzipping of hangers during failure.
3. Use of powder-actuated fasteners is not permitted for the support of any overhead piping.
4. Provide hangers or supports for horizontal cast-iron soil pipe at each side of a joint and within 18 inches of the joint. Spacing of hangers shall not exceed 8 feet. Provide adequate sway bracing to prevent shear. On horizontal and vertical cast iron piping and fittings, use felt pad vibration isolators, Bline, Superstrut, Semco Trisolators, or equal. Provide felt isolators or PVC coated hangers. Provide isolation from copper piping to steel hangers and supports with Neoprene, felt, PVC coatings or similar means provided by the pipe hanger manufacture.
5. All hangers, hanger supports, hanger trapeze supports, fire piping hangers and strut supports shall have washers and one nut on top and one nut below. Provide jam nut below lower nut.
6. Provide pipe isolators at all hangers for non-insulated lines. Provide felt or plastic coated hangers at non-insulated copper piping.
7. Install hanger on insulated piping in a manner which shall not produce damage to insulation. Provide steel pipe saddles for piping thru 1 ¼" nominal diameter and calcium silicate (allowed for all pipe sizes) or equivalent rigid pipe blocks with similar diameter as the insulation to protect pipe covering. Calcium silicate blocks shall have galvanized cover shields. Where pipe saddles are used, they shall be 18 gauge, 12 inches long, 180 degree, shaped for the outside diameter of the insulation. Install pipe hangers on insulated piping on the outside of the insulation and not in contact with the pipe., unless not allowed by authority having jurisdiction. In cases where hanger is required to be in direct contact with the pipe, provide details of how piping shall be insulated to control condensation and heat loss.
8. Provide cushioning clamps at pipe clamps attached to strut.

9. Provide seismic bracing in accordance with CBC 1617 and ASCE 7. Mason OPM 0143-13 and Eaton Bline OPM-0052-13 are approved systems that the designer shall use. Provide clear identification of project requirements including project importance factor (i.e. $I_p = 1.5$ for hospitals), exemptions of piping based on steel, copper, and non-ductile piping. Provide pipe bracing criteria for piping with flexible connections and without flexible connections. List trapeze exemptions (i.e. trapezes with less than 5 lbs/lf), and list piping with hazardous content bracing requirements.
10. Gripple type cable hangers are not permitted for gravity loads.

E. FACILITY DRAINAGE PIPING CLEANOUTS

22 05 76

1. Make all cleanouts accessible. Cleanouts are not allowed to be installed in ceiling spaces. Where feasible, wall cleanouts shall be used. Use graphite on all cleanouts with all threads being thoroughly greased after acceptable pressure test. Provide end of line clean outs on upper floor branch lines. Cleanouts shall be provided at maximum 50 ft interval and at the base of any risers. At least one cleanout shall be provided in the upper floors for any horizontal carriers. Provide cleanouts 6" above the flood level of the fixture (i.e. break room sink, exam sink, hand sink). For piping 3" and larger provide cleanouts at a maximum height of 30" above the floor. Lavatory cleanouts can be below the sink if in conflict with the mirror.
2. Where cleanouts occur in walls, cavity shall be sized to accommodate the pipe size, insulation, and hardware.
3. Types of Cleanout Bodies
 - a. Exposed: Cast iron plug.
 - b. In Wall: Cast-iron body, stainless steel cover.
 - c. Finished Floor Cleanouts: Adjustable, cast-iron body, ABS or brass threaded plug. Plug shall be installed within 1 -inch of finished floor. Provide Teflon pipe sealant to prevent plug from becoming seized in the body.
 - d. 2-Way Cleanouts: Provide back-to-back combos. Manufactured single access 2-way cleanouts are not acceptable.
4. Where sewer piping is epoxy coated provide "EPOX" identification on cleanout cover so facility will understand that no cutters can be used in the line.

F. PLUMBING INSULATION

22 07 00

1. Insulate
 - a. Rainwater leader and overflow drain piping inside the building for up to 25 feet from the roof drain or overflow inlet. Fiberglass or closed cell insulation such as AP Armacell, or equal, is acceptable.
 - b. AC unit condensate drains and similar drainage systems that are extremely cold have had issues with condensation, causing water damage inside the building. Provide insulation on condensate drains that may have risk of condensing inside the building. Locate for a minimum of 15 feet from the AC unit connection. Fiberglass or closed cell $\frac{1}{2}$ " insulation such as AP Armacell, or equal, is acceptable.
 - c. Water piping, 6-inches and smaller, exposed to the weather, including interior spaces subject to outside temperatures.
 - d. Domestic hot water piping.
 - e. Domestic hot water return piping.
 - f. Industrial hot water piping.

- g. Domestic water pipes in spaces that can experience high humidity such as central sterile or steam processing or in places where pipe can experience temperature below ambient dewpoint. Intent is to control against condensation.
- h. Comply with California Energy Code for insulation thickness, R value, and conductance. Comply with California Mechanical Code for allowable flame spread and smoke developed ratings. Refer to insulation Section 23 07 19.
- i. Insulated piping outside the building shall be protected with aluminum jacket for piping and fittings. PVC elbows are not allowed.
- j. Provide PVC jacketing color coded to UCD standards or preferences for all exposed insulated lines in occupied spaces and in mechanical rooms.
- k. Provide labeling of all insulated and non-insulated piping. Provide labels at 20-foot intervals, a minimum of one per room. Provide directional arrows of flow, and a label adjacent to any shut off valve describing content.

G. COMMISSIONING OF PLUMBING

22 08 00

- 1. Disinfection of Water Systems
 - a. All water systems shall be disinfected per California Plumbing Code and authority having jurisdiction (AHJ).
 - b. Provide valved ports for chlorination with plugs. This may require freezing line to minimize facility downtime. Valve size shall be a minimum of ½". All valved ports shall have a plug or cap.
- 2. Balance hot water return systems and verify hot water temperature to fixtures meets requirements.
- 3. On new systems verify hot water return pumps are operating in accordance with the intended sequence of operations. Test hot water high temperature alarms, test start/stop sequences of hot water return pumps, test aquastat off operation where applicable.
- 4. Tests and Adjustments
 - a. Test only new piping. Final connection between new and existing piping shall be tested at normal system operating pressures. Make no high pressure test against an existing service valve or meter except where approved by UCD representative. Isolate all existing piping systems from new or existing equipment which may be damaged by test pressure. Line pressure testing against an existing valve with visual inspection for 20 minutes with no leakage is acceptable where allowed by authority having jurisdiction and the Inspector of Record (IOR) witnesses the test.
 - b. There shall be no loss in pressure or visible leaks shall show after 2 hours at the pressures indicated in the table below unless noted otherwise.

System Tested Sanitary and Lab, Waste, Drain, Vent, Storm drains, Overflows	Test Pressure PSI 10 ft. head 5 psi	Test with Sanitary & Lab Water Air (30 minutes)
Compressed Air	150 PSI	Air & Soap
Deionized or Reverse Osmosis Water	100 PSI	Deionized or RO water
Industrial and Domestic Hot & Cold Water	150 PSI*	Water
Gas	100 PSI	Air & Soap
Medical Gas and Vacuum	150 psi Initial Test	All Testing in Accordance with NFPA

*or 1.5 times the operational pressure, whichever is higher.

High pressure steam pipe test pressure: 150% more than operational pressure

Low pressure steam and condensate: 150 psi, water

Other systems not listed: Test at 150% of operating pressure.

H. FACILITY WATER DISTRIBUTION

22 11 00

1. Systems Definition

- a. The potable water system is identified as the Domestic Water Distribution System. This system serves the building domestic water, building industrial water, and fire water.

2. Building Domestic Water

- a. This system is used to provide for consumption and sanitary needs, industrial water needs, make-up water for mechanical system, and process water needs (i.e., DI, RO, etc.).
- b. The service at the building shall provide the following.
 - iv. A reduced pressure backflow prevention device (RPBP). Provide two with 100% capacity in parallel.
 - v. Shut off valve.
 - vi. Water meter connected to and readable from the Building Automation System (BAS). Provide Xylem Omni pulse type.
 - vii. Provide a 1" ball valve with plug at the main supply line entrance feeding the building to allow for domestic cold-water chlorination.
- c. Provide a 1" ball valve with plug to allow domestic hot water chlorination. This shall be located at the building's water heater source. (Chlorination is used to periodically disinfect to reduce the risk of Legionella.) An accessible main strainer with "blow down" capabilities to prevent well water sediment from reaching building's water supply and fixtures. Strainer shall be #20 mesh (1/32-inch). Coordinate location with UCD representative.
- d. Water pressure calculations shall be performed for the project to determine the need for a booster pump. Water booster pumps shall be controlled with variable frequency drives (VFDs) in lieu of hydraulic controls. Booster pump systems shall have a minimum of two pumps and a hydro pneumatic tank. Request a water pressure test for all new buildings during project SD or DD phases. Provide a minimum of 30 psi to the top floor for multi-story buildings. Size the booster system for a minimum of 120% of the calculated demand and estimated growth. Provide demand analysis and performance for the university's acceptance.
- e. Domestic water service inside each building shall provide the following.
 - i. Isolation valves on branch lines serving each floor and at each equipment connection to facilitate maintenance and future building renovation projects. Provide a plan to shut off

- patient rooms and multi-person occupancy toilet rooms that minimizes the impact on adjacent rooms and areas.
- ii. In large floors provide isolation valves for every quadrant or for each department.
 - iii. The building plumbing systems shall have appropriate shut off valve zoning to allow for ease of maintenance with minimal shutdown impact to building occupants. At minimum, shut off valves shall be provided for the following: each floor, multi person toilet rooms, each laboratory room, each equipment room, and each kitchen.
 - iv. Provide accessible water hammer arrestors for hot and cold-water supplies to each quick-closing plumbing fixture or solenoid valve (e.g., water closet, urinal, dishwasher, washing machine, clinic sink, food service hand-held sprayers, etc.) in accordance with the American Society of Sanitary Engineers Standard 1010, Water Hammer Arrestors.
 - v. Size and locate arrestors per Plumbing Drainage Institute (PDI) Standard PDI-WH 201, Water Hammer Arrestors, latest edition, requirements.
 - vi. Water hammer arrestors shall have a minimum 12" x 12" stainless steel access door. Coordinate the access door location with partitions, grab bars, and obstructions. Install above ceilings or behind wall access door at each applicable plumbing fixture, or where plumbing fixtures are installed in groups, at each group of fixtures.
 - vii. For renovation projects, dead-end piping shall be removed in the area of the renovation back to the nearest active main or branch line. Empty risers, mains, and branch lines stubbed with line size shut-off valves for future use are permitted. These requirements apply to all domestic water utilities.
 - viii. For potable hot water systems, provide a recirculation loop that serves all areas of the facility. Provide a balance valve for each floor and provide a recirculation loop that shall allow domestic hot water systems to maintain hot temperatures to the fixtures. Provide additional balance valves as necessary to maintain hot water throughout the space. Piping arrangement shall limit the number of balance valves and utilize larger recirculation loops. Due to fixture layouts, it recognized this is not always possible. Balance valves on new systems shall be constant flow style with a cartridge for set gpm flow. Each balance valve shall have an upstream strainer and ball valve, and a downstream ball valve for complete isolation and replacement of a cartridge. Existing systems may use cartridge style or circuit setters depending on existing types of valves and available pump pressure. Cartridge style setters are expected to have a higher-pressure loss and they shall be analyzed for usefulness in an existing return pumping system. Hot water return designs shall limit the maximum velocity to 4 fps to minimize the potential of pipe pitting and erosion. California Plumbing Code allows a maximum of 25 feet of uncirculated domestic hot water piping. UCD standard is to have up to 15 feet maximum (horizontal and vertical) of unrecirculated domestic hot water. For nourishment/ kitchen areas the maximum allowed time before hot water is available at the fixture is 10 seconds or as otherwise required by the Authority Having Jurisdiction (AHJ). Kitchens shall have 140oF water supply (or as specified by California Plumbing Code) and shall incorporate thermostatic mixing valves for hand sinks and other fixtures requiring supply temperatures below 140oF.
 - ix. Provide digital water tempering mixing valve system at the water heater. Store potable hot water at 140oF. Provide a high tempered water alarm per the California Plumbing Code. Alarm to the BAS and alarm locally at the water heater with a visual and a cancelable audible alarm. BAS control points shall include tempered water supply, temperature, hot water return temperature, recirculation pump status, recirculation pump start/stop, domestic hot water storage supply. Points may be obtained from the digital tempering valve or separate wired points. Smart mixing valves shall be on emergency power for hospitals.
 - x. Do not use once-through potable water for medical equipment cooling unless approved by the university representative. Where once thru cooling systems are used they shall only flow during demand and not flow continuously.

3. Hose Bibbs

- a. Exterior Hose Bibbs: Shall be served by industrial or utility water services (where feasible). Provide hose bibbs within 20 feet of entrances into the building. Provide each hose bibb with an isolation ball valve, vacuum breaker, loose key handle, ¾ inch hose outlet. Exterior wall boxes shall be chrome-plated rough bronze, and vandal proof. Provide hose bibbs on roof within 150 feet max of each other. Provide hose bibbs within 40 feet of HVAC units for washing coils. Provide removable water-resistant canvas insulation covers for hose bibbs. Insulate domestic water on roof, refer to insulation specification.
 - b. Interior Hose Bibbs: Vacuum breaker, loose key handle, ¾ inch hose outlet, chrome plated brass, vandal proof.
4. Backflow Preventers
- a. Provide lead-free reduced pressure principal backflow preventers consisting of assembly, including shutoff valves on inlet and outlet, and strainer on inlet.
 - b. Where required, provide backflow preventers to separate industrial water from domestic water, and any other locations where prevention of backflow is critical for safety.
 - c. On industrial water for labs, hospitals, and all other new buildings, provide parallel backflow prevention devices sized at 100 percent of the flow each.
 - d. On make-up water to hydronic systems, provide a single RPBP device.
 - e. Backflow preventers shall include test cocks, and pressure-differential relief valve located between two positive seating check valves. For single backflow applications, provide independent isolation valves on each side of backflow device to allow for removal and replacement. This is in addition to the manufacture provided isolation valves.
 - f. Provide a strainer upstream of the backflow devices with union, and a blowdown ball valve with hose connection fitting and cap.
 - g. Install no higher than 5 feet above finished floor, 12 inch minimum from floor, 12 inch minimum from wall.
 - h. RPBP's located inside a building are subject to water discharge and shall have air gap fittings and piped drains to a floor sink or an approved location. The wall adjacent to a backflow preventer shall be protected from water discharges with a minimum of FRP or similar water protection for a distance of 24 inches above and 24 inches to the sides of the discharge location, all the way to the floor of the room.
5. Piping
- a. Domestic Cold Water
 - i. Underground: Type K copper tubing, drawn temper, seamless, ASTM B88. Piping shall be installed in a plastic sleeve wrap. Joints underground shall be brazed.
 - ii. Above Ground: Type L copper tubing, hard drawn temper, seamless, ASTM B88.
 - iii. Below Grade cold water to trap primers: Type L annealed soft temper, no joints. Piping shall be installed within plastic sleeve wrap.
 - b. Domestic Hot Water
 - i. Underground: Preinsulated Type L, ASTM B88, brazed joints. Provide with high-density polyethylene (HDPE) exterior jacket. Permapipe or equal.
 - ii. Above Ground: Type L copper tubing, hard drawn temper, seamless, ASTM B88.
6. Joints
- a. Copper Tubing for Domestic Water: All above grade piping, 1-1/2" and larger, and all below grade piping, regardless of size, shall be brazed with silver solder 1000oF. All joints 1-1/4" or less are allowed to be soldered with lead free 95/5 tin antimony for pipes above ground. UCD has had

leakage with solder joints due to water hammer. Male and female threaded adaptors of any size shall be soldered in lieu of brazing (the higher brazing temperatures anneal the threads making them more susceptible to weakening and leaking).

- b. Dissimilar Materials: Install 6" long brass nipple, dielectric transition at points where dissimilar metal pipes connect together. Dielectric unions are not to be used unless approved specifically by the UCD representative. Dielectric Waterway that are NSF listed and are specific for transitioning from steel to copper are acceptable, ASTM F-1545. Clearflow or Victaulic or equal.
- c. Pro-press can only be used with approval from university representative and in limited conditions. In no cases can Pro-press be 1 ½" and larger.

7. Fittings

- a. Copper tubing: Wrought copper or cast brass unions and flanges
 - i. Unions and flanges shall be provided at the inlet and outlet of all apparatus and equipment, at all valves, and elsewhere as required to facilitate removal of valves and equipment. When connecting dissimilar metals, use brass nipples. Do not use dielectric unions.
 - ii. Two inches and smaller ground joint shall be cast bronze unions. Cast brass unions may be used for pipe sizes 1" and smaller.
 - iii. Two-and-one-half inches and larger shall be CTS flange or 150-pound flange, cast brass.
 - iv. Do not use tee pulling methods (no extracted tees).

I. FACILITY SANITARY SEWAGE

22 13 00

1. Floor Sinks
 - a. All mechanical spaces shall be provided with floor sinks.
2. Floor Drains
 - a. Install vented P-trap below each drain. Provide trap primer connection for drains with infrequent use.
 - b. All toilet rooms with more than one toilet or a toilet and urinal, laundry rooms, mechanical rooms, plumbing equipment rooms (i.e. water softener or R.O. rooms) and first floor trash rooms shall have floor drains. Kitchen floor drains with grease potential shall be a minimum of 3" pipe size.
 - c. Provide flashing ring and clamp at floors with waterproofing membrane. Adjustable set top with the top of the drain installed slightly below the finished floor to ensure drainage.
3. Trap Primers
 - a. Install with Type L, hard copper piping (above grade) and soft copper piping with no joints (below grade) to trap primer connection on floor drains and floor sinks with infrequent use. Underground piping shall be within a plastic sleeve wrap.
 - b. Install trap primer piping to ensure that the line shall drain fully to the floor drain or floor sink.
 - c. Provide a ball valve to the inlet at each trap primer location.
 - d. Mount trap primer in wall. Size access door and box to suit valve and primer operation. Provide locking door when installed in occupied spaces.
 - e. Where one trap primer shall be used for more than one trap, provide a distribution unit with feeder piping for a maximum of four traps sized for equal pressure drop to each trap.
4. Drain, Waste, and Vent Piping
 - a. Provide a statement of the sewer pipe design slope in the project Basis of Design. Record any slope restrictions and proposed design solutions. Slope piping at 1/4"/LF whenever possible.
 - b. Coordinate with the local Utility District and Health Department to determine if kitchen waste requires a grease removal system.
 - c. Pipe and Fittings
 - i. Above and Below Grade: Cast iron soil pipe and fittings, asphaltic coated, conforming to ASTM A888 and Cast-Iron Soil Pipe Institute Standard (CISPI) 301 and so marked. Pipe and fittings shall be manufactured by AB&I, Charlotte, Tyler Pipe, or equal. Pipe and fittings shall be the products of a single manufacturer.
 - ii. Horizontal cast iron piping (waste and vent) shall have hangers installed on each side of piping and fitting joints. Hangers shall be within 18" of the joints.
 - iii. Joints: Couplings above and below grade: No-Hub couplings, meeting the requirements of FM 1680 Class 1, ASTM C1540, ASTM C564, IAPMO listed. Four band stainless steel clamps, 3/8-inch bolt heads, Type 304 stainless steel corrugated shield, welded, flanged. 0.15-inch thickness. Husky SD 4000 or equal, no known equal. Couplings shall be torqued to manufacture specified values (80 ft lbs).
 - iv. UCHD shall only accept the use of Husky 4000, stainless steel 4 band couplings.
 - v. No reducing couplings allowed. Sewer lines at toilet room sinks shall be designed properly with sweeps rather than "Ts" to allow for snaking when blockage occurs.
 - d. Vent Pipe
 - i. Provide hubless cast iron soil pipe and fittings conforming to ASTM A888 and Cast-Iron Soil Pipe Institute Standard 301 and so marked.

- ii. Joints in cast iron vent pipe shall be the same as specified for cast iron waste pipe below ground. Two band, no hub couplings are not permitted. Provide No-Hub couplings, meeting the requirements of FM 1680 Class 1, ASTM C1540, ASTM C564, IAPMO listed. 4 Band stainless steel clamps, 3/8-inch bolt heads, Type 304 stainless steel corrugated shield .015-inch thickness. Husky SD 4000 or equal, no known equal. Couplings to be torqued to manufacture specified values (80 ft lbs).
 - iii. Type DWV copper tubing shall be allowed with approval from the UCD representative. DWV copper is not allowed for laboratory venting.
- e. Condensate Drain Piping
- i. Inside and outside buildings provide ASTM B88, Type L copper tubing and fittings. Provide Wye fittings with capped cleanout plug for tubing up to 1 inch size. Provide wrought copper or cast DWV fittings for sizes 1-1/4 inch and larger. Drainage fittings may be used for condensate piping.
 - ii. Connect condensate drains to mechanical equipment per equipment manufacturers recommendations; provide P-trap where required. Slope piping to drain, with 1/8 inch per foot minimum pitch. Provide dielectric couplings at connections to dissimilar materials.
 - iii. Mechanical equipment on spring isolation rails or spring mounted curbs provided with threaded metal connector at mechanical equipment, Metraflex Model SST or BST, Unisource Mfg. Co. "V" connector, or equal, listed for the potential movement. Arrange flexible connection to ensure drainage of condensate under all installation conditions and arrange for support of flexible connection at end of the connector, to ensure alignment at all times.
 - iv. Where condensate drain P-traps are required, install trap using Wye fitting on inlet and outlet of trap. Provide cap on top of each Wye, made removable for cleaning and inspection. Drill 1/8-inch diameter hole in cap at outlet of the trap to allow venting of the system. Minimum depth of the trap shall be 4 inches, or as recommended by the manufacturer in printed literature.
 - v. Provide cleanout tees or "Wye" at each change in direction.
 - vi. Condensing-Type Equipment Condensate Drainpipe: CPVC pipe where allowed by jurisdiction and fittings conforming to ASTM 2618, stainless steel piping and cast stainless fittings.
 - vii. Provide continuous support for horizontal plastic piping.
 - viii. Piping and fittings shall be as manufactured by Spears Manufacturing, Charlotte Pipe, and Foundry Co., or equal.
- f. Sanitary Sewer Ejector
- i. General Requirements: Provide duplex sewage ejectors or duplex grinder ejectors. Coordinate with UCD. Provide general alarms to BAS for monitoring.
- g. Drip Pans
- i. Piping is not allowed to run above electrical rooms or IT rooms. Where existing conditions have piping above these rooms, provide drain pans as specified below and incorporate a moisture sensor connected to the BAS for alarming if wet conditions exist. Each drain pan shall have a 1" piped drain with a ball valve incorporating a hose connection and cap.
 - ii. Drip pans located directly below hydronic piping or similar sources of possible damage shall be provided to protect electrical and electronic work which is sensitive to moisture.
 - iii. Pans shall be 2" deep, extending a minimum of 10" beyond each edge of overhead piping for electrical work to be protected.
 - iv. Fabricate pans with 20-gauge galvanized steel, with rolled edges and reinforced for proper support, soldered fully watertight, and fitted with a copper drainpipe.
 - v. For drain pans that cannot be feasibly piped to a drain, provide moisture sensor and valve with hose connection per item 1 above.

J. FACILITY STORM DRAINAGE

22 14 00

1. General
 - a. The maximum allowable size for storm drains is 12 inches.
 - b. Provide daylight overflow drains to exterior with a cast bronze downspout nozzle that drips away from building (cow tongue). Provide NPT threaded connection only. “No hub” connection for outlets is not allowed. Size nozzle to match connected pipe. Overflow outlets located lower than 8 ft above grade shall be permanently labeled as an “overflow”.
 - c. If a pump is required, locate it outside of the building.
 - d. Do not drain outside building sub-soil drains to interior sump pumps.
 - e. Insulate all horizontal piping runs inside buildings for 25 feet to control condensation.
 - f. Roof and overflow drain piping shall not be combined.
 - g. Overflow drain piping shall be day-lighted through exterior wall, minimum 18-inches above grade, in a location that is readily visible.
 - h. Surface drains and building foundation drains shall be provided as necessary.
 - i. Size piping for rainfall rate of 3”/hr unless otherwise approved by UCD chief engineers.
2. Piping
 - a. Same as above sanitary sewage piping. Refer to Section 22 13 00 - Facility Sanitary Sewage.
3. Drains
 - a. Area Drain: Provide heel proof grate for public walk areas and traffic grate with locking clips & retained bolts for traffic areas.
 - b. Roof/Overflow Drain: Cast iron with flange, flashing ring, gravel stop, underdeck clamp, extension, sump receiver, 5-inch-high cast iron vandal proof dome type strained inlet and clamping collar.

K. PLUMBING EQUIPMENT

22 30 00

1. Domestic water treatment
 - a. At the beginning of a project that requires water treatment (new sterilizer, washes, deaerators, cooling towers, etc.) obtain water analysis by the UCD water treatment specialist (currently Evoqua) to determine the level of water treatment necessary for maintaining proper equipment performance. Provide necessary water softeners, deionizer system, reverse osmosis system, pressure boosters, etc. in accordance with water treatment specialist report. Water treatment systems shall have valved bypasses and flow meters.
2. Carbon filters
 - a. Performance Requirements
 - i. Equipped with an electro-mechanical metered valve.
 - ii. Filter shall be activated carbon and regenerated by a backwash cycle.
 - b. Products: Valve: Fleck, or equal.
3. Provide neutralizing basin for acid waste.
 - a. Furnish sufficient limestone chips in chunks 1 inch to 3 inches in size to fill the tank to within 2 inches of the outlet. Place this material in the tank at the completion of the work. Dwell time in the tanks is to be designed in accordance with ASPE standards of 2 ½ to 3 hours. Provide UCD staff training for limestone regular replenishment and inspection of basin. Replenishment is

generally 1 to 3 months but must be adjusted based on usage. Provide PH monitoring and BAS alarming when effluent is below allowable PH levels (generally 5.5 PH is accepted, verify with local jurisdictions). Chemical caustic dosing systems may be utilized for larger systems. All materials are to be acid resistant. Point of use neutralization is acceptable where the neutralization quantity of fixtures is small. Point of use neutralization does not require PH monitoring unless necessary by the authority having jurisdiction (AHJ).

4. Commercial Electric Water Heaters

- a. Provide commercial electric water heaters that comply with ASHRAE 90.1 for energy efficiency with UL listing.
- b. UCD is moving away from gas water heaters where possible. Consideration shall be given to heat pump water heaters.
- c. Provide the following accessories.
 - i. Brass or bronze drain valve
 - ii. 3/4-inch minimum temperature and pressure relief valve
 - iii. Thermometer
 - iv. Expansion tank
 - v. Electronic mixing valve connected for BAS.

5. Instantaneous Point-of-Use Electric Water Heaters

- a. Cabinet mounted stainless steel electric heating style. Flow switch activated, UL listed, 150 PSI rated.
- b. Point-Of-Use instantaneous electric water heaters shall be used for remote located fixtures or at fixtures with limited use.
- c. Identify in plans fixture gpm and water temperature rise.

6. In-line Domestic Hot Water Recirculation Pumps

- a. Provide in-line domestic water recirculation pumps to maintain design temperature of the domestic hot water supply throughout the building.
- b. Pumps shall be of the centrifugal type with non-overloading characteristics and shall not overload the motor above its nameplate horsepower rating under any operating condition. No allowance for service factor shall be used in pump selection.
 - i. Provide redundant pumps for hospitals and medical office buildings (MOBs).
 - ii. Size pump heads to accommodate constant flow balancing valves (higher pressure drop).
 - iii. Provide BAS timer function and aquastat for medical office buildings.
 - iv. Provide pump status to BAS for hospitals and medical office buildings.
 - v. Provide domestic hot water return temperature monitoring and alarm at the suction side of the circulating pump.

7. Concrete Grease Interceptors

- a. Furnish and install a concrete grease interceptor with minimum capacity as required by the AHJ. Provide manholes to grade for access to each section. Provide gastight cast-iron ring and cover at grade for each manhole. Provide effluent sample box where required by local jurisdiction.

8. Domestic Water Booster Pumps

- a. Provide skid mounted, centrifugal pumps with integrated control panel, alarms, and variable speed drives.
 - i. Provide variable speed booster systems. Do not utilize mechanical regulating valves except with UCD approval.

- ii. Ensure that Variable Frequency Drives (VFD) communicate with the Building Automation (BAS) and Control Networks. Provide pumps status and alarm to BAS.
 - iii. Motors shall be premium efficient. Provide shaft grounding.
 - iv. Provide hydro pneumatic tank for draw down at low flows.
 - v. Provide a minimum of 30 psi pressure at the highest floor.
 - vi. Provide bypass valving with check valve around domestic booster pump to allow for operation when booster pumps are out of service. Provide inlet and outlet isolation valves at the booster and at each pump.
 - vii. Consider future demands for the booster system in the Basis of Design. Coordinate with UCD representative for expansion projections.
 - viii. Provide a duplex system for MOB's with each pump able to accommodate 2/3rds of the total demand. The total performance of the system shall be a minimum of 115% of the demand with both pumps in operation. Each pump shall have an identical performance.
- b. Provide a triplex domestic booster pump system for hospitals. Size each pump to accommodate 75% of the total demand. The third pump is redundant. The total demand of any two pumps operating shall be a minimum of 130% of the demand. Each pump shall have identical in performance. List on design drawings the total calculated building demand and the pump performance requirements.
9. Sumps in Elevator Pits:
- a. Avoid adding a sump pump in an elevator pit unless required by the State or AHJ. Provide for a means of water removal from a temporary pump being inserted into the pit.

L. COMMERCIAL PLUMBING FIXTURES

22 42 00

1. General Requirements
- a. Comply with Cal Green water conservation flow rates.
 - b. Provide fixtures and trim listed here in this section. Alternate or special fixtures not listed shall be presented to the UCD representative for review and written approval.
 - c. Provide all water supplies to fixtures with shut-off stops with IPS inlets with threaded brass nipples at pipe connection and lock shield-loose key. Concealed stops as well as exposed stops are required to have lock shield and loose key.
 - d. Provide 3/8" risers for all sinks and lavatories. IPS supply flex risers can be compression type connector.
 - e. Fixtures not having integral traps shall be provided with "P" traps of chromium-plated brass connected to concealed waste in wall and sanitary fittings. Provide 17-gauge minimum traps and tailpieces.
 - f. Install wall-mounted vitreous china fixtures with concealed arm carrier with floor feet anchored securely to the floor.
 - g. Install wall-mounted urinals with carriers with floor feet anchored securely to the floor.
 - h. Bottle Filling Stations: Provide bottle filling station, one for each high/low drinking fountain.
 - i. Bottle filling stations shall be installed at an accessible height. The unit shall be lead-free; contain bayonet style, non-proprietary, built-in filtration system and shall include antimicrobial protection. Basin shall be designed to minimize splashing and standing water.
 - ii. Refrigerated units shall be provided if installed above the second floor or if piping passes through an unconditioned basement. Verify refrigeration requirements with the UCD representative.
2. Products: Fixtures shall be American Standard, Zurn, Kohler or an equal. Faucet shall be Chicago

HyTronic series, or equal. Appendix lists fixtures that have been preapproved by UCDH. Designer is encouraged to use these fixtures where they are applicable to the project. Designer is responsible for ensuring all fixtures used meet the project requirements, jurisdictional code requirements, and all handicap/barrier free requirements.

- a. Faucets serving lavatories in public and private restrooms shall be domestic made, with 0.5 gpm laminar flow restrictor. Provide with 120v plug-in sensor faucet. Battery operated sensor faucets may be used only with the university's approval. Provide faucets with thermostatic mixing valve with integrated check valves. All wiring below sink shall be neatly organized and coordinated with the electrician for placing the power source directly below the sink. All low voltage wiring shall be concealed behind raceways. Provide faucet with DC battery backup.
 - b. Faucets serving hand wash sinks shall be domestic made, gooseneck faucet with laminar flow 1.5 gpm restrictor. Provide with 120v plug-in sensor faucet. Battery operated sensor faucets may be used only with the university's approval. Provide faucets with thermostatic mixing valve with integrated check valves. All wiring below sink shall be neatly organized and coordinated with the electrician for placing the power source directly below the sink. All low voltage wiring shall be concealed behind raceways. Provide faucet with DC battery backup.
 - c. Electronic infrared 120v sensor faucets shall have DC battery backup or shall be on emergency power.
 - d. Except where specifically approved by PO&M, the use of turbine, self-generating power, sensor operated faucets are not allowed. The generating power fails when fixture is infrequently used.
 - e. Electronic infrared sensor flush valves shall operate on 120 volt power. Battery operated flush valves can only be used with PO&M approval.
3. Water Closet: Floor mounted. Vitreous china, top-spud, siphon jet, dual flush 1.6/1.1 GPF flush valve. Complete toilet assembly (bowl and flushometer) shall have a Maximum Performance (MaP) flush score of 1000 and be WaterSense labeled. Seat shall be self-sustaining with check hinge. Electronic infrared sensor flush valve 120v power. 1.1 GPF is not acceptable. ADA toilets shall be floor mounted due to bariatric patients.
 4. Water Closet: Wall hung, vitreous china, siphon jet action, Maximum Performance (MaP) score of 1000. Dual flush 1.6/1.1 GPF. Provide white, open front seat, less cover. Seat: White, heavy-duty, commercial type, elongated, open front, solid plastic, with self-sustaining stainless steel check hinge. Duco cast iron floor mounted carrier. Electronic infrared sensor flush valve 120v power. 1.1 GPF is not acceptable. Wall hung units shall be used in restrooms with multiple toilets. ADA toilets that are wall hung shall have a bariatric heavy duty wall carrier rated for 1000 lbs.
 5. Urinal (UR-1): Wall Hung, ADA compliant, vitreous china, top-spud, 0.125 GPF flush valve. Complete urinal assembly (urinal and flushometer) shall be WaterSense labeled. Electronic infrared sensor flush valve 120v power. Wall carrier with floor feet anchored securely to the floor.
 6. Lavatory (L-1): Under Mount vitreous china lavatory with electronic infrared Chicago HyTronic sensor faucet non-aerating (0.5 gpm), grid drain, 17-gauge seamless brass P-Trap less trap screw cleanout with chrome plated body, brass connection nuts, wall return and chrome plated wall escutcheon to match trap finish.
 - a. For handicapped applications use offset grid drain and insulate hot water and drain piping exposed below lavatory.
 - b. Provide Trubro or equal insulated protective covers for water and waste below the sink.
 - c. Provide thermostatic mixing valve with integrated check valves.
 7. Lavatory (L-2): Wall Hung, vitreous China lavatory with electronic infrared Chicago HyTronic sensor faucet non-aerating (0.5 gpm). Concealed arm support with carrier and floor feet secured to the floor, 17-gauge seamless brass P-Trap less trap screw cleanout with chrome plated body, brass

connection nuts, wall return and chrome plated wall escutcheon to match trap finish.

- a. For handicapped applications use offset grid drain and insulate hot water and drain piping exposed below lavatory.
 - b. Provide Trubro or equal insulated protective covers for water and waste below the sink or provide shroud over plumbing below the sink.
 - c. Provide thermostatic mixing valve with integrated check valves.
8. Mop Sink (MS): Floor mounted, terrazzo with faucet that includes vacuum breaker, wall support, integral check stops, 5' hose and hose bracket mounted with stainless steel. Where steam humidifiers discharge to the mop sink, provide 16-gauge stainless steel mop sink, in lieu of terrazzo.
 9. At rooms requiring a mop sink, install a hot and cold water stainless steel wall box with check valves for each supply line for the users' soap system. Supplies shall have a vacuum breaker. Final connection to soap filter will be by the Owner.
 10. Bottle Filler Stations: Elkay EZH20 System Cooler/Bottle Filling Station, Oasis Universal Barrier-Free VersaCooler II with VersaFiller, or equal, 115v, ADA compliant, sensor activated, filter.
 11. Hand Sink (Counter Mounted Exam Room Sink): 18-gauge, type 304 stainless steel sink counter mounted, single bowl, 19-inch by 18-inch by 5-½-inches deep. Deck mounted, 1.5 gpm faucet, Chicago HyTronic gooseneck, laminar flow faucet, discharge is a minimum of 7" above flood level, 17-gauge brass chrome plated 1-½-inch by 1-½-inch trap. Products: Just Manufacturing, Elkay, or equal.
 12. Ice Maker Cut Sink: Just Manufacturing, 18-gauge stainless steel drop in sink. Used for counter mounted ice makers. Coordinate with ice maker vendor to provide four feet to allow for drain piping to the cup sink.
 13. Break Room Sink Counter Mounted Drop In: 18-gauge, Type 304 stainless steel, single bowl, 22"x19-1/2"x5-1/2" deep, deck mounted, 1.5 gpm, manual Chicago faucet (no garbage disposal, no pull out heads), 17-gauge brass chrome plated 1-1/2"x1-1/2" trap, basket strainer. Product: Just Manufacturing, Elkay or equal.
 14. Laboratory Faucets: Deck-mounted, atmospheric vacuum breaker, gooseneck spout with replaceable stainless-steel seat. Faucet shall be fully assembled, and factory tested prior to shipment. Water Saver, Chicago, or equal. Coordinate with lab technician for specific requirements.
 - a. Shower Valve: Pressure balancing integrated, quarter turn stops. 36" grab bar, 60" stainless steel flex hose, outlet diverter, 1.5 gpm shower/1.5 gpm hand shower. Product: Simmons, or equal.
 - b. Laboratory Sinks, general purpose: Epoxy resin, under counter mount, chemical resistant. Faucet: Deck-mounted, gooseneck spout, replaceable stainless-steel seats, built in stops; self-closing for D.I. applications. Sink: Durcon, Orion, or equal. Chicago faucet, or equal.
 15. Laboratory Sinks Used for Dry Ice Disposal: Sink: 18-gauge, Type 304 stainless steel. Faucet: Deck-mounted, gooseneck spout, replaceable stainless-steel seats, built in stops. Products: Sink: Elkay, Just Manufacturing, or equal. Faucet: Chicago, or equal.

M. EMERGENCY PLUMBING FIXTURES

22 45 00

1. General

- a. Emergency eye or eye/facewash equipment shall be provided in all work areas where, during routine operations or foreseeable emergencies, the eyes of an employee may come in contact with a substance which can cause corrosion, severe irritation, or permanent tissue damage or which is toxic by absorption. Eyewash shall be provided if there shall be processes that produce flying particles, including sawdust, metal shavings, biological agents, etc. This equipment shall

meet the performance and installation requirements of American National Standards Institute (ANSI) Z358.1 1998 (*current version*). UC Davis Health's EH&S shall make final determination on selection of equipment to ensure the equipment meets this standard.

2. Emergency Eye Wash and Showers

a. The units shall be

- i. Supplied by domestic water.
- ii. Readily visible and accessible to the laboratory or work site. The unit shall be located as close to the hazard as possible and cannot be blocked by building structures, cabinets, supplies or equipment.
- iii. Provided with an activation device, such as stay open ball valve, that allows the user full movement of both hands after the valve is turned on.
- iv. Identified with a highly visible sign.
- v. Drain shall be plumbed to sanitary sewer.
- vi. Located so as not to pose an electrical shock hazard. No electrical outlets within 6 feet unless GFI protected.
- vii. Indoor units are not required to deliver tempered water unless water is 60oF or less. Units installed outdoors or in adverse climates shall be tempered. The need for tempered water shall be reviewed by the UCD representative and EH&S during the design phase.

3. Emergency Eye Wash

a. Emergency eye or eye/face wash units are Haws 7611 or Guardian G1805 (laboratory unit – install at sink), Haws 7000BT or Guardian G1750PT (Barrier Free), Haws 7656WC or Guardian GBF 1735DP (recessed), or equal.

b. In addition to the requirements above, the units shall be

- i. Regulated to provide a spray force of three to six gallons per minute at 30 psi.
- ii. Mounted such that the water nozzles are 33-inches to 45-inches from the floor level; and 17 to 25-inches from bowl edge, wall, or obstruction; height shall comply with Americans with Disabilities Act of 1990 (ADA) requirements and at least 34-inches of clearance around the eyewash must be maintained.
- iii. Mounted so that spray nozzles, when activated, are no more than 18 inches from the counter front when located above work counters or benches.
- iv. Drain shall be plumbed to sanitary sewer.
- v. For laboratory units installed at sinks, provide eyewash unit which swings spray head assembly over sink activating continuous flow of water.
- vi. For barrier Free units, provide wall-mounted, low-profile eyewash with plastic receptor and aluminum wall bracket.
- vii. For recessed units, provide swing down eyewash in a fully recessed wall mounted stainless steel cabinet with drain pan.
- viii. Provide Chicago Faucet eyewash at location that it is required to be an eyewash/faucet combo.

4. Emergency Showers

a. The unit shall be installed and located so both the shower and eyewash can be used at the same time by one person. Eyewash/emergency shower units are Haws 8346 or Guardian G1909 HFC (GBF1909 Barrier Free), Haws 8355WC (recessed), Guardian GBF2150 (recessed), or equal. Eyewash component shall meet the requirements for Emergency Eye Wash above. In addition to the requirements above, the units shall be:

- i. Adequately supplied with potable water to meet the requirements of each component. The shower shall be able to deliver a minimum of 30 gallons per minute. The diameter of the water pattern of the shower measured 60 inches above the surface on which the user

- stands shall be a minimum of 20-inches. The center of the spray pattern shall be located at least 16-inches from any obstruction.
- ii. Supplied by a minimum pipe size of 1-1/4 inch.
 - iii. Shower component activated yearly to verify proper operation.
 - iv. Emergency shower with integral eyewash unit is required if during routine operations there is a risk of a splash of corrosive or other skin hazardous material to the body.
 - v. Units shall be adequately supplied with potable water to meet the requirements of each component.
 - vi. Use of a floor drain is encouraged.
 - vii. A combination eyewash/emergency shower shall be located within a research laboratory using hazardous chemicals; or a combination eyewash/emergency shower may be located outside the laboratory provided an eyewash is located in the laboratory. The combination unit shall be located so that the travel distance is no more than 10 seconds or 55 feet with no obstructions and only one door to pass through to reach the unit.

N. MEDICAL GASES AND MECHANICAL VACUUM

22 63 13

1. Medical Gas equipment requirements shall be coordinated with the UCD representative during the design phase. Vacuum pumps and air compressors shall be installed on the ground floor. Provide acoustical evaluation for equipment located in hospital patient areas or other sensitive areas. Consider spring isolation even if the OSP does not cover spring isolation (coordinate with the project structural engineer.)
2. All piping shall be copper Type L ASTM B819 Med, Oxy labelled per NFPA 99.
3. All joints shall be brazed per NFPA 99. Lokring type joints are allowed for tie in locations in remodel areas.
4. All installation and testing shall be in accordance with NFPA 99.
5. Label all piping per NFPA 99.
6. Medical vacuum pumps shall be by Beacon Medaes, or equal, NFPA 99 compliant, oilless, BACNet connection to BMS.
7. Medical air compressors shall be by Beacon Medaes, or equal, NFPA 99 compliant, BACnet connection to BMS.
8. Medical gas outlets shall be Beacon Medaes, Series B (Geometric Index PB style). Ceiling outlets shall be Series B DISS key style.

O. CHEMICAL WASTE SYSTEMS FOR LABORATORY & HEALTHCARE FACILITIES

22 66 00

1. General
 - a. Coordinate with the local jurisdiction and the UCD representative if chemical drainage is required to pass through an acid-neutralizing tank before connection to the building sanitary sewer system. When an acid-neutralizing tank is required, specify a Ph sensor and a point to monitor through the Building Automation System (BAS).
2. Piping
 - a. Piping shall be Orion Watts PVDF chemical waste piping and fittings, joined with electro fusion joints or socket fusion joints by the same manufacture. Piping around the benches and equipment can have chemical waste no hub joints by Orion Watts. Compression fittings are not allowed. Verify compatibility of chemicals with piping materials. Alternate materials may be required for U.L. penetrations through rated walls and shafts.
3. Supports

- a. Horizontal PVDF piping shall have a continuous 16-gauge galvanized sheet metal trough support or maximum 48-inch support spacing system (or as otherwise required by the manufacture).
4. Fixtures
 - a. Chemical resistant lab sinks, Orion or equal.
 - b. Cup Sink: Polyethylene, oval with integral waste fitting, 1-½-inch with polypropylene or PVDF trap.

DESIGN CRITERIA FOR MECHANICAL**DIVISION 23**

1. Refer to Division 1 for substitution of products.
2. The project designer shall incorporate an exception to the Design Guidelines listing standards that cannot be adhered to and reasoning compliance cannot be met. Obtain approval of exceptions from UCD.
3. These guidelines are to be implemented into project designs. Where code or local jurisdiction conflicts with the guidelines, the codes shall govern.
4. Calculations and Sizing of Equipment: Use the most recent American Society of Heating, Refrigeration & Air Conditioning Engineers (ASHRAE) Climatic Data Region X, Zone 12 (Sacramento) to determine outside design conditions.
 - a. For 100 percent outside air systems: Review project criteria with UCD representative. The minimum outside air design temperature to be used is the 0.1% design dry bulb and coincident wet bulb (104oF DB/ 72oF WB) However, it shall be recognized that localized warming patterns are prevalent and 100% fresh air mechanical system can be dramatically impacted by higher ambient temperatures. Therefore, most 100% fresh air systems shall need a higher design temperature to maintain comfort and process loads. Provide recommended design temperature with explanation for the UCD campus engineer approval. The winter design temperature shall be selected as the ASHRAE Median of Extreme temperature (30oF).
 - b. For recirculating air systems: The minimum outside air design temperature to be used is the 0.1% design dry bulb and coincident wet bulb (104oF DB/ 72oF WB). The winter design temperature shall be selected as the ASHRAE Median of Extreme temperature (30oF). The 0.5% design dry bulb and MCWB shall be considered on a case-by-case basis with approval from UCD campus engineer.
 - c. Special consideration shall be given to environmental conditions for certain projects such as animal facilities, pathology laboratories, operating rooms, sterile processing departments, and sensitive areas (defined by the California Mechanical Code in Chapter 3) where maintaining temperature and humidity can be critical. The design shall be discussed with the UCD representative, with a default starting point of 107oF dry bulb for summer and 26oF for winter to ensure interior design conditions are maintained throughout unusual weather cycles.
 - d. Submit cooling and heating load calculation for each individual zone in the building's HVAC system and sizing data for all applicable proposed equipment such as air handling equipment, pumps, etc., by 50% completion of the design development phase. Calculations shall be performed using a standard HVAC load calculation program such as: Trane Trace, Carrier E20 or equal.
 - e. Size air handling systems with an additional 15% safety factor for cooling and 20% safety factor for heating. For buildings that shut down on weekends and/or holidays such as medical office buildings, the heating safety factor is expected to be increased and morning warmup cycles implemented. Special consideration shall be made for heating systems that are all electric and discharge temperatures are below 100oF. This condition requires a higher safety factor for improving morning warm up duration.
 - f. Size chillers with an additional 25% safety factor. Size boilers with an additional 25% safety factor. Safety factors listed are to be used as a guide. Provide description of proposed safety factors for UCD acceptance. There may be cases where safety factors need to be increased depending on the circumstance of the design and possible future expansions.
 - g. Safety factors shall be identified by the beginning of the Design Development phase and approved by UCD.
 - h. For interior temperature conditions (other than special use in the building), for hospital, research

facilities, medical office buildings and laboratory: 74oF degrees for cooling and 70oF degrees for heating.

- i. For all OSHPD/HCAi projects a mechanical system shall be designed to maintain the temperatures and humidity as listed in California Mechanical Code Chapter 4. For areas not listed, use ASHRAE standard 170- (current version) or best engineering practices. The California Mechanical Code identifies required temperature ranges that specific rooms should control to. Design shall incorporate being able to control to all temperature within this range. There shall be special considerations for rooms that may need control beyond these ranges based on vendor equipment requirements or based on specific procedures. Orthopedic surgery requires lower temperature rooms of 64oF due to their processes.
 - i. For cooling tower selection and evaporative condensing systems use the 0.1 percent design wet bulb conditions (74oF), based on 2022 Building Efficiency Standards Title 24 Part 6 Reference Appendices California Design Location Data Cooling 0.1%.
 - j. Internal heat loads.
 - i. Lighting: Per Title 24 but coordinate with electrical engineer for actual density. For remodels without alterations in lighting use actual density.
 - ii. Equipment: Per manufacturer's data or ASHRAE 2017 Fundamentals Latest edition, Ch.18.
 - iii. The following spaces are normally assumed to have no equipment load: Toilets, Locker Rooms, Showers, Corridors, Storage Rooms, Lobby.
 - iv. People: Per ASHRAE Fundamentals (current version), Ch. 18.
 - k. The building pressure shall be slightly positive to ambient but allow exterior doors to close automatically. For buildings under OSHPD/HCAi jurisdiction follow California Mechanical Code and California Building Code for accessibility.
5. General Noise Conditions
- a. HVAC system noise: Design all other areas within the NC standards recommended in the latest edition of ASHRAE Applications Handbook.
 - b. Minimize the number of penetrations due to all ducts and pipes through sound rated construction. Provide an airtight seal around the perimeter of all penetrations through rated construction using acoustical sealant. Avoid unnecessary penetrations into the conference rooms.
 - c. Lay out ductwork and diffusers to avoid crosstalk between rooms.
 - d. For mechanical rooms, incorporate spring isolation on equipment with excessive vibration. Discuss with UCD representative to provide acoustical engineering analysis where there is a probable reason to need additional noise and vibration protection.
6. Air distribution design: (Deviations from these criteria may be exercised as necessary for proper air balance and acoustic control. Discuss any deviations with the UCD representative).
- a. 425 cfm or more. Provide adjustable modular core diffusers. Double deflection grilles shall be used at sidewalls and in IT rooms to blow air downward. Ceiling return and exhaust grilles shall be perforated type. Diffusers, grilles and registers shall be selected and laid out so that air velocities at the occupied levels do not exceed 50 fpm.
 - b. Low pressure ductwork shall be sized for a friction rate of 0.08 inch/100 foot of duct and not exceeding 1200 fpm or as otherwise suggested by the sound consultant. The use of round ducts is encouraged if space allows it. All main distribution ductwork shall be sized to accommodate the air handlers' peak cooling air flow including the 15% safety factor. Velocities up to 1500 fpm are allowed for straight low-pressure ducts located in shafts.
 - c. Medium pressure ductwork shall be sized for velocities not exceeding 1750 fpm on main ducts

and a friction loss of 0.2 inch/100 foot of duct. Supply ductwork in existing shafts may have velocities up to 2000 fpm. Return ductwork in shafts is to have a maximum design velocity of 1600 fpm. Sizing considerations shall be given to conditions such as duct size with respect to distance to the fan. Long runs of ducting, back-to-back elbows, etc. may require enlarged duct sizing. Ductwork runouts from main supply duct to VAV or CAV boxes that are less than 10 feet long shall generally be one size larger than the box inlet size (i.e. 8" box shall have a 10" duct feeding the box). Medium pressure ductwork shall be used with approval from the UCD representative. Sound consultant may govern velocities.

- d. Terminal boxes shall be provided for up to 900 square feet of open space. Corner offices shall have independent boxes and control. Terminal boxes shall have rooms with similar exposures and similar use (i.e., west facing offices). Provide separate terminal boxes for large conference rooms. A maximum of 6 exam rooms may be on one terminal box. A maximum of 5 offices may be on one terminal box.
 - e. Provide sandwich style, gasketed removable access panel at each fire/smoke damper and at 100 ft intervals on return and exhaust ductwork to allow for duct cleaning. Label ceiling to identify duct access panel. Provide access panels adjacent to turning vanes on exhaust and return. Access doors are not necessary on supply ducting except where necessary to have access to fire dampers or other equipment. Sandwich style access doors are used due to their low/no leakage characteristics. Hinged access doors are only allowed where larger access to interior ductwork components is necessary (such as an FSD actuator inside the duct). Hinged access doors shall be equipped with a continuous hinge on one side and cam locks at 6" on center. Size of access door is to be large enough to provide easy access for removing/replacing devices and can be up to 22"x22". Access door must be fabricated for the duct pressure class.
 - f. MRI rooms wave guides are prone to having the return or exhaust air clogged with lint. Provide a 20% efficient filter for each return or exhaust wave guide grille. There shall be no ferrous metal for the grille and filter assembly.
7. Hydronic Distribution
- a. Pumps shall be selected for stable and efficient operation throughout the entire operating range, not only the peak design operating point.
 - b. Size piping for a maximum friction loss of up to 4.0 feet per 100 feet of pipe with the velocities not to exceed 5 fps in occupied area, 7.5 fps for main and large branches inside buildings, and 10 fps outside buildings at maximum flows. Velocities in pipes that can lead to erosion in pipes shall not be accepted. Certain piping has flow limits identified by the manufacturer (such as plastic piping). Follow max flow limitations where they are recommended. Friction rates shall take into consideration available pumping pressures on existing systems.
8. Outdoor refrigeration equipment, air handlers, and HVAC units require a hose bib and 115-volt electrical receptacle be installed to allow cleaning, service and maintenance. Non-freeze or insulated hose bibbs are required for project sites located in freezing conditions.
9. Metering
- a. All new buildings shall be designed for metering of thermal utilities. Meter shall report energy usage to BAS.
10. Thermal Comfort
- a. Comply with latest edition of ASHRAE Standard 55, Thermal Comfort Conditions for Human Occupancy.
11. Ventilation
- a. Outside air shall be provided according to California Mechanical Code, Title 24 Energy Code, and ASHRAE standard 62.1 "Ventilation for Acceptable Indoor Air Quality" (utilize the more stringent

of the three). The location of all air intakes shall be remote from any pollution sources and the building air intakes and exhaust shall be remotely located from each other to prevent contamination.

- b. For buildings falling under OSHPD/HCAi jurisdiction, the ventilation rates shall be set as per California Mechanical Code Table 4A and ASHRAE STD 170.
- c. Consideration shall be given to proximity of fresh air intakes to noxious odors that will travel further than the code requirement minimum clearances. This includes, but is not limited to, generator exhaust (monthly testing), fume exhaust, cooling tower air discharge, garbage containment areas, and chemical storage areas. In these cases, it may be necessary to increase intake distances significantly to the source of odors. Air scrubbing systems may also be considered.

12. Ventilation Monitoring

- a. Install permanent monitoring and alarm systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements in a form that affords operational adjustments:
 - i. For mechanical ventilation systems that predominantly serve densely occupied spaces install a CO₂ sensor within each densely occupied space per Title 24. This applies to buildings that must comply with Title 24.
 - ii. For all other mechanical ventilation systems, provide minimum outdoor airflow measurement system capable of measuring the minimum outdoor airflow rate at all expected system operating conditions. UC Davis Health has encountered maintenance difficulties with typical air measurement devices. Consult and review proposed airflow measurement device with UCD representative before specifying for a project.

13. Requirements for CO₂ Sensors when required by section above.

- a. To ensure that sensors can reliably indicate that ventilation systems are operating as designed:
 - i. CO₂ sensors shall be located within the breathing zone of the room as defined in the latest edition of ASHRAE Standard 62.1 and Title 24.
 - ii. CO₂ sensors shall be certified by the manufacturer to have an accuracy of no less than 75 ppm, factory calibrated or calibrated at start-up, and certified by the manufacturer to require calibration no more frequently than once every 5 years.
- b. A building automation system (BAS) alarm visible to the system operator/engineer.
- c. CO₂ sensors shall be used for demand-controlled ventilation. The control strategy shall comply with the latest edition of Standard 62.1 and Title 24 requirements.
 - i. Space CO₂ alarms and demand-controlled ventilation set points shall be based on the differential corresponding to the ventilation rates prescribed in Standard 62.
 - ii. When outdoor CO₂ concentration is not measured, refer to Title 24 for assumed concentration.

14. Coordinate with design team for creating a tight envelope which shall assist in obtaining room pressure differentials. This shall be done by gasketing doors, sealing penetrations, sealing conduits, providing gyp ceilings. Etc.

15. Ventilation Criteria for Laboratories and Similar Use Rooms

- a. Hazardous materials that are used or stored in Chemical, Biological, or Radiological Research and Teaching Laboratories require special ventilation.
- b. Room Ventilation
 - i. The laboratory ventilation rate is dependent on the hazards, heat, and/or odors to be

controlled. At no time during occupied periods shall the ventilation rate be less than 1 cfm/sf. The system shall be designed to reduce the ventilation rate during unoccupied periods by utilizing approved sensing technologies. Obtain approval from the UCD representative for any reduced ventilation for the type of use and hazards.

c. Room Pressurization and Containment

- i. Laboratories and storage areas shall be maintained negative relative to non-laboratory or storage areas (hallways, offices, conference rooms, etc.); a room offset value of 10 percent of the maximum air value to the room is recommended. This may need to be increased to control room pressure.
- ii. Animal facilities containing noninfectious animals/agents and that are located within mixed-use buildings, shall maintain room air pressure differentials so that room pressure is negative to all adjacent areas.
- iii. Positively pressurized laboratories may be necessary under defined circumstances, such as cell culture.
- iv. Special containment (ventilated storage cabinets, special local exhaust, etc.) may be required for extremely noxious operations (muffle furnaces, etc.), extremely odiferous materials (mercaptans, sulfur compounds, etc.), carcinogenic, radioactive, or infectious animals/agents.
- v. Toxic gases (arsine, phosphine, etc.) require ventilated cabinets with alarms.
- vi. Coordinate with design team for creating a tight envelope which shall assist in obtaining room pressure differentials. This shall be done by gasketing doors, sealing penetrations, sealing conduits, providing gyp ceilings, etc.

d. Exhaust

- i. The fume hood exhaust discharge location shall be a minimum of 10 feet above the finished roof with velocity in accordance with NFPA.
- ii. Special air cleaning devices may be required for some fume hood applications as required by the local jurisdiction. Consult the UCD representative for any special requirements.
- iii. Fume hood ducts may be ganged onto exhaust plenum w/ multiple fans, with the exception of hot-acid, radioactive, etc.
- iv. Ductwork shall be non-reactive, acid resistant and compatible with intended usage.

16. Telecommunication Rooms

- a. Temperature design of 74oF cooling; no heating; No Relative Humidity control unless directed by the UCD representative. See UC Davis Health's Telecommunication Standard for more details. 78oF setpoint may be used when room is unoccupied as sensed by an occupancy sensor.
- b. Provide air conditioning on a 24/7 basis for all IT rooms. A secondary source of cooling capable of handling the full cooling load may be required by the IT Dept. Coordinate with the IT Dept during the design phase for redundancy requirements. We encourage using a fan array house air system as a primary source of air conditioning through means of VAV/CAV boxes. The fan array generally provides the appropriate level of redundancy for most IT rooms in a hospital. Note that UCD chillers may not be available during cold ambient temperatures. Where this occurs ensure the air handling systems serving IT rooms are equipped with economizers. UCDH has standardized on supply air reset for air handlers. Due to this some air handlers can utilize up to 65oF supply air. Air quantities for rooms should reflect the altering supply air temperatures. Coordinate with PO&M during the design phase.
- c. For medical office buildings that shut down at evenings and nights provide a secondary source of cooling to become the lead air conditioning source during off hours. Do not utilize the main AC units during unoccupied hours to cool process rooms. Provide a VAV for the primary cooling of an MOB for occupied hours. The off hour source shall be DX.
- d. Air circulation within the room shall be discussed with the UCD representative during the design

phase. Consideration shall be given to hot isle/cold isle configuration.

- e. Internal load: Per IT department if information available or otherwise Per National Telecommunication Standard.
- f. Ductwork or piping not supporting equipment dedicated to the telecommunications room shall not be installed in, pass through, or enter the telecommunications room. Mechanical equipment shall not be installed directly above telecom equipment. Consideration of service clearance, access, and the potential of water damage from dripping or leaking equipment or piping shall be given. Wall mounted fan coils are not desired by UCD IT. Piping from condensate or pressure piping should not run above IT room.
- g. Provide monitoring and alarm status for each IT room. Alarm high room temperature and motor status for all fan coils.

17. Electrical and Mechanical Rooms

- a. Provide cooling to building electrical and mechanical rooms from the house air handling system for hospitals. Air handlers with a fan array generally provide the level of redundancy needed. Separate fan coils shall not be used for electrical or mechanical rooms. Non-hospital buildings that shut down their main AC units on weekends and nights should have Dx fan coils or unitary AC units to cool the electrical or mechanical rooms if they produce heat.

A. COMMON MOTOR REQUIREMENTS

23 05 13

1. General

- a. Combination magnetic starters shall have circuit breaker disconnects trip size of breaker as required for motor size, or equal.
- b. Motor starters shall be provided by the mechanical equipment supplier where they are readily available as a standard option. These motor starters shall be specified by the mechanical engineer and installed by the mechanical contractor.
- c. Where motor starters are not available from the equipment manufacturer, they shall be sized and specified by the electrical engineer and provided and installed by the electrician. The mechanical engineer is to coordinate and provide adequate information to the electrical engineer for sizing each motor starter.
- d. Where motor starters are to be included in a motor control center (MCC) they shall be specified by the electrical engineer and installed by the electrician. Mechanical engineer shall coordinate the motor sizes and full load amps with the electrical engineer.
- e. There may be conditions where a motor starter cannot be used due to seismic certification requirements. An OSP certified variable frequency drive (VFD) can be used as a substitution for any motor starter. When a VFD is provided for mechanical equipment, it shall be specified by the mechanical engineer, installed by the mechanical contractor, and wired to and from the device by the electrician.
- f. Coordinate BAS control of all motor starters and VFD's.
- g. Motors and VFDs furnished under Mechanical Work shall be installed under Electrical Work.
- h. Shaft grounding device manufacturer's specific installation literature, specifications, and recommendations shall be followed.
- i. Field installed shaft grounding systems shall be tested for proper conductive path to ground and shall pass manufacturer's published test procedure. Motor shall be grounded to the common earth ground with drive.
- j. All motors 1 HP and over that are used at least 1,000 hours per year shall be premium efficiency.

No shaded pole motors on fractional horsepower motors 1/20 HP and larger.

- k. ECM motors are not permitted except where specifically approved by the university representative.
 - l. Provide VFDs with 3 contactor bypass (not electronic bypass). VFDs shall have ultra-low harmonics (THD of 3% maximum). For fan arrays and direct drive motors provide redundant VFDs in lieu of a bypass. On large fan arrays provide multiple redundant VFDs (coordinate with the PO&M during design). Do not use micro VFD's (one for each fan in the array). Micro VFDs are prone to larger harmonics, and premature bearing failure Provide ABB ACH 580 ULH or equal.
2. Shaft Grounding
- a. Shaft grounding is required on all VFD assemblies with operating motors 5 HP and above. Provide shaft grounding systems manufactured by Aegis, SGS or equal. Provide factory installed shaft grounding devices, either by motor or equipment manufacturer. VFD driven motors shall be inverter-rated, premium efficient. Where shaft grounding is not recommended by the manufacturer (i.e. ceramic bearings on some fan wall systems) it may be omitted.
 - b. For field installed devices, consult the UCD representative for approval. If field installed devices are provided, they shall be installed by a certified representative of the equipment, motor, or shaft grounding device manufacturer.
 - c. Shaft grounding device manufacturer's specific installation literature, specifications, and recommendations shall be followed.
 - d. Shaft grounding systems shall be installed so that they are accessible for maintenance and inspection.
 - e. Field installed shaft grounding systems shall be tested for proper conductive path to ground and shall pass manufacturer's published test procedure. Motor shall be grounded to the common earth ground with drive.
 - f. If the motor is subject to contaminants, debris or moisture, special shaft ground systems and/or seals shall be required. Follow manufacturer's applicable recommendations.
 - g. For motors operating at 100 horsepower or more: Follow shaft ground manufacturer's recommendations. Often it is required by the manufacturer that two shaft grounding devices be installed.
 - h. Motor bearings shall be guaranteed from electrical bearing fluting damage during the motor warranty period. Motor or bearing(s) shall be replaced at no additional cost to UC Davis Health.

B. METERS AND GAGES FOR HVAC PIPING

23 05 19

1. General
 - a. All new buildings shall be designed for metering of thermal utilities integrated to Building Automation System (BAS). This includes, but is not limited to, heating water, chilled water, and steam.
2. Products
 - a. Thermometers
 - i. Bimetal helix or liquid-filled type, Weston, Marshal Town, or equal. All thermometers shall be 5-inch diameter round, stainless steel case construction with glass front and shall be accurate within plus or minus one of the smallest scale divisions throughout the entire range.
 - ii. Liquid thermometers for tanks and similar equipment shall have a minimum 5-inch diameter

- face. Thermometers for piping shall have a minimum face diameter of 5 inches and be liquid filled.
- iii. Thermometers used for air temperature in ductwork, plenum boxes, etc., shall have a minimum scale face of 5 inches and shall have an adjustable mounting flange.
- b. Pressure gauges shall be of high quality, with accuracy to be within 1% in the middle third of the dial range and equipped with front calibration. Gauges shall be liquid filled with pigtail and shut off. Minimum diameter of gauges shall be 4 inches.
 - i. Pumps shall use one gauge with separate valve isolation for suction and discharge.
 - ii. Provide pressure gauge at inlets and outlets of steam pressure reducing stations.
 - iii. Provide gauges at inlet and outlet of main equipment such as chillers and boilers.
 - iv. Provide gauge downstream of pressure reducing valves for hydronic make up water.
 - v. Provide Pete's plugs adjacent to gauge locations of hydronic systems.
 - c. Fluid Flow meters: Shall be magnetic full bore or insertion type. Manufacturer Onicon or equal.
 - d. Domestic cold water and irrigation shall be pulse flow measuring.
 - e. Steam energy meters shall measure LBS/HR.
 - f. Meters shall be non-resettable.

C. VIBRATION & SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT 23 05 48

1. Isolate all ventilating equipment connections including conduit, piping drains, etc., so that equipment will operate under continuous demand without objectionable vibration.
2. Support all fans on anti-vibration bases. Individual fans shall have integral fan and motor bases, spring type, unless otherwise noted.
3. Selection of the bases or supporting units shall be in accordance with the vibration eliminator manufacturer's recommendations. Smaller equipment may have 1-inch deflection such as small inline fans, larger equipment (chillers) shall have 3-inch deflection. Consult with vibration isolation manufacturer to control the equipment vibration. Where vibration isolation curbs and vibration spring isolation fans are both used on one system (i.e. large AC units) the spring deflection ratio shall be 1 to 3 or as otherwise recommended by the vibration isolation manufacturer.
4. Most fan array systems shall not require spring isolation. Some arrays with larger fans require spring isolation. Provide analysis and recommendation for fan arrays best practices to limit noise and vibration. Coordinate with UCD representative.

D. HVAC INSULATION 23 07 19

1. Pipe insulation materials
 - a. Calcium Silicate: Hydrous calcium silicate material with galvanized outer shield recommended for temperatures up to 1200°F. Applied per manufacturers recommendations. Provide at pipe hanger attachment locations where allowed.
 - b. Fiberglass Insulation: Fiberglass Heavy Density 25, Johns-Manville Microlok, Owen Corning Fiberglass, with ASJSSL jacket, or equal, with factory-applied, fire-retardant jacket and self-sealing laps, applied per manufacturers recommendations.
 - c. Meet the requirements of the California Energy Code and minimum requirements listed below, provide more stringent of the two.
2. Piping insulation:
 - a. Piping system equipment, pumps, valves, unions, couplings and other components: Insulate with removable formed insulated covers. Formed covers may be made from AP Armaflex sheet

insulation. Provide with PVC jacket indoors and aluminum jacket outdoors. PVC jackets shall match the UCD color standards.

- b. Chilled water and domestic cold-water valves installed in insulated piping lines shall have valve handle extensions to clear the insulation. Affix label for valve location and directional flow.
- c. Cover all insulation that is exposed to outdoors with aluminum jacket. Do not use PVC jacket covers outdoors.
- d. Cover all piping insulation that may be exposed to occupied rooms and mechanical rooms, etc. with 20 mil thick fire-retardant PVC jacket. The color must match the UCD standard. Request color chart from UCD representative. Covers in contact with piping or equipment surfaces that exceed 120oF shall have aluminum jacket.
- e. Insulate domestic cold-water piping when routing occurs through unconditioned spaces (e.g., mechanical room, sterilizer room, etc.) or through uninsulated soffits.
- f. Insulate domestic hot water system components and piping to maintain piping temperature throughout the system. Identify design temperature loss of the system for UCD approval.
- g. Isolation valves and balance valves on domestic hot water can be uninsulated.
- h. Provide insulation on piping systems and components which are subject to condensation.
- i. Provide insulated jacket for valves, manways, blind flanges, strainers, pressure reducing valves and equipment needing access. Insulated with silicone fiberglass cloth insulation flexible jacket with stainless steel lace up wiring, pins, washers and retention hooks, as manufactured by Unitherm International or equal. Thickness and specific finish is to be in acceptance with operating temperatures of the piping or equipment.
- j. Steam and Condensate Piping: Insulate steam and condensate piping with high temperature mineral fiber insulation with jacketing or fiberglass insulation with ASJ-SSL per manufacturer's recommendation. Provide insulation thickness and R value per the California Energy Code and Title 24.
- k. Steam Piping (251oF – 350oF) Minimum Insulation thickness reference:
 - i. Piping 3/4" and smaller: 3".
 - ii. Piping 1" to 1-1/4": 4".
 - iii. Piping 1-1/2" to 3": 4-1/2".
 - iv. Piping 4" to 8": 4-1/2".
- l. Heating hot water and chilled water piping: Insulate all heating hot water supply and return piping with 4 lb. nominal density fiberglass insulation. Provide insulation thickness and R value per the California Energy Code and Title 24.
 Heating hot water piping minimum insulation thickness reference:
 - i. Piping 1-1/4" and smaller: 1-1/2".
 - ii. Piping 1-1/2" and larger: 2".
 - iii. Chilled water piping minimum insulation thickness reference:
 - iv. Piping 1" and smaller: 1".
 - v. Piping 1-1/4" and larger: 1-1/2".
- m. Chilled water system equipment: Insulate equipment, including chilled water pump bodies, air separators, heat exchangers, tanks, etc.
 - i. Insulation shall be closed cell flexible insulation (Armacell or equal).
 - ii. Provide aluminum jacket for outdoor insulated equipment. Provide PVC jacket color coded per UCD standards for indoor equipment.
- n. Heating water system equipment: Insulate equipment, air separators, heat exchangers, tanks,

etc.

- i. Cover the hot water equipment with rigid fiberglass pipe and tank insulation with factory applied FRK or ASJ vapor seal systems operating below ambient temperatures or high temperature mineral fiber blocks, securely wired on. Provide PVC proto or aluminum jacketing over insulation. Owens Corning or equal.
 - ii. Valves: Insulate valves with “Isocover” insulation jacket. Covers are to be provided with stainless steel safety lace wire and stainless steel lacing hooks and washers. Insulation is form fitted and with insulation thickness suitable for system temperature.
- o. Refrigerant Piping Insulation.
- i. Consideration shall be given to temperature of refrigeration system to determine type of refrigerant pipe insulation. The California Energy Code shall apply and industry standard practices.
 - ii. Industrial piping and cold refrigerant lines: Use rigid molded fiberglass pipe insulation of appropriate wall thickness with white kraft paper reinforced with self-sealing longitudinal laps and butt strips. PVC jacket indoors, aluminum dimple jacket outdoors. No PVC jacketing outdoors.
 - iii. Standard refrigeration systems walk in boxes, remote condensing units, split systems: Use Armaflex closed cell insulation or equal. Minimum ½” wall thickness (40oF – 60oF) for medium and high temperature applications and minimum ¾” wall thickness for low temperature applications (below 40oF).
 - iv. Small split systems: Pre insulated “line sets” may be utilized with approval from UCD representative.
- p. Insulated Piping Outdoors.
- i. All pipe insulation and fittings exposed to the weather shall be protected with an aluminum jacket, no exceptions. PVC elbows are not permitted.
- q. Insulated Piping on Roof Protection from Damage.
- ii. Provide stepover bridges for insulated piping wider than 18” at locations where personnel may need to cross. Coordinate locations with the Architect.
3. Ductwork Insulation
- a. Manufacturers: CertainTeed Corporation, Johns-Manville Corporation, Owens-Corning Fiberglass Corporation, or equal.
 - b. All ductwork insulation to be exterior only. Wrap all supply and return ductwork and sound traps, unless with 1-½” thick, 1-pound density Fiberglass 100P, FSK faced, Johns-Manville, or equal. Where required by Title 24 or California Mechanical Code (CMC) provide additional insulation thickness to meet the authority having jurisdiction (AHJ) code required minimum R values. Medical office buildings can use acoustic lining only when approved by UCD.
 - c. For rectangular ducts exceeding 24” in width, provide mechanical fasteners on the bottom of duct at maximum spacing of 18” c.c. Fasteners shall be weld pins or clinch pins: adhesive type pins shall not be used.
 - d. Cover all ductwork that may be exposed to the mechanical rooms, with fiberglass, and protect with a sealant adhesive, Foster SEALFAS, Hardcast Flex-Grip, Childers Chil-Perm or equal.
 - e. Ductwork exposed to outdoors: Provide 2” thick (or as required by Title 24) closed cell elastomeric (AP Armaflex) insulation on the exterior of the ductwork or Polyisocyanurate insulation (Thermasheath-3). Provide Butyl backed hardcast foil grip at all joints of polyisocyanurate insulation. Provide galvanized painted sheet metal cover around the insulation. Where accepted by UCD provide aluminum jackets over all sides, top and bottom. Highly visible areas shall use galvanized painted jackets. Slope the top surface to avoid ponding at minimum



3/8" LF.

E. COMMISSIONING OF HVAC	23 08 00
1. Refer to UC Davis Health’s “Owner Project Requirements for Commissioning.”	
F. INSTRUMENTATION & CONTROL FOR HVAC	23 09 00
1. Additional Building Automation System (BAS) Integration:	
2. UCD requires systems integration and special considerations as described below. This is required on every new construction event. These integrations enable UCD to centralize alarming and monitoring of key facility systems. All integrations shall be BACnet with a manufacture provided gateway. In the event a gateway is not an equipment feature - engineer shall coordinate with Johnson Controls Inc. (JCI) for alternate protocol integration (modbus) or dry contact status monitoring. All integrations shall have a dedicated floor plan graphic providing device locations and using color identify alarms/alerts.	

Integration Type	Description	Integration Use case
Indoor/Outdoor Air Quality	Provide CO2, PM2.5, PM10.0, VOC, Temp/Humid, Ozone	Provide one outdoor unique to each building and one on each floor public waiting area and one on each floor staff hallway in back of house. Change ventilation requirements based on outdoor and indoor air quality (i.e., wildfire smoke mode) to improve indoor air quality for staff and patients.
Refer Monitoring	Monitor Temp and Freezers	Trend, Alarm and Report Fridge Data for Compliance. Leverage manufacture provided temperature outputs where available, otherwise provide Temp Sensor in Glycol Bottle. Includes patient related fridges/freezers that hold drugs or other medical items (does not include fridges for popsicles or patient food) (this system is not intended for Validation, just monitoring trending and alarming). Integrate with Aeroscout vendor for all food and nutrition monitoring. All else shall be Aeroscout and Johnson Controls Metasys.
Weather Station	Ambient Light, Outdoor Temp, Humidity, CO2	This station shall be secondary to the weather data provided at the CUP for control SOO's.
ATS Integration	Integration of ATS	Metasys to provide Modbus to BACnet gateway to provide Full integration of ATS system to show use data and provide remote enable/disable.
Generator Integration	Integration of Generator	Metasys to provide Modbus to BACnet gateway to provide full integration of generator. Provide alarm, fault, fuel tank level, run hour information via this gateway.
OR Scheduling	Integrate to OR Scheduling Software	Change HVAC SOO based on what type of surgery is scheduled (optimal start/setback/temp/humidity set points). The goal is to automatically adjust ORs for specific procedures and to put into setback (temperature and airflow) if an OR is unscheduled.
OR Environment Display	Provide 7" Loytech Display with Environment Data	Provide touch screen display to show temperature, humidity, temperature adjust, pressure relationships and if integrated - type of surgery via the OR schedule integration. Work with MEOR to show OR ready status for temperature, airflow, pressure.
Critical Room Pressure	Display Screen with Visual and Cancellable Audible Alarm Monitors shall be standardized on TSI RPM 20 series.	Provide room pressure monitoring of critical rooms: USP Pharmacies, Sterile Processing rooms, isolation rooms, Operating rooms, soiled utility rooms (negative pressure), and other sensitive areas required by UCD. Integrate alarm with Metasys. Provide door contacts.
Alarm/Intrusion	Integrate to Intrusion System	Simple integration to monitor Armed and Disarmed status of Alarm system. When Armed, HVAC should be off (unless local override).

Integration Type	Description	Integration Use case
Indoor Lighting	Integrate to Lighting System	Provide BACnet IP integration to lighting controls system. Lighting system to provide main/daily/dimming control of lights. BAS to provide lighting system on/off schedules to sync with HVAC schedule (same schedule). Exception schedules and overrides in the HVAC shall similarly override in lighting (in addition to integral lighting system overrides). Outdoor lighting to have simple schedule and status control via Metasys. Additionally - leverage lighting system occupancy sensors for occupied standby sequences during normal hours.
Outdoor Lighting	Integrate to Lighting System	Provide BACnet IP integration to outdoor lighting to have simple schedule and status control via Metasys.
Motorized Shade System	Integrate to Shade System	Integrate to Shade System to provide locations, alarm and shade position displayed in Metasys. Sync enable/disable/override/schedule control with HVAC system - for example when HVAC is unoccupied close shades. Daily control of shades to be in Shade Control system with override and schedule synchronization via Metasys.
Nurse Call	Integrate to Nurse Call System	Leverage Nurse Call system to provide in-bed patients ability to Adjust Temp, Lighting, Shade Position from Nurse Call system.
KW Meters	Integrate into the KW Meter System	Div 26 to provide single BACnet IP connection for all KW metering in building. Metasys to report and visualize data in user interface.
G36 SOO	Energy Improvements	<p>UCD wants to continue to improve the energy efficiency of their buildings. Please provide trim and response logic on:</p> <ul style="list-style-type: none"> • CHW and HW Temperature/Pressure setpoints • AHU DAT temp and DP setpoints <p>Please provide faulting/alerting on VAV boxes per 5.6.6 in G36 2021 for low airflow, low DAT, airflow sensor calibration, leaking damper and leaking valve.</p>
Medical Gas	Monitor Med Gas Alarms	Metasys to monitor ALL medical gases in the building. Div 22 contractor to provide appropriate level of monitoring (locations/qty of pressure transducers) with integration to Metasys. Metasys to additionally monitor gas switchover manifolds for switch to reserve tanks and any bulk storage tanks. Provide BACnet integrations to Medical Air and Medical Vacuum Skids.

Integration Type	Description	Integration Use case
BTU Meter Summary	Provide unique to each system load	Provide BTU meter on HW and CHW unique to each system load (not device load). IE - if there is a CHW system with both cooling for HVAC and process systems, provide a BTU meter on each system loop to provide total CHW BTU.
Water Meter Summary	Water Meters	Provide water meters for the below feeds. Meter may be provided by Div 22 monitored by Metasys. <ul style="list-style-type: none"> • Irrigation • Domestic Water • Domestic Hot Water
Miscellaneous Plumbing Systems	Additional Plumbing Systems	Monitor and Alert to the following additional plumbing systems: Domestic Booster Pump Skids <ul style="list-style-type: none"> • RO/DI Water Skids • Domestic HW systems (supply temp and interlock to pumps) • Sump Pumps • Water Treatment Systems • Water Filtration Systems • Water Softeners
Fire Alarm System Integration	Status of FLS	Provide a status/monitoring only (no control) of the FLS system. Leverage a BACnet integration to get system info and alarms. Provide graphics for floor plan layout with locations of FSDs and smoke detectors. Use FLS contractor shop drawings to generate floor plan graphics. Alert for afterhours incident at OWS.
FSD Monitoring	Open/Close	JCI to have Metasys Directly Monitor FSD open/close status and display on floor plan graphic. Where building is existing without BM integration, monitoring through the fire alarm system can be utilized.
Solar PV Integration	Monitor Status of PV System	Provide BACnet integration to PV controller to monitor system status, alerts and totalization of KW produced.

G. HYDRONIC PIPING AND PUMPS

23 21 00

1. System Design

- a. For the hospital campus, differential pressure shall be verified at point of connection. Coordinate with UCD representative for available pressures on the Sacramento Hospital Campus. For buildings where the secondary loop cannot provide the necessary pressure to overcome the pressure drop across the new building piping system, a tertiary pump must be used to maintain adequate pressure. Unless otherwise directed by the UCD representative, consider chilled water supply temperature 43oF and hot water from the central plant 220oF. The future campus setpoint shall be as low as 120oF. Coordinate design temperatures to accommodate resetting of the heating loop to a lower temperature. The exact temperature has not been identified and a design approach shall be discussed with UCD. The design temperature shall be different for remodels vs new building construction. Heat exchangers shall be provided for all floors above the 8th floor of a building for chilled water and 6th floor for heating water. All loads at or below the listed floors shall be directly connected to the central plant hydronic system without a secondary loop.

- b. Coordinate with the existing tertiary pipe arrangement whether serial pumping or provide a blending loop. Unless otherwise directed by the UCD representative, consider chilled water supply temperature 43oF and hot water from the central plant 220oF.
 - c. Provide BTU meter integrated with the BAS controls on the CHW and HW supply on the loop.
 - d. Provide full size by-pass with check valve around tertiary CHW pumps for first stage cooling.
 - e. Provide two tertiary CHW pumps each sized for 100 percent max flow requirement. Pumps to have variable frequency drives (VFDs).
 - f. Provide two tertiary HHW pumps each sized for 100 percent max flow requirement. Pumps to have VFDs.
 - g. Shaft grounding is required on VFD driven pump motors. Refer to Section 22 05 13 Common Motor Requirements.
 - h. For hydronic systems where variable water volume (VWV) is used, provide the following:
 - i. Install modulating valves with tight shut-off rated to close against a differential pressure of 1-1/2 times pump head.
 - j. Locate differential pressure sensor at hydraulically most remote coil. Wire directly back to the central plant pumping system. A minimum of one per building is required.
 - k. If hydraulically most remote coil is variable, provide multiple differential pressure sensors and use a low signal selector to send proper signal to variable frequency drive.
 - l. Three-way valves shall be minimized: Limit total bypass gpm through 3-way by installing balance valve in the bypass of all 3-way valves. Use 3-way valves to maintain minimum required VFD speeds. Use 3-way valves at end of runs to maintain heating loop temperatures to minimize thermal cycling of heating loops. Approximate pump turndown is expected to be 25% of the total flow. (Coordinate minimum speed to maintain motor cooling with motor manufacture).
 - m. In coil schedule, identify the control valve Cv value. Target CV is 2-5 psi drop at the design flow.
2. Piping, Joints and Fittings for Chilled and Heating Water
- a. Below grade: Schedule 40 steel, welded, flanged.
 - b. Above ground: Black steel welded, ASTM A53 or ASTM A106, flanged or screwed fittings. Type L copper tubing 4 inches or smaller and type K copper tubing 5 inches and larger are also acceptable. Copper tubing joints of all sizes shall be brazed with silver solder 1100oF. Provide CTS flanges for copper connections to flanged piping. Facility has numerous failures at joints – all sizes are to be brazed.
 - c. Mechanical grooved couplings are allowed on chilled water systems in mechanical rooms only. Mechanical grooved couplings are not allowed on heating hot water systems. Provide 50-year warranty on grooved couplings.
 - d. Underground direct-buried chilled water and heating hot water piping shall be factory pre-insulated Schedule 40 carbon steel, ASTM A-53, Grade B., ERW (Type E) or seamless (Type S), standard weight for sizes 2" and larger, and shall be ASTM A-106, Grade B, standard weight for sizes 1-1/2" and smaller (Std. Wt. is the same as Sch. 40 through 10"). All carbon steel pipes shall have ends cut square and beveled for butt-welding. Straight sections of factory insulated pipe shall have 6" of exposed pipe at each end for field joint fabrication. Underground piping systems shall be pre-engineered. Factory shall provide piping stress calculations and expansion and contraction compensation provisions, utilizing factory prefabricated and pre-insulated expansion elbows, Z-bends, expansion loops, and anchors specifically designed for the intended application. Provide a leak detection system.
 - i. Underground chilled water piping insulation shall be 90% closed cell polyurethane with a

minimum 2.0 lbs. per cubic foot density, compressive strength of 30 psi @ 75°F, and coefficient of thermal conductivity (K-Factor) of not higher than 0.16 @ 75°F per ASTM C-518. Jacketing shall be extruded, black, high-density polyethylene (HDPE), having a minimum wall thickness not less than 100 mils for pipe sizes less than or equal to 12", 125 mils for jacket sizes larger than 12" to 24". Chilled water factory pre-insulated pre-engineered piping systems shall be Ferro-Therm by Thermacor Process, L.P., of Fort Worth, Texas or equal.

- ii. Underground heating hot water piping insulation shall be suitable for carrying an absolute minimum of 300°F heating hot water at a minimum 150psi. Insulation shall be polyisocyanurate foam insulation bonded to both the jacketing and carrier pipe with a minimum thickness of 2-1/2" for systems operating at or below 300°F. Insulation shall be rigid, 85% closed cell foam insulation with not less than 2.4 pounds per cubic foot density, having a compressive strength of not less than 30 psi @ 75°F and a coefficient of thermal conductivity (K-Factor) not higher than 0.17 @ 75°F and 0.30 @ 300°F. The maximum operating temperature of the system shall not exceed 300°F. Polyurethane foam insulation shall NOT be acceptable for heating hot water piping. Furnish a complete HDPE jacketed system of factory pre-insulated steel piping for the specified service. The jacket throughout the entire system shall incorporate electric fusion, butt fusion, or extrusion welding at all fittings, joint closures, or other points of connection. All pre-insulated pipes, fittings, insulating materials, and technical support shall be provided by the Pre-insulated Piping System manufacturer. Factory pre-insulated pre-engineered piping system for underground heating hot water shall be HT-406, manufactured by Thermacor Process, L.P., of Fort Worth, Texas or equal.
- iii. Provide manufacturer's shop drawings with dimensioned piping layout and details of all expansion loops, Tee joints, elbows, anchor points, building and/or manhole entry points and all other pertinent information.
- iv. Underground systems shall be buried in a trench not less than 2-feet deeper than the top of the pipe and not less than 18-inches wider than the combined O.D. of all piping systems. A minimum thickness of 24 inches, unless specified otherwise elsewhere, of compacted backfill over the top of the pipe shall meet H-20 highway loading.
- v. Piping systems shall be cleaned, flushed and water treated to the satisfaction of the University. The cleaning and flushing are to be overseen by a water treatment specialist (company specializing in water treatment such as EAI Water. They shall provide all cleaning chemicals and provide identification of required duration and velocity of cleaning agent in a complete submittal. Contractor shall provide means of circulation of the piping including bypasses, valves, and the like to perform cleaning to the water treatment specialist's criteria. Coordinate with University for providing a final water treatment that matches the existing campus closed loop treatment. Utilize the campus water treatment supplier for final chemical requirement.
- vi. Valves: Heating Hot Water (HHW) full ported pre-insulated ball valves and Chilled Water (CHW) full ported, flanged valves suitable for direct buried in the ground. Shut off valves on CHW shall be butterfly type. All valves shall be flanged. Valves installed in insulated piping lines shall have valve handle extensions to clear the insulation. All underground valves shall be pre-insulated. Valves and valve operator stem to the surface shall be fully protected from exposure to soil. Shut-off valves shall be provided local to the point of connection to the main HHW and CHW loops and at the point of connection to the building. Isolation valve located below ground shall be direct buried in the ground with sleeve to the surface to allow for operation of the valve. Valve insulation shall match the piping system insulation and outer jacketing shall be High Density Polyethylene. Refer to other sections of this specification for additional valve requirements. Do not use quarter turn isolation valves on piping greater than 4" pipe size below grade. Provide 250 psi WP gate valves for piping greater than 4".

3. Shut Off Valves

- a. Threaded or flanged, two-piece, bronze body, full port, ball valves, with stainless steel ball and stem, for isolation/shut off valves. Isolation valves shall be provided for all heating and cooling control valves, strainers, and coils. Chilled water valves shall have an extended stem to allow for insulation thickness to be continuous around the stem.
- b. Balance valves shall not be substituted for isolation valves. Design criteria for balance valves shall be based on best practices for optimal location to facilitate maintenance without compromising building operations and shall include the following minimums: one for each floor, one at each terminal unit. If piping kits are provided at terminal units, separate isolation valves are required to allow complete removal and replacement.
- c. Butterfly Valves: Nibco, or equal. Provide lug body on valves located adjacent to equipment. All valves shall have EPDM seats with aluminum bronze disc and throttling handle with memory stop. Furnish flow performance curve for each valve. EPDM seats are acceptable up to 180oF hydronic systems (secondary loops after heat exchangers in the buildings). Provide gear operators handles, for valve sizes 8" and larger, for shut-off service, and infinite position throttling handles with indicator plates for balancing service. All valves on heating water system from the central plant loop (primary loop) shall be rated for water 250°F or higher (campus heating water can be 200-220oF). Heating water valves shall be Nibco LCS6822 high performance, 400oF, Teflon seat, Class 150.
- d. All building shut-off valves from Central Plant distribution system shall be Class 150 stainless steel body flanged ball valves, Nibco or equal (Model F-515-S6, full port, 275 psi WP @ 330oF, available in ½" to 4" size. For piping larger than 4" provide 250 psi WP gate valve. Provide building shut off valves with valve box (or equal) and max 36" below grade.
 - i. Provide valves with operator nut with tee handle and 6-inch diameter PVC sleeve/access cover only where approved by UCD. Deep valves accessed in this manner are discouraged. If sleeves are allowed by PO&M, provide permanent label mechanically fastened on sleeve as to the type of valve (i.e., gate, butterfly).
 - ii. Underground valves shall be identified with GPS coordinates. Coordinate with PO&M.
 - iii. Valves below 36" deep shall be installed in a vault. Valves within 36" of the grade shall be installed within a valve box. Identify valve box cover with welded description of fluids.
- e. Provide butterfly control valves at building entrance to allow chilled and heating water to be isolated through the BAS (supply and return). Valves shall be inside the building, accessible.
- f. All equipment branch lines shall have shut-off valves at branch connection.
- g. Shut off valves on heating and chilled water shall be ball valves thru 2" and butterfly 2-½" and up. Valves serving the building from the central plant are ball valves as listed above up to 4" in size and gate valves larger than 4" diameter.
- h. Locate valves to be accessible. All branches from vertical risers shall have shut off valves.
- i. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward from horizontal plane.
- j. Install isolation valves on each side (supply and return) of heating, chilled, and reheat coils to allow for coil replacement.
 - i. If piping upstream of the valves is in the way of coil replacement install main isolation valves in the entrance of the mechanical room.
- k. All strainers shall be cleaned after the project has gone through pipe cleaning and start up.

4. Water Treatment

- a. Any project that uses more than 50 gallons of hydronic water in the remodel or in new work must

import and inject chemically treated water matching the campus chemical composition. Remodels or new projects with less than 50 gallons of hydronic water can use the campus hydronic fluid for make-up water.

- i. Provide services from a water treatment specialist (EAI Water) and identify pipe cleaning agent, circulation duration, and circulation velocities. EAI currently manages closed loop systems in the hospital. Provide all necessary testing, analysis, and chemicals to be compatible with the campus loops to control biocide and corrosion.
5. Labeling of Piping and Ceiling
 - a. Provide pipe labelling in every room and at 20 feet on center.
 - b. Provide direction of flow at each label. Provide identification of piping content at each valve and direction of flow at each valve. Provide numbering of each valve coordinated with PO&M.
 - c. Provide label for each valve and each piece of equipment above the ceiling. Labels shall be permanently adhered to the ceiling grid or access door. Labels shall be plastic engraved, white background with black letters. Letter size shall be 1/2".

H. STEAM AND CONDENSATE

23 22 00

1. System Design
 - a. Size steam pipe and steam condensate flows per good engineering practices and allow for future system expansion. If steam is run through building, engineer to calculate requirements for expansion loop and design support. Designs are to minimize water hammer by ensuring sloping piping is in the direction of flow.
2. Piping, Joints and Fittings
 - b. High Pressure Steam Piping, Above Ground.
 - Steel Pipe: ASTM A53 or A106, Schedule 80, black.
 - Fittings: ASTM B16.3, malleable iron Class 250, or ASTM A234 forged steel welding type, Class 3000.
 - Joints: Screwed, or AWS D1.1 welded.
 - c. Low Pressure Steam Piping, Above Grade.
 - Steel Pipe: ASTM A53 or A106, Schedule 40, black.
 - Fittings: ASTM B16.3, malleable iron Class 125, or ASTM A234, forged steel Class 125.
 - Joints: Screwed, or AWS D1.1, welded.
 - d. High Pressure Steam Condensate Piping Buried.
 - e. High Pressure Steam Condensate Piping, Above Ground.
 - Steel Pipe: ASTM A53 or A106, Schedule 80, black.
 - Fittings: ASTM B16.3, malleable iron Class 125, or ASTM A234, forged steel Class 125.
 - Joints: Screwed, or AWS D1.1, welded.
 - f. Low Pressure Steam Condensate Piping Buried.
 - g. Low Pressure Steam Condensate Piping, Boiler Feedwater Piping Above Grade.
 - Steel Pipe: ASTM A53 or A106, Schedule 80, black.
 - Fittings: ASTM B16.3, malleable iron Class 125, or ASTM A234, forged steel Class 125.
 - Joints: Screwed, or AWS D1.1, welded.

- h. Piping connected to low pressure stand along canister style humidifiers may utilize copper Type “L” ASTM B88 for steam and condensate where recommended by the steam generator manufacture.
3. Buried Steam and Steam Condensate:
- a. Pre-insulated Piping – Factory pre-insulated steel piping. the system shall be a combination of a drainable, dryable, testable type conduit system, suitable for all ground water and soil conditions, site Classification “A” (Federal Construction Guide Spec. 02695), with an external covering of polyurethane insulation and a high-density polyethylene (HDPE) jacket.
 - b. The pre-insulated pipe manufacturer shall make a complete layout of the system showing anchors, expansion provisions, and building entrance details. Means for expansion must be made in pipe offsets or loops unless this is compensated for integrally in the system.
 - c. The conduit shall be 10 gauge, welded, smooth-wall black steel conforming to ASTM A-139, A-134, and A-135. Conduit shall be tested at the factor to ensure air and watertight welds prior to any fabrication or application of coating. No internal coating of conduit.
 - d. Conduit closures shall be 10-gauge steel, furnished with the conduit at a ratio of one closure for each fabricated item or length. Closures shall be field welded over adjacent units after pipe insulation.
 - e. Piping in the conduit shall be standard weight (Std. Wt. is the same as Sch. 40 through 10”), steel, ASTM A-53, Grade B, ERW 2” and larger and A-106 Smls for 1-1/2” and smaller. Steam lines shall be standard weight, and condensate lines shall be extra strong (XS is the same as Sch. 80 through 8”). Pipe joints shall be welded in accordance with the Pressure Piping Code, ASME/ANSI B 31.1.
 - f. The Class “A” pipe insulation shall be mineral wool applied to the R-Value and thickness as required by the California Energy Code and as required to control proper heat loss at possible operating pressures/ temperatures.
 - g. Prefabricated ells, loops, and tees shall be furnished and installed and shall consist of pipe, insulation, and conduit conforming to the same specification as hereinbefore stated for straight runs. Expansion loops shall be designed in accordance with the stress limits as dictated by the Power Piping Code, ASME/ANSI B31.1. Loop piping shall be installed in conduit suitably sized to handle indicated pipe movement. Elbows, loops, offsets, or any other direction changes shall conform to the standards set by ASME B31.1, Code for Power Piping.
 - h. The steel conduit for the steam and condensate shall be insulated with polyurethane foam insulation to a nominal thickness of 1”. Insulation shall be rigid, minimum 90% closed cell polyurethane with a minimum 2.0 lbs per cubic foot density, compressive strength of 30 psi @ 75oF, and a coefficient of thermal conductivity (K factor) not higher than .17 @ 75oF per ASTM C518. Maximum conduit interface temperature shall not exceed 200oF.
 - i. Jacketing material shall be extruded, black, HDPE, having a minimum wall thickness of 125 mils for jacket sizes less than or equal to 12”, 150 mils for jacket sizes larger than 12” to 20”, and 175 mils for jacket sizes greater than 20”. The inner surface of the HDPE jacket shall be oxidized by means of corona treatment, flame treatment (patent pending), or other approved methods. This will ensure a secure bond between the jacket and foam insulation preventing any ingress of water at the jacket/foam interface.
 - j. Straight run joints are insulated using a wraparound HDPE jacket placed over the field joint and insulated with polyurethane foam. The HDPE jacket is sealed with a heat shrink sleeve, as recommended by the manufacturer.
 - k. Conduit fittings are factory prefabricated and pre-insulated with urethane to the thickness specified and jacketed with a molded, extrusion welded, or butt fusion welded PE jacket. No

taping or hot air welding shall be allowed.

- l. Underground systems shall be buried in a trench not less than 2-feet deeper than the top of the pipe and not less than eighteen inches wider than the combined O.D. of all piping systems. A minimum thickness of 24 inches of compacted backfill placed over the top of the pipe shall meet H-20 highway loading.
 - m. Trench bottom shall have a minimum of 6" of sand as a cushion for the piping. All field cutting of the pipe shall be performed in accordance with the manufacturer's installation instructions.
 - n. The system shall be Duo-Therm "505" as manufactured by Thermacor Process Inc. of Fort Worth, Texas or equal.
4. Valves
 - a. All low-pressure steam (below 50 psi) shall have valves rated for a minimum of 300 psi @ 300oF.
 - b. High pressure steam (above 50 psi) shall have Class 800 valves.
 5. Pressure Reducing Valves and Regulators
 - a. Steam pressure shall be reduced from the high-pressure distribution system in two stages, the first being a reduction to 65 psi (adjustable) and the second to 15 psi. Each stage shall have two pilot operated pressure regulating valves piped in parallel. The sizing of step-down regulators is 2/3 and 1/3 of the total design flow. The design flow shall incorporate safety factors appropriate for the project. Consideration is to be made for future demand changes.
 6. Support
 - a. Pipe supports shall have calcium silicate or equivalent rigid insulation blocks with galvanized covers. Provide pipe rollers, pipe alignment guides, and pipe protection saddles (rigid bottom rib such as Bline B3100 series) where necessary to allow for expansion and contraction.
 7. Steam Traps
 - a. Campus is using BAS monitored steam traps in some areas such as outside the building footprint in vaults. Coordinate with UCD BAS specialist for areas where this is required. Otherwise follow industry standards for types of traps. UCD campus preference is Spirax Sarco and TLV.
 - b. Where integrated BAS traps are not used, provide monitoring of temperature sensors strapped on condensate lines entering and leaving the steam trap. Provide BAS alarm when temperatures are out of range indicating failure of the steam trap and abnormal inlet temperature.
 - c. All steam traps shall have a dirt pocket, isolation valve, strainer, trap and downstream isolation valve. Clean all strainers after start up.
 8. Steam Humidifiers
 - a. Campus has standardized on Condair Nortec OSP certified, electrode humidifiers with replaceable cylinders. Provide with BACnet interface to BAS. Provide airflow proving switch, high limit humidistat, and BAS temperature/humidity sensor. Provide status and faults to BAS. Provide condensate water cooler to maintain discharge temperature to sewer less than 140oF.
 9. Condensate Return Pumps
 - a. Provide condensate return pumps with integration to BAS. Integration shall provide pump status and alarm for when water overflows (high temperature drain discharge alarm).

I. REFRIGERANT PIPING

23 23 00

1. General
 - a. At all times during brazing a nitrogen purge is required.

- b. ACR Type L nitrogenized refrigeration grade copper pipe (ASTM B280) is required for all refrigerant piping. All copper-to-copper joints shall be made with 15 percent silfoss and all copper to brass connections shall be made with 45 percent silver solder.
2. Testing of Refrigerant Piping
- a. Refrigerant piping shall be pressure tested to a minimum of 175 psig. Test pressure shall not exceed the maximum rating of the weakest component of the system.
 - b. Each system upon completion of the pressure test shall be evacuated to a minimum of 500 microns. The system shall hold 500 microns for 20 minutes without deviation of more than 10 percent.
 - c. Where manufacture recommends testing pressures and evacuation procedures, follow their guidelines.

J. HVAC AIR DISTRIBUTION

23 30 00

1. Systems Design
- a. Indicate on the drawings or specifications that low-pressure loss duct fittings shall be installed per Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
 - b. Specify appropriate SMACNA duct air leakage class (see SMACNA HVAC Air Duct Leakage Test Manual and SMACNA Technical Paper on Duct Leakage). Identify duct pressure classes on the plans, such as 2", etc. Refer to SMACNA HVAC Duct Construction Standards, Figure 1-1. Require duct leakage testing for all ducts rated at three (3) inches of water and greater. Recommended maximum system leakage shall be listed 1% of design air flow according to ASHRAE 2017 Fundamental Handbook chapter 21. Minimum pressure class for ductwork shall be +2" and -2". Pressure class upstream of terminal boxes is expected to be 4".
 - c. In medical office buildings where the code allows it, plenum return is acceptable. Do not use a build shaft as a plenum. Provide galvanized ducting to the floors of which it serves.
 - d. Ductboard ductwork is not permitted.
 - e. Gripple type cable hangers are not permitted.
2. Fans, Motors, and Drives
- a. Fans shall be licensed to bear the Air Movement and Control Association (AMCA) ratings seal. Fans shall be tested for air and sound performance in accordance with the appropriate AMCA standard in an AMCA accredited laboratory.
 - b. The design horsepower rating of each drive shall be at least 1.5 times the nameplate rating of the motor. Proper allowances for sheave diameters, speed ration, arcs of contact and belt length shall be followed in meeting the design horsepower of the drive.
 - c. All variable speed drives shall be selected to allow an increase or decrease of a minimum of 10 percent of design fan speed.
 - d. Motor shaft grounding: See Division 23 05 13 Common Motor Requirements.
 - e. Motors over 10 HP: Adjustable sheaves shall be removed and replaced with fixed diameter sheaves prior to final air balancing.
 - f. For fans with variable frequency drives (VFD's): Sheaves shall be sized to allow for the fan to operate within 10% of the design CFM when the VFD is in bypass.
 - g. Sheaves shall be cast of fabricated, bored to size or bushed with fully split tapered bushings to fit properly on the shafts.
3. Shafts and Bearings

- a. The fan shaft shall be ground and polished solid steel with an anti-corrosive coating.
 - b. Bearing shall be selected for a minimum L-10 life in excess of 100,000 hours at maximum cataloged operating speed. Bearings shall be locked to the shaft concentrically without marring or burring the shaft.
 - c. All shaft bearings shall have extended lube lines with zerk fittings. Extended lube lines shall be UV resistant where exposed to the sun. Provide grease type and recommend by the manufacture.
4. Ductwork
- a. Use low pressure drop duct design. Use round duct wherever space permits. Only use flex duct to connect ducts to terminal diffusers, registers and grilles. Maximum length in a hospital shall be 7 feet and at the end of the runout for medical office buildings the maximum length is 5'-0". Do not install flex ducts downstream of HEPA filters. The throat radius of all bends shall be 1-1/2 times the width of the duct wherever possible and in no case shall the throat radius be less than one width of the branch duct. Provide square elbows double thickness turning vanes where space does not permit the above radius and where square elbows are shown. The slopes of transitions shall be approximately one to five, and no abrupt changes or offsets of any kind in the duct system shall be permitted. Design pressure drop to 0.08 inches water per 100 feet. Insulation shall comply with the latest CCR-Title 24, and California Energy Code.
 - b. Provide drive slip or equivalent flat seams for ducts exposed in the conditioned space or where necessary due to space limitations. Provide Ductmate flanged transverse joints. On ducts over 48 inches wide, and where required by SMACNA, provide standard reinforcing on inside of duct. Run outs to grilles, registers or diffusers on exposed ductwork shall be the same size as the outer perimeter of the flange on the grille, register or diffuser. Provide flexible connections on inlet and outlet of each fan. Provide galvanized cover over flexible connections where exposed outdoors. Seal all seams around fan and coil housings airtight with appropriate sealing compound.
 - c. Flexible duct connections shall be made with listed tape (UL 181 listed) seal for the inner core membrane to the galvanized duct with a minimum of 3 wraps. The inner core shall be secure with a stainless steel worm gear or Panduit strap with minimum 150 psi tensile strength. The outer insulation shall be secured with a second stainless steel worm gear band or Panduit strap.
5. Dampers
- a. Motor-operated, opposed blade type shall be galvanized iron or extruded aluminum airfoil with nylon bearings, and to prevent leakage. Dampers shall have replaceable blade seals and stops for minimum air leakage. Blades shall be heavy gauge aluminum airfoil or galvanized 16-gauge minimum with 8 inches maximum width. The frame shall be sealed airtight to ductwork. Dampers exposed to the weather shall be weatherproof and made of corrosion proof materials. Provide Belimo 120v damper actuators.
 - b. Manual dampers shall be provided with locking quadrant with standoff. Manual dampers for low CFM ducts shall be tight fitting to allow balancing company to balance to tight tolerances. Manual dampers are to utilize end bearings or low leakage end bushings. Dampers are to be constructed in accordance with SMACNA guidelines.
6. Duct Smoke Detector and Fire Smoke Dampers.
- a. For additional information, refer to UC Davis Health's Standard Specification Section 28 31 00, Fire Detection and Alarm. Activation of fire smoke dampers shall be through area detection where the building is equipped with total coverage area detection.
 - b. Layout ductwork and locate duct smoke detectors to ensure clearance is available upstream.
 - c. Duct detectors shall be compatible with the building's Fire Alarm System and shall be approved by the Fire Marshal of record. Duct detectors shall be accessible for testing and maintenance.

Duct detectors shall disable fan motors and send signals to building automation system (BAS) to shutdown unit.

- d. Activation of a fire smoke damper is to cause associated air handler to shut down and alarm sent to the BAS. Some areas of the existing hospitals do not have BAS integrations. For these areas match the existing means of monitoring the damper position.
 - e. Campus standard for fire smoke dampers is Ruskin FSD60 with Belimo actuators, EFL/SP100 switch, test reset switch, and TS150 where override is necessary on smoke control system. Provide all actuators outside of the ductwork. There are families of FSD 60 that allow actuators in alternate locations. Where side access is not achievable, bottom access is available. Provide access door for inspection of dampers.
7. Duct Access Doors
- a. Provide sandwich style gasketed, removable access panel at fire/smoke dampers and elsewhere where needed to provide access to interior ductwork components. Provide access panels at 100 ft intervals on return and exhaust ductwork to allow for duct cleaning. Label ceiling to identify duct access panel location. Locate access panels adjacent to turning vanes on exhaust and return ducts and downstream of detectors pursuant to detector manufacturer's requirements.
8. VAV and CV Boxes
- a. The maximum air pressure drop (PD) of a terminal box with a reheat coil shall be based on the system limitations and is expected to be below a .35" wg (exception is venturi valves). As heating water designs change to low temperatures (potentially 110oF) due to electrification of heating systems over natural gas, the rows in a coil are expected to increase to more than 2. CAV boxes in OSHPD/HCAi facilities shall be double wall construction.
 - b. Terminal boxes: UCD is trending toward the standardization of Accutrol (AVT4000 series) terminal boxes with hot water reheat, BACnet controller, and no interior liners (exterior insulation is required). The boxes can provide variable or constant volume control in the return, exhaust, or supply with little risk of drifting due to dust in the airstream (making them suitable for critical environments). The box is pressure independent, does not require straight inlet conditions to work effectively, and has an accuracy is +/- 5%. Early in the design phase discuss the terminal box type being proposed with UCD for approval.
9. Grilles, Registers and Louvers
- a. Provide all outlets with gaskets to minimize the streaking of the walls or ceilings due to leakage.
 - b. Provide modular core diffusers (i.e., Titus MCD no exceptions). Omit opposed blade dampers. Provide ceiling regulators in hard lid areas or provide access doors within 2 feet of damper.
 - c. Provide perforated return and exhaust registers. Omit opposed blade dampers. Perforated are used to allow for easier cleaning than eggcrate style registers.
10. Labeling of Equipment
- a. Label each piece of equipment with plastic engraved labels. Black background with white letters 1" high minimum. All equipment includes, but is not to be limited to VAV's, CAV's, fans, fan coils, filter racks, etc. Label the ceiling grid or access doors to identify equipment above the ceiling. Provide plastic white background with black ½" high lettering. Permanently adhere to the ceiling grid at location of access. Label all equipment, such as terminal boxes, fire smoke dampers, valves, fan coils, main balancing dampers, and valves.

K. FUME HOOD FANS

23 38 16

1. Refer to UC Davis Health's Standard Specifications, Division 11 on Laboratory Equipment for information on fume hood construction. Refer to Section 23 09 10 for Laboratory Airflow Control

Requirements. Refer to Division 11 for fume hood requirements. Coordinate mechanical engineering concepts with hood selections.

2. Laboratory Hood Exhaust Fans

- a. Fan type and materials shall be carefully engineered and selected to meet or exceed its intended usage.
- b. Fan assemblies shall be constructed with corrosion resistant materials engineered for the intended application.
- c. Fan shall be licensed and bear the AMCA ratings seal. Fans shall be tested for air and sound performance in accordance with the appropriate AMCA standard in an AMCA accredited laboratory.
- d. Each fan shall be vibration tested as an assembly before shipping in accordance with AMCA 204-05.
- e. Unit shall bear an engraved nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM.
- f. Unit fasteners exposed to corrosive airstream shall be of stainless-steel construction.
- g. Provide fan curves for each fan at the specified operation point, with flow, static pressure, and horsepower clearly plotted.
- h. Analysis shall be provided to UCD identifying the fan discharge height shall be a minimum of 10 feet above the roof, and location of discharge with respect to fresh air intakes and openings into the building, and prevailing winds.

3. Fans, Motors, and Drives

- a. Motors shall be premium efficiency, standard NEMA frame, 1800 or 3600 RPM, TEFC with a 1.15 service factor.
- b. Motor shaft grounding: See Division 23 05 13 Common Motor Requirements.
- c. Motor maintenance shall be accomplished without fan impeller removal or requiring maintenance personnel to access the contaminated exhaust components. The belt drive configuration (if equipped) shall be AMCA arrangement 1, 9, or 10. High plume arrangement 9 fans shall feature a bifurcated housing with the motor, belt drive (if equipped), and bearings located outside of the contaminated airstream. Direct drive arrangement 4, or direct drive arrangements requiring access and handling of hazardous and contaminated fan components for motor replacement are not acceptable.
- d. Drive belts and sheaves shall be sized for 200 percent of the fan operating brake horsepower and shall be readily and easily accessible for service. Drive shall consist of a minimum of two belts under all circumstances.
- e. Fan shaft bearings shall be Air Handling Quality, ball or roller pillow block type and be sized for an L-10 life of no less than 200,000 hours for high plume fans and critical applications, and L -10 100,000 hours for all others. Bearings shall be fixed to the fan shaft using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use set screws shall not be acceptable.
- f. All shaft bearings shall have extended lube lines with Zerk fittings. Extended lube lines shall be UV resistant.
- g. Provide manufacturer recommended grease for all bearing applications.

1. Identification
 - a. Refrigerant and compressor oil type shall be clearly marked using nameplates on each unit.
 - b. The initial refrigerant charge shall be clearly listed using nameplates on each condensing unit.
 - c. A permanent nameplate shall be installed on both indoor and outdoor equipment stating the room number the equipment is serving (or located within) and identifying each piece of equipment clearly.
2. Electrical
 - a. All motors over 1.5 horsepower shall have three phase characteristics.
 - b. Each refrigeration system shall be served by its own dedicated circuit breaker and disconnect means.
3. Condensing Units
 - a. The refrigeration system shall be the standard product of a single manufacturer and shall be cataloged as systems, complete with system capacities. All components including controls and accessories shall be furnished by the system manufacturer and shall include a fully piped air-cooled condensing unit (as described below), evaporator (as described below), thermostatic expansion valve, liquid line drier, room thermostat, liquid line solenoid valve, suction line filter, etc.
 - b. Condensing units shall include motor-compressor, condenser, receiver, electrical control panel and all defrost components completely assembled on a steel rack, piped, wired, run-in and tested by the manufacturer. The motor compressors shall be semi hermetic with inherent 3-leg overload protection.
 - c. Air-cooled condensing units not located outside the building shall be located in a controlled temperature room. All systems with outdoor condensers or condensing units shall be provided with low ambient controls including a crankcase heater and a condenser fan control.
 - d. Condensing units shall carry a 5-year compressor warranty.
 - e. All refrigeration pressure relief lines shall be piped to a location outside the building.
 - f. All refrigeration pressure relief lines shall be piped to a location outside the building.
 - g. A complete wiring and control diagram shall be permanently affixed in a waterproof container to the inside of each compressor control panel.
 - h. Equipment charged in the field shall have a permanent label affixed to the condensing unit stating the refrigerant type, oil type, and operating refrigerant charge in pounds.
 - i. An oil failure control shall be required on all semi-hermetic compressors with an oil pump.
 - j. Suction lines shall have traps at intervals not exceeding manufactures recommendations.
4. Evaporators
 - a. Evaporator drain shall be provided with a trap outside of the refrigerated areas.
 - b. Drains shall include a clean out tee and a pipe union.
 - c. Freezer drains shall include a drain line heater and rubber insulation.
 - d. Fan motors shall have built-in thermal overload protection.
 - e. Systems having electric defrost shall include an evaporator fan thermostat and defrost termination control.
 - f. Drain pans shall be stainless steel.

M. DECENTRALIZED UNITARY HVAC EQUIPMENT

23 81 00

1. General
 - a. Filtration: MERV 13 filters are to be used for medical office buildings.
 - b. 100 percent outdoor air: Units over 5 tons shall have two stages of mechanical cooling. Gas fired heating in this application shall have a modulating burner.
 - c. All refrigeration circuits shall be equipped with high- and low-pressure safety pressure switches.
 - d. All compressors shall be mounted on vibration isolators.
 - e. Temperature controls integrated with BAS.

N. CONVECTION HEATING

23 82 00

1. Heaters over 100,000 BTUH shall be hard piped to their external shut off valve.
2. Fan and blower motors shall be wired to allow cooling of the heat exchanger upon cycling on temperature.
3. In alignment with UC Davis Health's Sustainability Policy, gas-fired equipment shall be avoided unless approved by the UCD representative.
4. A dirt leg shall be installed on gas supply piping at each appliance.
5. Gas fired unit heaters installed indoors shall have forced draft combustion.
6. Gas fired equipment installed in a dirty, dusty, or otherwise contaminated location shall feature separated combustion ducted directly to the outdoors.
7. Gas fired equipment installed in a negative pressure environment shall feature separated combustion ducted directly to the outdoors.
8. Gas fired equipment heating 100 percent outside air or heating air at an inlet air temperature below 40oF shall feature stainless steel burners and heat exchangers.

O. BUILDING MECHANICAL ROOMS

23 90 00

1. The final size and layout of the mechanical rooms is dependent on the final accepted mechanical system and required equipment. All mechanical rooms shall be sized adequately to allow, not just code compliant clearances, but manufacturers required service clearances for maintenance. Review and coordinate the size, design and layout of the mechanical rooms with the UCD representative.
2. Equipment rooms shall not be used for return air plenums.
3. Mechanical rooms shall be sized to allow removal and replacement of coils, motors, fans, pumps, and dampers.
4. Each mechanical room shall have noise and vibration control. Where questionable provide acoustical engineering evaluation.
5. Equipment shall be placed on minimum of 4” high housekeeping pads.
6. Mechanical room location shall take into consideration adjacent sensitive spaces, noise and vibration. For sensitive areas provide an acoustical engineering evaluation.
7. Mechanical room shall be provided with concrete curbs below the walls for protection from wash down and floor drains appropriately placed.
8. Allow for additional space for future equipment such as pumps, DI systems, compressor(s), or similar common hospital equipment.
9. Verify all equipment has a means of fitting through the size of the door.

P. BUILDING AUTOMATION SYSTEM (BAS)

23 00 00

APPENDIX A – OWNER PROJECT REQUIREMENTS FOR BUILDING AUTOMATION SYSTEMS

1. Reference “Owner Project Requirements for Building Automation Systems”. See Appendix.

APPENDIX B – OWNER PROJECT REQUIREMENTS FOR COMMISSIONING

1. Reference “Owner Project Requirements for Commissioning”. See Appendix.

APPENDIX C – PREFERRED PLUMBING FIXTURES

1. Reference “Preferred Plumbing Fixtures”. See Appendix.



UCDH FACILITY STANDARDS ELECTRICAL

2

SUMMARY OF UPDATES

Electrical - 26 00 00

1. Added item A.7 to provide MCC wiring drawings inside each door. (4/27/23)
2. Added item A.8 to coordinate use of circuits on projects with UCDH FP&D and UCDH PO&M. (3/1/24)
3. Added item A.9 to require the update of existing 12kV master drawings if revisions are made to the medium voltage system as part of the project. (3/1/24)
4. Update item B.5.e to validate circuitry is accurate. (4/4/24)

Power System Study - 26 00 60

1. Added item A.5 to provide applicable studies and any required arc flash assessments. (4/27/23)
2. For any Protective Device Coordination issues found on existing systems, proposed solutions shall be coordinated with UCDH PO&M. (2/9/24)

Medium Voltage Cable, Terminations, Splices, and Structures - 26 05 13

1. Added item C.1.d to provide vault number on the manhole cover. (4/27/23)
2. Revised the looping of cables for manholes and vaults only. (7/1/23)
3. Added item C.1.e to provide ground busbar in manholes. (4/4/24)

Low Voltage Electrical Power Conductors & Cables – 26 05 19

1. Revised item A.1 to indicate the minimum size of emergency conductors to be #12 and minimum #10 AWG for emergency homeruns. (4/27/23)
2. Added item A.8 to provide dedicated neutrals for multi-wire circuits. (4/27/23)
3. Clarify A.8 for homeruns with more than one circuit in lieu of “multi-wire circuits”. (9/15/23)
4. Revised item A.1 to indicate the minimum size of emergency conductors to be #10. (2/9/24)
5. Revised item C.2 to provide 9” of slack conductor at each outlet. (4/4/24)

Grounding & Bonding For Electrical Systems – 26 05 26

1. Revised item A.2 to indicate steel or malleable grounding bushings. (4/4/24)

Pull Boxes and Junction Boxes – 26 05 32

1. Revised item A.1 to indicate minimum 2-1/8” deep boxes. (1/11/24)

Conduit, Fittings, and Raceways – 26 05 33

1. Revised item A.16 to indicate ½” trade size minimum for flexible conduit. (4/27/23)
2. Deleted item A.25.a.vii noting elbows for underground conduits to be plastic conduit. (4/27/23)
3. Added to item A.2 to allow for up to 40% maximum conduit fill. (7/1/23)
4. Added “steel” after rigid for item A.25. (9/15/23)
5. Revised item A.26.C.2. to utilize galvanized rigid metal conduit for all elbows. (9/15/23)

Identification for Electrical Systems – 26 05 53

1. Revised item A.1 to replace “sign” with “nameplate”. (4/27/23)
2. Revised item A.3 to replace “sign” with “nameplate”. (4/27/23)

3. Revised item A.4 to replace “signs” with “nameplates”. (4/27/23)
4. Revised item A.5 for the equipment identification nomenclature. (4/27/23)
5. Updated sample panel name in part A.5. (4/27/23)
6. Update item A.9. to include “In the Central Utility Plant, provide brass tags for all conduits leaving electrical gear to identify the feeder.” (7/1/23)
7. Updated item A.10.b for junction and pullbox labeling. (1/9/24)
8. Added item A.12 for disconnect labeling. (2/9/24)
9. Corrected the verbiage for item A.8 which had a portion of the verbiage as item A.9. Adjusted the following items’ numbering accordingly. (4/4/24)
10. Revised item A.9 to include circuit breaker number. (4/4/24)
11. Updated item A.10.b to include branch of power for junction and pullbox labeling. (4/4/24)
12. Update item A.7 to indicate ¼” high letters in lieu of 1/8” high letters. (4/4/24)
13. Added items A.10.a.vi and A.10.a.vii. (4/4/24)

Power Monitoring and Control Systems – 26 09 13

1. Revised item A.1.a.iv to remove manufacturer for BMS equipment and spelled out the Building Management System (BMS). (4/27/23)
2. Revised item A.1.b.iv to remove ABB manufacturer callout. (4/27/23)
3. Added to item A.1.d to update central plant lineup screen for expansion of central utility plant as well. (7/1/23)
4. Formatted items A.1.b and A.1.c. (4/4/24)
5. Removed duplicate information from A.1.b. (4/4/24)

Lighting Control Devices – 26 09 23

1. Revised item A.8 to remove Wattstopper manufacturer for the lighting control system. (4/27/23)
2. Added item A.10 to provide outdoor lighting controls for exterior lighting at non-Hospital buildings. (4/27/23)
3. Added item A.11 for contractor to provide manufacturer shop drawings for the lighting control for project. (2/9/24)
4. Added item A.12 for lighting control devices to be labeled with the devices/luminaires they control. (2/9/24)
5. Added item A.13 to provide individual lighting level controls for any luminaires greater than 6’ in length. (4/4/24)
6. Updated item A.7 to include additional monitoring and controls. (4/4/24)
7. Inserted item A.10 for open office area controls. (4/4/24)

Pad Mounted, Liquid-Filled Medium-Voltage Transformers – 26 11 19

1. Deleted item B.3 to remove General Electric Company manufacturer callout. (4/27/23)

Low-Voltage Transformers – 26 22 00

1. Updated item A.5 with additional information for 360 degree rotatable IR Port. (12/8/23)
2. Added additional approved manufacturers under item A.4. (2/6/24)
3. Added item 7 for minimum K-4 rated transformer. (2/9/24)
4. Update item 9 to clarify that external transformer vibration isolators shall be provided for projects in non-HCAI facilities. (2/9/24)
5. Removed Square D from item A.4. (4/4/24)

Switchboards & Panelboards – 26 24 00

1. Deleted item A.1.d to remove ABB/GE manufacturer callout. (4/27/23)
2. Revised item A.5 to include “UCDH PO&M approved equal” for acceptable manufacturer. (4/27/23)
3. Added item A.1.e, “Panels shall not be located behind doors.” (7/1/23)
4. Added item A.1.f for factory connections. (4/4/24)
5. Added item B.1.1 to provide electronic version of the panel schedule to PO&M. (4/4/24)

Wiring Devices – 26 27 26

1. Added to item B.2.d to provide UPS that can function connected to generator power. (4/27/23)
2. Added “and public waiting areas” in item A.6. (7/1/23)
3. Added item A.11 to “Provide welding equipment receptacles in Central Utility Plant. Coordinate exact locations with UCDH.” (7/1/23)
4. Added item A.12 to indicate that pre-wired switches or receptacles are not allowed. (2/9/24)

Low-Voltage Circuit Protection Devices – 26 28 00

1. Added to item A.8 that breakers for fire alarm system are to be a breaker with locking device on. (4/27/23)
2. Update item A.8 that breakers in red color are to be by factory, not painted.

Enclosed Controllers (Motor Starters) – 26 29 13

1. Added to item A.1 to include variable frequency drives with low harmonics and the ability to connect to the existing BMS. (4/27/23)
2. Added item A.5 for acceptable manufacturers. (4/27/23)

Automatic Transfer Switches (ATS) – 26 36 00

1. Added to item A.11 to include “UCDH PO&M approved equal”. (4/27/23)

Interior Lighting – 26 51 00

1. Revised item A.8 to add reference for box identification requirements. (4/27/23)
2. Added item A.10 to note quantity of spare luminaires to provide per project. (4/27/23)
3. Added line B.3 to state “All light fixtures in Utilities and Central Plant mounted over 15’ from the floor shall be mounted with lowering system to service the light fixture.” (8/12/23)
4. Added item A.11 for typical room lighting levels. (3/1/24)

Exterior Lighting – 26 51 10

1. Revised item A.1 to note desired Kelvin temperature of exterior lighting. (4/27/23)
2. Added item A.7 for typical lighting levels for exterior lighting. (3/1/24)
3. Revised item A.1 to indicate that all exterior luminaires shall have a Kelvin temperature of 3000K. (4/4/24)
4. Revised item A.2 for CRI as 90 in lieu of CRI of 80. (4/4/24)



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ELECTRICAL**26 00 00****A. GENERAL**

1. Verify points of connection to existing UC Davis Health CUP utilities with the University Representative. New SMUD utility work shall be coordinated with SMUD and UC Davis Health. All utility services including electric, telephone, fire alarm, data, etc. are to be underground.
2. Building electrical systems shall have utilization voltages of 480/277 volts, 3 phase, 4 wire and/or 208/120 volt, 3-phase, 4-wire, or as coordinated with the University Representative. New CUP supported projects shall have primary selective electrical services for normal power and emergency power from redundant CUP feeder circuit pairs (A and B feed respectively).
3. Convenience receptacles: Provide dedicated 20-amp, 120-volt circuits to feed duplex convenience receptacles (6 maximum per circuit). Spacing shall be no more than 50 feet in corridors with a maximum distance from any end wall of 25 feet.
4. Provide housekeeping pads for all floor mounted electrical equipment.
5. New electrical equipment shall have a minimum of 25% of spare capacity during design. All new boards shall have a minimum of 25% breaker pole space available for future breaker installations.
6. New electrical services shall be designed with a minimum of 25% spare capacity available for future.
7. For motor control centers (MCC), provide MCC wiring drawing inside each door.
8. Coordinate use of circuits and panels in projects with UCDH FP&D and UCDH PO&M to eliminate duplication of circuits/panels used in other active projects.
9. Electrical Engineer to request existing 12kV normal and emergency campus one-line diagrams. The UCDH master files are drawing #22222 and #22223. Coordinate with UCDH PM/PO&M to update master files with any medium system updates in the project.

B. TESTING

1. Perform inspection and test procedures per f Inter-National Electrical Testing Association (NETA) Standard latest edition.
2. OSHPD projects shall have all testing requirements included in their TIO documentation process by the projects design professional.
3. Testing shall be performed by an independent third -party testing agency.
4. Testing shall be provided for all electrical systems, including the following:
 - a. All Medium voltage equipment, feeders, terminations, splices, service transformers, switches, and interrupters.
 - b. All Service and electrical equipment which also includes unit substations, switchboards, automatic transfer switches, distribution boards, and panelboards boards,
 - c. All electrical overcurrent devices which also includes breakers, switches, fuses, and disconnects.

- d. All electrical wiring which also includes feeders, wiring, and branch circuits.
 - e. All electrical devices which include receptacles, switches. Validate all circuitry is accurate.
 - f. All lighting and lighting system components which includes interior light fixtures, exterior light fixtures, and all lighting controls.
5. The contractor shall develop an outline of all project specific equipment to be tested as part of their project scope. Include the proposed dates and timing for testing, the parties involved in the testing, information about the proposed tests to be included, the number of tests, how the testing report will be created, and all testing protocols shall be submitted to the University Representative for review and approval.
 6. For any Protective Device Coordination (i.e. HCAI PIN 70) issues found on existing electrical distribution systems in HCAI facilities, proposed solutions shall be coordinated with UCDH PO&M.

POWER SYSTEM STUDY

26 00 60

A. TESTING

1. Provide a comprehensive power system study including separate sections for Short Circuit, Protective Device Evaluation & Protective Device Coordination Studies, harmonics evaluation, and Arc-flash and shock risk assessment. Submit studies to University Representative prior to receiving final acceptance of distribution equipment shop drawings or prior to release of equipment for manufacture. Include all new and/or modified equipment and breakers. Study shall include the complete normal and emergency systems as required. All analysis shall meet the current version of NFPA 70E.
2. Studies shall include all portions of electrical distribution system from the point of connection at 12,470V primary down to and including 480V and 208V distribution systems respectively. Including contributions from secondary power sources such as generators or the UC Davis Health CUP, all maximum fault condition shall be adequately covered in the study.
3. Evaluate a comprehensive harmonics evaluation as part of the power system study. This study shall demonstrate whether K rated transformers, feeders, and oversized neutral system components should be implemented.
4. The Arc Flash and shock risk assessment analysis shall include physical labels to be installed at all equipment outlining their hazard categories and required personal protective equipment (PPE).
5. For existing systems, provide Short Circuit and Protective Device Coordination study where applicable. Provide Arc-flash and shock risk assessment as required for the project.

SELECTIVE DEMOLITION FOR ELECTRICAL

26 00 90

A. GENERAL

1. Contractor shall coordinate all required power shutoff work and energizations with the University Representative prior to starting their work.
2. Where remodeling interferes with circuits in areas that are otherwise undisturbed, circuits shall be reworked as required by the contractor.

3. Contractor shall visit the Project site and verify existing device conditions and shall remove, re locate and/or rework any electrical equipment or circuits affected (whether indicated or not) due to removal of existing walls, ceilings, etc. When electrical equipment or electrical circuit is demolished, remove circuit back to the source (i.e. panel, etc.) or to the last active device to remain.

MEDIUM VOLTAGE CABLE, TERMINATIONS, SPLICES, AND STRUCTURES
26 05 13
A. MEDIUM VOLTAGE CABLE

1. Single conductors, Class B stranded, copper.
2. Insulation shall be Ethylene-propylene rubber (EPR), with 133% insulation level.
3. Jacket material type = Cross-linked polyolefin (XLPO), or polyvinyl chloride (PVC).
4. Metallic Shielding: Copper shielding tape, helically applied over semi-conducting insulation shield.
5. Cable Voltage Rating: 15 kV phase to phase.
6. Ground shield of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cables and separable insulated connector fittings, and hardware in accordance with manufacturer's written instructions.
7. In manholes, handholes, pull boxes, junction boxes and cable vaults, cables shall be fully looped around the walls for the longest route from entry to exit and sport cables on galvanized steel racks at intervals adequate to prevent sag.
8. In each manhole and pull box install permanent tags on each circuit's cables and wires to clearly designate their circuit identification the tags shall be polyethylene with black stamped letters. Tags shall have a PVC holder and shall be attached to cable 6" below all terminations with two nylon cable ties. Tag shall identify cable phase, as well as circuit number and designation as indicated on the single line diagram. Tags in manholes shall be over fireproofing.
9. Any underground feeders shall be fully concrete encased with red dyed concrete.
10. No horizontal boring allowed.

B. SPLICES AND TERMINATIONS

1. Splices and terminations shall be in accordance with IEEE 48, 386, 404 and 592.
2. Splices shall be made with standard kits and shall be one of the following types:
 - a. Pre-molded, cold shrink rubber, inline splice kit.
 - b. Pre-molded ethylene propylene diene monomer (EPDM) splice body kit with cable joint sealed by interference fit of mating parts and cable.
3. Conductor Terminations, General: Comply with Class 1 of IEEE Standard 48. Insulation class shall be equivalent to that of the cable upon which they are installed. Terminations for shielded cables shall include a shield-grounding strap. Termination kits shall be performance tested for compliance with IEEE Standard 48 and shall be of the following types: All terminations shall utilize separable type connectors.

- a. Class 1 Termination for Shielded Cable: Modular type, furnished as a kit, with stress relief tube, multiple molded silicone rubber insulator modules, shield ground strap, compression-type connector, and end seal.
4. Ground shields of shielded cable at terminations and splices. Ground metal bodies of terminators, splices, and hardware in accordance with manufacturer's written instructions.

C. MEDIUM VOLTAGE STRUCTURES

1. Manholes
 - a. Size manholes to accommodate all feeders, wiring, switching, and extensions for future.
 - b. Manholes shall be reinforced concrete, precast and designed for H20-44 wheel loading. Provide knockouts for future duct connections.
 - c. Electrical manholes shall be nominal 10'x12' with inside clear height shall be nominal 8 feet-0 inches. Locate depressions in manholes for future sumps at an unused corner.
 - d. Provide vault # on manhole cover.
 - e. Provide ground busbar in manholes.
2. Pullboxes
 - a. Minimum size of pullboxes shall be 4 feet by 6 feet, and 3 feet deep. Boxes shall be reinforced concrete type with traffic rated lids.
 - b. Stamp boxes with Electrical on the top of the cover.

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS & CABLES

26 05 19

A. CONDUCTORS AND CABLES

1. Conductor size shall be a minimum of No. 12 AWG. The minimum size of emergency systems conductors shall be No. 10 AWG.
2. All power and low voltage conductors shall be copper, stranded type wire, 90C, THHN/THWN or XHHW unless otherwise required by the California Electrical Code. Do not use solid type wire.
3. Insulation voltage level rating shall be 600 volts minimum.
4. Conductors sized #6 and smaller shall be solid color wire of the appropriate phase color, wire #4 and larger may be black and phased tape at all boxes and terminations.
5. 60C ampacities shall be used for sizing of all wire and cable for branch circuits and feeders at 100 amps. 75C ampacities shall be used for sizing of all wire and cables for feeders greater than 100 amps.
6. Use 10 AWG conductors 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. Increase circuit conductor sizes for ambient temperature corrections, current carrying conductor adjustments in accordance with CEC article 310, and all voltage drop provisions including California Title 24 (T24). Include completed forms signed by the design professional, contractor or commissioning agent, as applicable.

7. 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.
8. Provide dedicated neutral conductor for each circuit. Neutral conductors shall be numbered with wire numbers of circuits it services/is associated to in all junction boxes, gutters, panels, etc.
9. Control Wiring
 - a. For control wiring less than 50V:
 - i. Separate from all other circuits. Separate cable tray and/or conduits.
 - ii. Digital signals to be in multiconductor cables (14 AWG) with a cable shield.
 - iii. Analog signals to be individually shielded twisted pairs. Pairs can be combined into one cable. 18AWG.
 - b. Splices are not allowed.
 - c. Provide terminal strips on both ends of the conductor run. No wire nuts.
 - d. Provide 10% spare wires for control circuits.
 - e. Each conductor to include wire number, landing location and source location.

B. SPLICES, TAPS, AND CONNECTORS

1. 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.
2. Splices, taps and connectors (No. 8 and larger) - Joints and connections shall be tool-applied pressure lugs and connectors. Uninsulated lugs and wire ends shall be insulated with layers of plastic tape. Polaris type connectors may be used with prior review and approval from PO&M electrical department.
3. Full size ground wires shall be installed. Do not use raceways for the sole grounding or bonding of a branch circuit. Secure using approved methods at each box with approved bonding fittings.
4. A maximum of three branch circuits are to be installed in any one conduit, on 3 phase 4 wire system. This includes homeruns, no more than three branch circuits shall be installed.
5. Make splices in conductors only within junction boxes, wiring troughs and other enclosures as permitted by the California Electrical Code. Do not splice in panels, or panelboards.
6. Do not splice conductors in pull boxes, panelboards, safety switches, switchboard, switchgear, motor control center, or motor control enclosures.
7. Splices in conductors installed below grades are not permitted, unless approved in writing by the University Representative.
8. Outdoors and below grade use wire connectors or compression type with heat shrink style watertight splice covers. Use Scotchcast 3570G resin epoxy to waterproof connections.

C. GENERAL

1. Control, communication, or signal conductors shall be installed in separate raceway systems from electrical line voltage wiring. Color coding of the low voltage wires used for these systems are specified under the respective sections for these systems.
2. Install a minimum of nine inches (300 mm) of slack conductor at each outlet.
3. Provide wire markers on all current carrying, and neutral conductors at each board source of origin and junction boxes. Megger and record insulation resistance of all 600 volt insulated conductors in the project scope and all new feeders on the single line diagram, using a 1,000volt megger. Make tests with circuits isolated from source and load.
4. 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.
5. Wire Color Code - Color code all conductors. Wire sizes #6 AWG or smaller shall have integral color coded insulation. Wire sizes #4 AWG and larger may have black insulation but identified by color coded electrical tape at all junction, splice, pull, or termination points. Color tape shall be applied 1/2 lap to at least 6 inches of conductor. Color Code wires as follows:

Conductors	120/208 Volts	277/480 Volts
Phase A	Black	Brown
Phase B	Red	Violet
Phase C	Blue	Yellow
Neutral	White	White or Gray
Ground	Green	Green

GROUNDING & BONDING FOR ELECTRICAL SYSTEMS

26 05 26

A. GENERAL

1. Ground rods shall be copper encased steel, $\frac{3}{4}$ " diameter, 10' length, minimum.
2. All conduit bushings shall be grounding type. Steel or iron malleable.
3. Ground conductors shall be UL approved and code sized copper, with dual rated THHN/THWN insulation, color identified green.
4. Grounding conductors shall be connected to ground rods or connected to structural steel using exothermic welds or high-pressure compression type connectors.
5. New systems shall include concrete-encased electrodes consisting of bare copper conductors placed in the bottom of the structural footings. The grounding system shall include all fittings, connectors, devices, and material necessary for a complete and useable system. Bond the grounding system to building columns in new construction. Grounding system shall obtain a ground resistance of the grounding grid of not to exceed 5 ohms.
6. Install ground rods inside of Precast concrete box nominal 9" throat diameter x 14" deep with light duty concrete cover for non-traffic areas or steel plate for traffic areas. Cover shall be embossed or engraved with "GROUND ROD".
7. Power system grounding

- a. Buildings shall have a main building ground bus mounted on the wall in the main electrical room. Connect the following items using CEC sized copper grounding conductors to lugs on the main building ground bus:
 - i. Grounding conductor from building reference ground bus in main service switchboard.
 - ii. Bonding conductor to Telecom grounding system.
 - iii. Bonding conductor to metallic cold water piping system.
 - iv. Bonding conductor to additional ground rods.
 - v. Bonding conductor to building structural steel.
 - vi. Separately derived system grounding conductors in same room.
 - b. At the building power system reference ground bus in the main service switchboard, connect the grounding electrode conductor from concrete encased UFER ground or alternate grounding electrodes.
8. Separately derived electrical system grounding
- a. Transformers: Provide a dual rated four or six-barrel grounding lug with a 5/8"-11 threaded hole. Drill enclosure with 11/16" bit and attach lug to enclosure utilizing a torque bolt and a dragon tooth transition washer or equal. Connect the following when present:
9. Equipment bonding/grounding
- a. Provide a CEC sized insulated copper ground conductor in all 120VAC through 600 VAC feeder and branch circuit distribution conduits and cables.

HANGERS & SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 29
A. GENERAL

1. 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.
2. Provide vibration isolation and all supporting hardware for vibrating electrical equipment, (e.g., transformers). Isolators shall be as recommended by manufacturer to maximize their effect. Isolators shall be as manufactured by Mason Industries, or equal.
3. Conduit Supports Single point beam clamps not allowed. Conduits shall not be attached to ceiling support wires. For individual conduit runs not directly fastened to the structure, use rod hangers. For multiple conduit runs, use trapeze type structural channel conduit support. In new construction, conduits installed inside of walls must have approved clamp supports. No twisted wire allowed.
4. Steel channels, bolts, washers, etc., used for mounting or support of electrical equipment shall be galvanized type. Where installed in a corrosive environment, stainless steel hardware shall be used.

PULL BOXES AND JUNCTION BOXES**26 05 32****A. GENERAL**

1. 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. Boxes shall have hinged covers or flat removable, galvanized sheet metal covers held in place with binder head sheet metal screws. Boxes shall be minimum 2-1/8" deep.
2. Outdoor boxes surface mounted above ground in wet locations shall be cast iron with a plain cast iron cover. Covers shall be neoprene gasketed and shall be NEMA 4 watertight construction. The cover shall be held in place by stainless steel screws.
3. Underground boxes - Underground boxes over 24-inches square shall be sized to provide floor space for workers to stand in the box without the need to stand on conductors in the box.
4. For recessed boxes, use an outside flanged recessed cover. For outdoor boxes mounted on exterior surfaces, use an unflanged box with weather seals.
5. Conduit openings shall be bossed, drilled and tapped in outdoor boxes.
6. Standard size metal boxes stamped from galvanized steel shall be used for indoor above ground general purpose.
7. Above ground outdoor boxes shall be cast iron with threaded hubs for vapor tight and wet locations where indicated.
8. Underground boxes 24-inches square or larger shall be high density reinforced concrete with end and side knock-outs. All such boxes shall be backfilled around the outside with concrete. Each shall be equipped with the following reinforced concrete accessories:
 - a. Extensions as required
 - b. Box floor
 - c. Lid with hold down bolts and labeled with usage. (Steel checker plate with hold down bolts in traffic areas.)
9. Provide pull boxes or junction boxes in conduit runs over 90' long or when more than 4 quarter bends occur in a conduit run.
10. Install all boxes such that covers are accessible.
11. Cut or sheared edges shall be filed or honed, eliminating all sharp edges.
12. Boxes shall be installed with unused or open knockouts plugged.
13. Install boxes direct buried in earth or concrete flush with surface, square with surrounding structures.
14. All above ground boxes shall be labeled on the cover indicating circuit number and panel number.

CONDUIT, FITTINGS, AND RACEWAYS**26 05 33****A. GENERAL**

1. The minimum size of interior conduit shall be ¾".
2. Conduits shall only be filled to 30% maximum fill. In a Central Utility Plant, conduits shall only be filled to 40% maximum fill.
3. Type MC cable shall not be used on the UC Davis Health campus.
4. 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.)
5. Expansion and deflection fittings shall be OZ/Gedney, type DX, or equal.
6. All under floor/ground raceways will be cleaned and mandrilled before wire is installed.
7. Electrical Metallic Tubing (EMT) couplings and connectors shall be steel compression "concrete tight" type. 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.
8. 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. Set screw or non-thread fittings are not permitted.
9. Malleable iron, die cast, or pressure cast fittings are not permitted. All fittings shall be steel.
10. All connectors and bushings shall be steel with insulated throat.
11. Non-metallic conduit when installed on the site shall have a minimum size 1.0".
12. Non-metallic conduit shall be heavy wall, Schedule 40 PVC or Schedule 80 PVC.
13. Non-metallic conduit fittings shall be of the same material as the conduit furnished and be the product of the same manufacturer. PVC 90-degree bend elbows shall not be used. Wrapped rigid will be used in its place. Double lap of Calpico 10 mil or approved equal.
14. Flexible conduit and fittings shall be liquid tight with watertight connectors when installed in damp or wet locations.
15. Flexible conduit and fittings 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.
16. Flexible conduit shall not be less than ½ " trade size and in no case shall flexible conduit size be less than permitted by the CEC for the number and size of conductors to be installed herein.
17. No aluminum flexible conduit shall be used.
18. Wireway systems shall utilize steel bases and covers.
19. Wireway systems shall have dividers between line voltage and low voltage systems.
20. Surface metal raceways - Wiremold, or equal (Series 2000, 3000, 4000, & 6000). Wireway systems smaller than Wiremold series 700, or equal are not permitted.

21. Provide completely separate raceways for the life safety, critical, equipment, and normal branch power systems in accordance with the CEC.
22. Galvanized rigid conduit shall be used in damp or wet locations including outdoor service yards and roofs, in concrete walls or block walls, in concrete vaults, when exposed in locations below 8', where subject to physical damage, and in mechanical rooms.
23. Conceal all conduits, unless approval for surface mount is obtained from the University Representative. Conduits may be exposed in non-public spaces such as electrical rooms, mechanical rooms, and penthouse or basement utility rooms.
24. Install galvanized pull line, or nylon pull rope in all spare conduits.
25. In Central Utility Plant, all conduits shall be rigid steel, including conduit to be used when embedded in concrete (i.e. concrete slab, concrete floor, etc.).
26. Uses permitted:
 - a. Galvanized rigid conduit or IMC shall be used as follows:
 - i. For primary and secondary service (except when installed below the ground floor slab and above the building mat slab) and for secondary unit substations, switchboard,
 - ii. motor control center, dry-type transformer and panelboard feeders.
 - iii. Buried in or in contact with earth to be half -lapped with omic pipe wrapping tape with sealant applied to all joints.
 - iv. In poured concrete walls, floor and roof construction, provided a minimum of 2" of cover is maintained.
 - v. In all walls up to the first outlet box where fed from rigid conduit in damp locations or locations exposed to the weather.
 - vi. In exposed locations below 8 feet above the floor, including all mechanical rooms.
 - vii. All elbows for underground plastic conduit.
 - viii. All conduits for interior wiring systems whose voltage is above 600 volts.
 - ix. All conduits entering refrigerated spaces.
 - x. For emergency power feeders and circuits when installed outside of building.
 - b. Electrical metallic tubing (EMT) shall be used as follows:
 - i. Concealed in stud partitions and hollow masonry walls.
 - ii. For connections from junction box to lighting fixtures except in accessible ceilings.
 - iii. In suspended or accessible ceilings above 8 feet.
 - iv. Exposed in dry locations above 8 feet where not subjected to mechanical damage.
 - v. In furred ceiling spaces.
 - c. Rigid non-metallic conduit shall be used as follows:
 - i. For the branch circuit wiring for exterior lighting pole base s and bollards (horizontal runs only).
 - ii. All elbows, both vertical and horizontal, shall be galvanized rigid metal conduit, not PVC.

- iii. Any non-metallic PVC conduit used for emergency power systems shall be schedule 80 PVC.
- iv. The communications conduit shall be schedule 40 PVC.
- d. Flexible steel conduit shall be used as follows:
 - i. Recessed lighting fixtures. (last 6ft to the fixture, max)
 - ii. Motor connections.
 - iii. Connection between fan plenum and structure.
 - iv. At expansion joints.
 - v. At transformers and other equipment which produces vibration.
 - vi. At damp and wet locations or where exposed to weather, flexible steel conduit shall be liquid tight type.
 - vii. Tite-bite type connectors shall be used.
 - viii. All flexible steel conduit shall be used with code sized ground wire installed.
 - ix. All homeruns shall be in conduit, do not use flexible conduits for any homeruns routed to panels.
- e. All other conduits shall be electrical metallic tubing (EMT) unless otherwise noted.
- f. Direct Burial Conduit
 - i. Unless otherwise indicated install top of conduits 24" minimum below finished grade.
 - ii. Utility primary conduit shall be 48" below finished grade.
 - iii. Medium voltage conduits installed on the UC Davis Health campus site shall be 5.0" schedule 80 PVC, or GRC when routed inside buildings.
 - iv. All medium voltage conduits not under building slabs or parking lots shall be encased in a minimum of 3" concrete. Concrete for primary conduit shall contain a red pigment dye to make it readily noticeable. Provide 10% red oxide per cubic yard of material.
 - v. Pitch the trench uniformly towards manholes or both ways from high points between manholes for the required duct line drainage. Avoid pitching the ducts toward building wherever possible.
 - vi. Install top of conduits approximately 6" minimum below bottom of building slabs. 6). Install top of conduits 30" minimum below grade, below roads and any other paved surfaces.
 - vii. Place a 4" wide, bright yellow, non-biodegradable plastic tape 12" above all underground conduit outside of building foundations.
 - viii. Where transition is made from below grade PVC installation to a metallic conduit system above grade or slab, and at transition at manholes and service switchgear, make transition with rigid galvanized elbows and extend through slab or above grade with galvanized rigid steel conduit. For corrosion protection, where the elbow penetrates surface, wrap with vinyl all-weather electrical tape for 6" above and below concrete surface.
 - ix. For all underground runs of two or more conduits, separators or spacing blocks made of plastic or other suitable nonmetallic, nondecaying material shall be placed on not greater than four foot on center. They shall be of the interlocking type both horizontally and vertically. Ducts shall be anchored to prevent movement during placement of concrete.

- x. 10) Before installing the last 8" of lift of backfill for all primary feeders and for secondary service feeders, install plastic identification tape warning of buried electrical lines the full length of duct bank trench.
- g. Raceway Installations Within Concrete
 - i. Conduits shall not be installed within shear walls unless specifically coordinated with the structural engineer. Conduits shall not be run directly below and parallel with load bearing walls.
 - ii. Conduit stub-up penetrations through slabs shall be installed with the top of a threaded conduit coupling flush with the finished slab.
 - iii. Protect all conduits entering and leaving concrete floor slabs from physical damage during construction.

IDENTIFICATION FOR ELECTRICAL SYSTEMS

26 05 53

A. GENERAL

1. Provide engraved plastic-laminate nameplate on each electrical device or piece of electrical equipment in the building, or project including:
 - a. Electrical cabinets, panels, boards, disconnects, switches, control panels, devices, and enclosures.
 - b. Access panel/doors to electrical facilities.
 - c. Transformers, inverters, and UPS equipment
 - d. Automatic transfer switches and generator equipment.
2. Each individually mounted circuit breaker, and each breaker in the switchboards, secondary unit substations, and distribution panels shall have a sign.
3. Nameplate shall have ½" high text lettering on 1-1/2" high sign (with 2" high used for signs with multiline text).
4. Nameplates shall be color coded for the systems they serve as follows:
 - 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 (or emergency branch at non-hospital buildings) power equipment shall be identified with white faceplate with red core.
 - d. 480/27 volt equipment branch power equipment shall be identified with white faceplate with blue core.
 - e. 480/277 volt Inverter, UPS, or Solar power shall be identified with white faceplate with orange core.
 - f. 208/120 volt normal power equipment shall be identified with green faceplate with white core.
 - g. 208/120 volt critical branch power equipment shall be identified with yellow faceplate with white core.

- h. 208/120 volt life safety branch (or emergency branch at non-hospital buildings) power equipment shall be identified with red faceplate with white core.
 - i. 208/120 volt equipment branch power equipment shall be identified with blue faceplate with white core.
 - j. 208/120 volt Inverter, UPS, or Solar power shall be identified with orange faceplate with White core.
5. Equipment identification is to indicate the following
- Bldg/Floor/Riser(optional) Branch Voltage Panel
- Bldg = Building #
- Floor = Floor # (i.e. 1= first floor; 4 = fourth floor)
- Riser = Name of Riser (i.e. A='A' electrical system riser of building; Y='Y' electrical system riser of building; leave blank if not applicable)
- Branch = Branch of power (i.e. N=normal; LS=Life Safety; C=Critical, EQ=Equipment)
- Voltage = voltage of panel (i.e. H-277/480V; L=120/208V)
- Panel = 2 (i.e. add '2' at the end of the name for second panel with the same name)
- Example:
- 34/2/LSH2 = building 34, second floor panel, Life Safety Branch, 277/480V, second panel)
6. Submit complete schedule with the shop drawings listing all nameplates and information contained thereon.
 7. All electrical devices and switches shall have engraved device covers, 1/4" high letters. Include panel name and circuit number. Critical, life safety, and equipment branch devices shall have nameplates engraved in red. Normal branch devices shall have nameplates engraved in black.
 8. All conductors shall be marked and identified. Include 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.
 9. Provide brass tags, 2" diameter 19 gauge, die stamped and punched for fasteners. Tags shall be used to identify each individual conductor landed at ground buses. For example, "UFER", "Building steel", "Cold water bond", etc. In the Central Utility Plant, provide brass tags with circuit breaker number for all conduits leaving electrical gear to identify the feeder.
 10. Box Identification
 - a. After box installation and wire termination completion provide color coded junction box covers for all above ceiling junction boxes. Covers shall be painted with a masked stripe down the middle for hand inscription with black indelible marker. Color schemes shall conform to:
 - i. Normal power- Green background, black marker with circuiting information contained.
 - ii. Equipment power- Blue background, black marker with circuiting information contained.
 - iii. Critical power- Yellow background, black marker with circuiting information contained.
 - iv. Life Safety power- Red background, black marker with circuiting information contained.

- v. Fire alarm system – Red junction boxes, red raceways, red background, black marker with circuiting information contained.
 - vi. Inverter power – Orange junction boxes, black marker with circuiting information.
 - vii. 125vdc start circuit – Red and black junction boxes, red and black raceways.
- b. Using an indelible wide tip marker, indicate on the cover of each junction and pull box the designation of the circuits contained therein, with the following information:
- Line 1 : Panel designation
 - Line 2 : Circuit number
 - Line 3: Voltage
 - Line 4: Branch of Power
- Example:
- LSH2
- 1, 3, 5
- 277
- Life Safety
- c. 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 OSH A standards. All boxes shall also be painted red.
11. For disconnects for equipment (including integral manufacturer disconnects) shall have a nameplate including name of equipment, panel and circuit(s) it is fed from, and the room number of the panel. The nameplate shall be the color of the branch of power per item A.4 above.
12. Fasteners for equipment or device tag identification shall be self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot be used or should not penetrate the substrate material of the equipment. Disconnects for equipment, including built manufacturer disconnect, shall have a nameplate with the name of the equipment, with branch color, panel, circuit or circuits fed from, room number of the panel fed from.
13. Provide updated, type written, panelboard schedules for all branch circuit work completed as part of renovation and/or new construction projects. Schedules shall include the load description and the room number or area the load is installed.
14. For 12kv cable identification in vaults, provide cable ID off of drawings 22222, 22223 and Central Plant breaker numbers.

POWER MONITORING AND CONTROL SYSTEMS

26 09 13

A. GENERAL

1. New electrical services, main switchboards, and significant renovation project shall have new metering on the main boards. These meters shall be connected to the existing ABB monitoring and control system (PMCS).

- a. System requirements
 - i. Monitor the load measured by electronic power meters installed on each of the main breakers in new 15kV switchgear and secondary mains of new unit substations.
 - ii. Monitor the load measured by the trip devices on all feeder circuit breakers in all secondary unit substations. Monitor trip status.
 - iii. Configure Demand Reports for new electronic power meters on unit substation or service mains.
 - iv. For buildings not served by the Central Utility Plant electrical distribution system, provide a seamless integration with the existing UC Davis Health campus.
- b. Building Management System (BMS) Equipment shall be General Electric (EPM6000), or equal.
- c. Where new metering is added to existing facilities, the existing facility overview screen shall be updated to include the new monitoring equipment.
- d. Where new buildings are added and/or expansion of the Central Utility Plant is provided, the existing central plant lineup screen shall be updated to reflect changes made as part of the individual project. Metering system shall aggregate the load at each board and include all functions necessary to support OSHPD meter trends for load validation.
 - i. The metering system shall be consistent across the UC Davis Health campus, manufactured by Square D or ABB as coordinated with the PO&M electrical department.
 - ii. The meters shall all be networked to the existing ABB power monitoring server in the Central Plant. A single head end interface allowing for remote access via the internet. Include all parts and pieces necessary for PO&M to log into the system from their remote computers at their office space.
 - iii. The system shall locally store a minimum of 1 year of data on each meter installed.
 - iv. The meter shall not rely on a separate 120v cord and plug for its power connection.
 - v. Integrate the new meter installations with the new board installations.
 - vi. Meters may be furnished integral to boards, or in separate adjacent enclosures.

LIGHTING CONTROL DEVICES

26 09 23

A. GENERAL

1. Provide complete lighting control system consisting of relay panels, switching and dimming room controllers, addressable drivers, switching/dimming control stations, scene controls, emergency lighting transfer devices, daylighting photocells, occupancy sensors, remote input/output modules, raceways and wiring with network control interface.
 - a. Coordinate integration with Division 25 BAS when required.
 - b. All lighting control stations serving fixtures on the emergency, life safety, or critical branch shall be red in color.
 - c. All controls shall be compliant with the California Energy code – Title 24 requirements.

2. The lighting control system shall utilize distributed lighting controls, hybrid, or a centralized system approach and be capable of wireless, wired, or hybrid wireless/wired architectures. System shall be capable of networked, or standalone operation.
3. The lighting control system shall be programmable and the status readable using a USB connection to the UC Davis Health's computer operating system running the supplier's software package. Systems which require the computer to stay on-line and connected 24/7 are not acceptable.
4. One set of any interconnecting cables, adapters and/or software program required to operate, troubleshoot, program, display the status of or interface with the system shall be supplied. Software and cable or adapter costs shall be included.
5. The lighting control system manufacturing company shall be regularly engaged in the manufacture of lighting control equipment and ancillary equipment for not less than 5 years.
6. The lighting control system must have remote access ability for the factory to access the system and help troubleshoot, program, or alter the system without being on-site. This factory service must be available 24 hours a day, 365 days a year.
7. The lighting control system shall have the capability of integrating into Building Automation System (BAS) or Energy Management System (EMS) with the key feature being the ability to, but not limited to, monitoring the lighting zones, monitoring the lighting zone occupancy status, monitoring on/off status, monitoring % output as well as the ability to command zones on/off and % output.
8. The building interior lighting control system shall be Acuity nLight.
9. Lobby and Common Areas: Occupancy sensors will turn the lights on and off from the high trim to the low trim setpoints. If it applies, the area shall have dimming zones controlled by daylight sensors. Minimum lighting levels shall be maintained at the path of egress. Local control stations will provide override switching during off-times. Include these spaces on networked lighting controls system.
10. Open Office Areas: Provide luminaire level (not zone level) controls to allow for future space configuration.
11. For exterior lighting at non-Hospital Building, provide outdoor lighting controls to meet current Energy Code requirements. Provide final manufacture shop drawings for lighting control in electronic file format.
12. Contractor to provide final manufacturer shop drawings (in electronic format) for the lighting controls for the project.
13. Each lighting control device shall be labeled with what devices/luminaires it controls.
14. Provide individual lighting level controls for any luminaires greater than 6' in length.

SECONDARY UNIT SUBSTATIONS

26 11 16

A. GENERAL

1. Provide secondary unit substations for indoor/outdoor single -ended or double-ended configurations.

2. Construction: Provide totally enclosed, metal-clad secondary unit substation constructed of bolted or welded sheet steel, front operable free-standing, adequately braced for rated interrupting capacity without distortion or damage. Make provisions for future additions. Design housing for floor mounting, complete with channels and necessary hardware.
3. Housings: Ventilate housing to provide "natural chimney effect".
4. Bus: Provide ground bus extending entire length of unit substation.
5. Equipment Assembly: Assemble, wire, and test substations at factory. Equipment components shall be the responsibility of one manufacturer.
6. The transformer unit supply shall consist of an HV flange and an LV flange. Connections between the primary device and transformer shall be cable, and between the transformer and secondary shall be flexible braided bus.

B. PRIMARY SECTION

1. Switch Types
 - a. For Emergency Branch Unit Substation: Provide primary section consisting of 3-pole air interrupter fused switches. Size fuses to properly protect transformer. Include one extra set of primary fuses. Switch arrangement shall be for a primary selective system. Provide lugs to permit primary cables to be looped into and out of switch so that more than one switch can be connected to a primary circuit.
 - b. For Normal Branch Unit Substation: Provide primary section consisting of 3-pole air interrupter fused switches. Size fuses to properly protect transformer. Include one extra set of primary fuses. Switch arrangement shall be for a primary selective system. Provide lugs to permit primary cables to be looped into and out of switch so that more than one switch can be connected to a primary circuit.
2. General
 - a. The primary switches shall consist of deadfront, completely metal enclosed free-standing structure(s) containing interrupter switches and fuses (when appropriate) of the number, rating, and type noted on the drawings or specified herein. All switches shall meet or exceed all applicable NEMA, ANSI, and IEEE Standards.
 - b. The load interrupter switches shall be quick-make, quick-break three pole, gang operated, with stored energy operation. Each switch shall have the following minimum ratings:

i. System Voltage	12.47 kV three phase three wire
ii. Maximum Design Voltage	15 kV
iii. Basic Impulse Level	95 kV
iv. Amperes Continuous	600 Amps
v. Amperes Interrupting	30,000 Amps
vi. Momentary (Switch Closed, 10 Cycle)	30,000 Amps Asym.
vii. Fault Close	40,000 Amps Asym.
 - c. A manual over toggle type mechanism shall be supplied which utilizes a heavy duty coil spring to provide opening and closing action of the switch. The speed of opening and

- closing the switch shall be independent of the operator, and it shall be impossible to tease the switch into any intermediate position.
- d. The interrupter switch shall have separate main and make/break contacts to provide maximum endurance for fault close and load interrupting duty. The switch assembly shall have insulating barriers between phases and between outer phases and the enclosure.
 - e. The switch assembly shall be integrally designed and produced by the manufacturer of the interrupter switches, fuses, and enclosures to assure a completely coordinated design and establish one source of responsibility for the equipment's performance.

C. CONSTRUCTION

1. The following features shall be supplied on every three pole, two position open-closed switch:
 - a. A high impact viewing window that permits full view of the position of all three switch blades through the closed door.
 - b. For fused units, a fuse access door interlocked with the switch so that:
 - i. The switch must be opened before access to the fuses is possible.
 - ii. The door must be closed before the switch can be closed.
 - c. A grounded metal barrier in front of every switch to prevent inadvertent contact with any live part, yet still allow for a full-view inspection on the switch blade position.
 - d. Provision for padlocking the switch in the open or closed position.
 - e. Permanent "Open-Closed" switch position indicators.
2. Fault protection shall be furnished by fuses where indicated on the contract drawings. Fuses shall have a minimum interrupting rating of 30,000 Amperes symmetrical at 15 kV and shall be expulsion type. Furnish three spare refills for each fused switch and provide a storage rack on the inside of the main door for these spare fuses.
3. One two-hole NEMA pad per phase shall be provided for attaching field installed cable termination suitable for copper cable of the number and sizes indicated on the drawings. Sufficient vertical space shall be supplied for field installed electrical stress relief termination system.
4. All bus shall be tin plated aluminum and be mounted on NEMA rated glass polyester insulators. All bussing shall be braced for the maximum available fault current.
5. Enclosure construction shall be of the universal frame type using dieformed, welded, and bolted members. All enclosing covers and doors shall be fabricated from not less than 11-gauge steel. To facilitate installation and maintenance of cables and bus, the top and rear covers shall be removable.
6. Each switch cubicle shall have a single, full length, flanged front door or two hinged front doors over the switch and fuse assembly where applicable and shall be equipped with padlockable means.
7. All enclosing and supporting steel shall be thoroughly cleaned and phosphatized to assure proper surface for prime and finish coats.

8. Small wiring, fuse blocks and terminal blocks within the switch shall be furnished as required. All groups of control wires shall be labeled with wire markers and all wires leaving the switch shall be provided with terminal blocks having suitable numbering strips.
9. A nameplate shall be mounted on the front door of the switch cubicle.
10. Supply Kirk key interlocks between pairs of switches at each unit substation to prevent switch operation unless the associated low voltage main device is open.
11. 15 kV station class surge arrestors shall be provided per Section 26 14 23 and connected at the incoming terminations and securely grounded to the metal structure for the secondary unit substation.

D. TRANSFORMER SECTION (DRY)

1. The transformer shall be of explosion resistant, fire-resistant, air insulated, dry type construction, cooled by the natural circulation of air through the winding.
2. The ratings of each transformer shall be as follows:
 - a. KVA Rating: 750 KVA at 80°C/997.5 kVA at 150°C AA/FA or 1500 KVA at 80°C/2000 KVA at 150°C AA/FA or KVA size as required to support the specific load of the subject project scope.
 - b. Impedance: 5.75%
 - c. HV: 12.47 kV Delta
 - d. HV BIL: 95 kV
 - e. HV Taps: ± 2 to 2- $\frac{1}{2}$ % full capacity
 - f. LV: 480Y/277 volts Delta
3. Units shall be forced air (FA) units and shall contain all necessary components and wiring for automatically increasing the KVA rating to 133%. They shall include a temperature indicator and control device. Contacts for alarm as well as for starting and stopping fans shall be included. Control power for fans shall be obtained from a control transformer within the secondary switchboard or other external source as shown on the drawings. Provide hand-off-auto switch for fan control.
4. The electrical insulation system shall utilize Class H material in a fully rated 220°C system. Transformer design temperature rise shall be based on a 30°C average ambient over a 24 - hour period with a maximum of 40°C. Solid insulation in the transformer shall consist of inorganic materials such as porcelain, glass fiber, electrical grade glass polyester or Nomex. All insulating materials must be rated for continuous 220°C duty. The insulation between the high and low voltage coils shall be more than sufficient for the voltage stress without the need of a varnish.
5. The low voltage winding shall be pressure wound on a rectangular mandrel. Multiple strands of aluminum conductor shall be used for each turn. Turn -to-turn insulation shall consist of a combination of inorganic paper, high temperature fiber winding insulation and high temperature phenolic varnish. A flexible mica plate shall be wrapped over the cooling duct spacers of the low voltage winding to insulate it from the high voltage winding. The high voltage winding shall then be tension wound indirectly over the mica barrier to form a single rigid unit. Special inorganic paper and high temperature molded glass fiber spacers shall provide the layer-to-layer insulation within the high voltage winding.

6. The completed winding assembly shall be completely dried in special ovens, vacuum impregnated with silicone varnish, and fully cured to provide a 150°C rise (220°C hot-spot) insulation system.
7. The resin shall be polyester having high resistance to moisture. The transformer shall be designed for a temperature rise of 80°C and shall be capable of operating at 35% above base nameplate KVA capacity continuously without any loss of life.
8. The transformer shall be supplied in a knockdown case design, for ease in fitting through limited openings, and shall be of 13 gage sheet minimum steel construction, equipped with removable panels for access to the core and coils. Front and rear panels shall incorporate ventilating grills.
9. Transformer shall include diagram instruction plate, provisions for lifting and jacking, removable case panel for access to high voltage strap type connector taps for de-energized tap changing, drip proof cover, two ground pads with continuous copper ground bus.

E. SECONDARY SECTION

1. General
 - a. Provide key interlocks for main breaker and high voltage switch to prevent opening of switch without first opening main breaker.
 - b. Provide secondary section with required number of bolted sheet steel enclosures for proper installation of circuit-breakers and ancillary equipment indicated.
 - c. Fasten vertical sections together to form complete, and rigid structure. Provide hot-dip galvanized bolts, nut, and lock washers for fastening purposes.
 - d. Provide studs, buswork, and complete provisions for installing future circuit-breakers; also include provisions for mounting current transformers and meters.
 - e. AC Dead-Front Distribution Switchboards: Provide factory-assembled, dead-front, metal-enclosed, self-supporting secondary power switchboards, of types, sizes, electrical ratings and characteristics indicated; consisting of vertical panel units, and containing circuit-breakers of quantities, ratings, and types indicated. Provide copper main bus and connections to circuit-breaker branches of sufficient capacity to limit rated continuous current operating temperature rise of no greater than 65°C above average ambient temperature of 40°C; with main bus and tap connections silver-surfaced and bolted tightly according to manufacturer's torquing requirements for maximum conductivity. Brace bus for short-circuit stresses up to maximum interrupting capacity. Provide accessibility of line and load terminations from front of switchboard. Provide mimic bus on front of each switchboard. Equip units with built-in lifting eyes and yokes; and provide vertical individual panel units, suitable for bolting together at project site. Switchboards shall be type General Electrical Powerbreak II, or equal, no known equal. Construct switchboard units for the following environment:
 - f. Installation: Indoors, NEMA Type 1.
 - g. Provide accessory and instrumentation small wiring, necessary fuse blocks and terminals blocks within the switchboard. All groups of control wires leaving the switchboard shall be provided with terminal blocks with suitable numbering strips.

2. Bussing

- a. All bus bars shall be copper with bolted connections at joints. The bus bars shall be of sufficient size to limit the temperature rise to 65°C rise based on UL tests and rated to withstand mechanical forces exerted during short circuit conditions when directly connected to a power source having an available fault current of 65000 amperes symmetrical at rated voltages. Provide full capacity neutral.
- b. A ground bus rated a minimum of 25% of main bus ampacity shall be furnished firmly secured to each vertical section structure and shall extend the entire length of the unit substation. An incoming ground lug shall be furnished. Other ground lugs shall also be supplied for feeder circuits as shown in the schedules on the drawings.
- c. All hardware used on conductors shall be high-tensile strength and plated. All terminals shall be of the anti-turn solderless type suitable for CU or A1 cable of sizes indicated for 75°C.

3. Construction

- a. The vertical sections shall align front and rear with depth as shown on the drawings. Mains and feeder devices shall be individually mounted with line and load bus connections. Devices shall be front removable and load connections front accessible.
- b. Main and tie devices shall be individually mounted and arranged for drawout construction. Feeder devices shall be group mounted. All circuit breaker devices shall be individually removable from the front of the switchboard.

4. Metering

- a. Provide a separate customer metering compartment with front hinged door and include the following:
- b. Manufacturer's standard electronic metering package including ammeter, voltmeter, power factor, KWHR demand meter, instantaneous KVA, and peak demand readings for the system. Provide auxiliary dry contacts to allow metering data to be transmitted to a remote central monitoring station. Provide all required current and potential transformers.

F. OVERCURRENT DEVICES - GENERAL

1. Main and tie protective devices in all secondary unit substations shall be drawout mounted power circuit breaker with interrupting rating, frame, and trip ratings as coordinated.
2. Feeder protective devices shall be individually mounted, insulated case breaker type with frame and trip rating as shown on the drawings and have additional characteristics as specified.
3. Provide interface for each circuit breaker for the project equipment monitoring system. All ground fault currents, circuit breaker trips, and reason for breaker opening (i.e., ground fault, overload, etc.) shall be reported to and recorded by the project equipment monitoring system. Coordinate between the breakers and the equipment monitoring system to insure compatibility.
4. Breakers shall be manually operated (MO) unless electrically operated (EO) is required. Electrically operated breakers shall be complete with control switch plus red and green indicating lights to indicate breaker position.

PAD MOUNTED, LIQUID-FILLED MEDIUM-VOLTAGE TRANSFORMERS**26 11 16****A. GENERAL**

1. Windings Material: Aluminum.
2. Surge Arresters: Comply with IEEE C62.11, Distribution Class: metal-oxide-varistor type, fully shielded, separable-elbow type, suitable for plugging into the inserts provided in the high-voltage section of the transformer. Connected in each phase of incoming circuit and ahead of any disconnecting device.
3. Winding Connections: The connection of windings and terminal markings shall comply with IEEE C57.12.70.
4. Efficiency: Comply with 10 CFR 431, Subpart K
5. Insulation: Transformer rating shall be the average winding temperature rise above a 30 deg C ambient temperature shall not exceed 65 deg C and 80 deg C hottest-spot temperature rise at rated KVA when tested according to IEEE C57.12.90, using combination of connections and taps that give the highest average winding temperature rise.
6. Tap changer: External handle, for de-energized operation.
7. Tank: Sealed, with welded on cover. Designed to withstand internal pressure of not less than 70 psi (50 kPa) without permanent distortion and 15 psig (104 kPa) without rupture. Comply with IEEE C57.12.36.
8. Enclosure Integrity: Comply with IEEE C57.12.28 for pad-mounted enclosures that contain energized electrical equipment in excess of 600 V that may be exposed to the public.
9. Mounting: An integral skid mounted frame, suitable to allow skidding or rolling of transformer in any direction, and with provision for anchoring frame to pad.
10. Insulating Liquids
 - a. Mineral Oil: ASTM D 3487, Type II, and tested for compliance with ASTM D 117.
 - b. Less-Flammable Liquids:
 - i. Edible-Seed-Oil-Based Dielectric: Listed and labeled by an NRTL as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic, having passed the Organization for Economic-Co-operation-and-Development G.L. 203 with zero mortality and shall be certified by the U.S. Environmental Protection Agency as biodegradable, meeting Environmental Technology Verification requirements.
 - ii. Biodegradable and Nontoxic Dielectric: Listed and labeled by an NRTL as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92.
11. Sound level shall comply with NEMA TR 1 requirements.
12. Corrosion Protection
 - a. Transformer coating system shall be factory applied, complying with requirements of IEEE C57.12.58, in manufacturer's standard color green.

- b. Fabricate front sill, hood, and tank base of single-compartment transformers from stainless steel according to ASTM A 167, Type 304 or 304L, not less than No. 13 U.S. gauge,
- c. complying with requirements of IEEE C57.12.28, standard color green.
- d. Base and Cabinets of Two Compartment Transformers: Fabricate from stainless steel according to ASTM A 167, Type 304 or 304L, not less than No. 13 U.S. gauge. Coat transformer with manufacturer's standard green color coating complying with requirements of IEEE C57.12.28.

B. MANUFACTURERS

1. ABB Control, Inc.
2. Eaton Corporation, Cooper Power Systems.
3. S&C Electric Company.
4. Siemens Energy and Automation, Inc.
5. Square D, Schneider Electric.

C. PRIMARY FUSING

1. Designed and rated to provide thermal protection of transformer by sensing overcurrent and high liquid temperature.
 - a. 150 KV BIL current-limiting fuses, conforming to requirements of IEEE C37.47.
 - b. Interrupting Rating: 50,000 rms Asymmetrical at system voltage.
 - c. Fuse Assembly: Bayonet-type, liquid-immersed, expulsion fuses in series with liquid-immersed, partial-range, current-limiting fuses. Bayonet fuse shall sense both high currents and high oil temperature to provide thermal protection to the transformer.
 - d. Provide bayonet fuse assembly with an oil retention valve and an external drip shield inside the housing to eliminate or minimize oil spills. Valve shall close when fuse holder is removed and an external drip shield is installed.
 - e. Provide a conspicuously displayed warning adjacent to bayonet fuse(s), cautioning against removing or inserting fuses unless transformer has been de-energized and tank pressure has been released.

D. HIGH-VOLTAGE SECTION: DEAD FRONT DESIGN

1. High-Voltage Section: Dead front design.
 - a. To connect primary cable, use separable insulated connectors; coordinated with and complying with the requirements of Section "Medium-Voltage Cables". Bushings shall be one-piece units, with ampere and BIL ratings the same as connectors.
2. Bushing inserts
 - a. Conform to the requirements of IEEE 386.

- b. Rated at 200 A, with voltage class matching connectors. Provide a parking stand near each bushing well. Parking stands shall be equipped with insulated standoff bushings for parking of energized load-break elbow connectors on parking stands.
 - c. Provide insulated protective caps for insulating and sealing out moisture from unused bushing inserts and insulated standoff bushings.
3. Load-Break Switch
- a. Radial-feed, liquid immersed type with voltage class and BIL matching that of separable connectors, with a continuous current rating and load-break rating of 200 or 600 amperes, and a make-and-latch rating of 12 KA rms symmetrical.
 - b. Switch shall not be located inside the transformer equipment and shall not require hot stick operation for switching of circuit feeds.

E. LOW-VOLTAGE SECTION

1. Bushings with spade terminals drilled for terminating the number of conductors indicated on the Drawings, and the lugs that comply with requirements of Section “Wires and Cables”.
2. Metering: Coordinated with and complying with requirements of Section “Powering and Monitoring and Control System”. Install the following:
 - a. Sensors.
 - b. BAS interface.
 - c. Kilowatt-hour meter.
 - d. Kilowatt-hour demand meter.

F. CAPACITIES AND CHARACTERISTICS

1. Power Rating (KVA): Per design consultant load calc.
2. Voltage Ratings: 12.47 KV – 480/277 V.
3. Taps: Comply with IEEE C57.12.26 requirements.
4. Transformer BIL (KV): Comply with IEEE C57.12.26 requirements.
5. Minimum Tested Impedance (Percent at 85 deg C: 5.5.
6. K-Factor: 1, complying with UL 1562.
7. Comply with FM Global Class No. 3990.
8. Comply with UL listing requirements for combination classification and listing for transformer and less-flammable insulating liquid.

G. TRANSFORMER CHARACTERISTICS

1. Drain and filter connection.
2. Filling and top filter press connections.
3. Pressure-vacuum gauge.
4. Dial-type analog thermometer with alarm contacts.

5. Magnetic liquid level indicator with high and low alarm contacts.
6. Automatically resetting pressure-relief device. Device flow shall be as recommended by manufacturer.
7. Stainless-steel ground connection pads.
8. Machine –engraved nameplate, made of anodized aluminum or stainless steel.
9. Sudden pressure relay for remote alarm or trip when internal transformer pressure rises at field-set rate. Provide without seal-in delay.

MEDIUM VOLTAGE FUSIBLE INTERRUPTER SWITCHGEAR

26 13 16

A. GENERAL

1. Manufacturer: GE (ABB), Schneider Electric (Square D)
2. Metal enclosed switchgear ratings:
 - a. The distribution system will be a grounded delta with two circuits, A and B.
 - b. The ratings for the integrated switchgear assembly shall be as designated below.

i. KV, Nominal	12.47
ii. KV, Maximum Design	17.0
iii. KV, BIL	95
iv. Main Bus Continuous, Amperes	600
v. Short Circuit Ratings Amperes, RMS Symmetrical	40,000
vi. MVA Three-Phase Symmetrical at rated Nominal Voltage	960
 - vii. The momentary and duty-cycle fault-closing ratings of switches, momentary rating of bus, and interrupting ratings of fuses shall equal or exceed the short-circuit ratings of the metal-enclosed switchgear.
 - c. Certification of Ratings
 - i. The manufacturer shall furnish, upon request, certification of ratings of the basic switch and fuse components and the integrated metal-enclosed switchgear assembly consisting of the switch and fuse components in combination with the enclosure(s).
 - ii. The integrated switchgear assembly shall have a BIL rating established by test on switchgear of the type and kind to be furnished under this specification. Certified test abstracts establishing such ratings shall be furnished upon request.

B. CONSTRUCTION

1. Enclosure
 - a. The enclosure of each bay shall be unitized monocoque construction to maximize strength, minimize weight, and inhibit corrosion.
 - b. The basic material shall be 11-gauge hot-rolled, pickled and oiled steel sheet.
 - c. Each bay containing high-voltage components shall be a complete unit in itself, with full side sheets resulting in double-wall construction between bays. Side and rear sheets shall not be externally bolted.

- d. The base shall be a continuous steel channel of 7-gauge material and shall extend completely around all four sides of each bay.
 - e. All hardware (including door fittings, fasteners, etc.), all operating-mechanism parts, and other parts subjects to abrasive action from mechanical motion shall be of either non-ferrous materials, galvanized, or zinc-plated ferrous materials.
 - f. Nominal bay dimensions shall be 46" wide x 46" deep x 90" tall.
2. Doors
- a. Doors shall be constructed of 11-gauge hot-rolled, pickled and oiled steel sheet.
 - b. Doors shall have 90-degree flanges and shall overlap with the door openings.
 - c. Doors providing access to interrupter switches or interrupter switches with power fuses shall be provided with a wide-view window, constructed of an impact-resistant material, to facilitate checking of switch position without opening the door.
 - d. Access control shall be provided as follows:
 - i. Doors providing access to interrupter switches only, which are operated by stored- energy type switch operators, shall be mechanically or key interlocked to guard against operating the interrupter switch if the door is open.
3. Screen Doors
- a. Each bay or compartment thereof containing high-voltage components shall be provided with a protective screen door, bolted closed, to guard against inadvertent entry to bays containing these components when the enclosure door is open.
 - b. Each bay containing a control-power transformer shall be provided with a protective screen door, bolted closed, to guard against inadvertent contact with the primary fuse when the enclosure door is open. The screen door shall be interlocked to ensure that the secondary load has been disconnected prior to removal of these fuses.
4. Insulators
- a. The interrupter-switch and fuse-mounting insulators, main-bus support insulators, insulated operating shafts, and (if applicable) push rods shall be of a cycloaliphatic epoxy resin system or of a porcelain system.
5. High-Voltage Bus
- a. Bus and interconnections shall consist of copper bar of a minimum 98% IACS conductivity.
 - b. The bus supports, bus, and interconnections shall withstand the stresses; associated with short-circuit currents up through the maximum rating of the switchgear.
6. Ground Bus
- a. A ground bus of short-circuit rating equal to that of the integrated assembly (or a ground connection, in the case of single-bay switchgear) shall be provided, maintaining electrical continuity throughout the integrated assembly.
 - b. The ground bus shall consist of aluminum bar of a minimum 56% IACS conductivity.
 - c. Bolted connections shall be as specified for the main bus, except that only one Belleville spring washer shall be required per bolt for attachment of ground bus to the nickel-plated steel bracket.

- d. For multi-bay metal-enclosed switchgear assemblies, two ground cable connectors accommodating No. 2 through 500kc mil conductors shall be provided for connection of ground bus to station ground.
7. Low Voltage Components
- a. All low-voltage components, including switch operators not integrally mounted in the switchgear, meters, instruments, and relays, shall be located in grounded, metal-enclosed compartments separate from high voltage to provide isolation and shall be arranged to allow complete accessibility for operation without exposure to high voltage.
 - b. Low-voltage wiring, except for short lengths such as terminal blocks and the secondaries of sensing devices, shall be in grounded conduit, cable trays, or raceways where necessary to isolate such wiring from high voltage.
8. Cable-Termination Space
- a. Provide full front access for easy positioning and removal of cable pulling sheaves.
 - b. Provide free access without interference from non-removable structural members or from mechanical linkages between the interrupter-switch blades and operating mechanism.
9. Finish
- a. The finish shall be light gray, No. 61 ANSI Standard Z55.1.
 - b. A packaged kit of refinishing materials - with complete instructions - shall be included with each shipment of metal-enclosed switchgear for touch-up in the field.
10. Louvers shall be provided at the top and bottom of the front and rear of each bay.
11. Lifting eyes shall be removable.

C. BASIC COMPONENTS

1. Interrupter Switches
- a. Interrupter switches shall have a one-time or two-time duty-cycle fault-closing rating equal to or exceeding the short-circuit rating of the integrated switchgear assembly. These ratings define the ability to close the interrupter switch either alone (unfused) or in combination with the appropriate fuse, once or twice (as applicable) against a three-phase fault with asymmetrical current in at least one phase equal to the rated value, with the switch remaining operable and able to carry and interrupt rated current.
 - b. Interrupter switches shall utilize a quick-make mechanism. For interrupter switches operated by stored-energy switch operators, the quick-make mechanism shall be integral part of the switch operator.
 - c. Interrupter switches shall be provided with a single blade per phase for circuit closing including fault closing, continuous current carrying, and circuit interrupting. Spring-loaded auxiliary blades shall not be permitted.
 - d. Circuit interruption shall be accomplished by use of an interrupter which is positively and inherently sequenced with the blade position. Circuit interruption shall take place completely with the interrupter, with no external arc or flame. Any exhaust shall be vented in a controlled manner through a labyrinthine muffler or a deionizing vent.
 - e. Interrupter switches shall have a readily visible open gap when in the open position to allow positive verification of correct switch position.

- f. Entrance and tie modules shall have key interlocks to guard against access to fuses unless all switches are open.
2. Power Fuses
 - a. Each main and feeder switch module shall be fused with electronic fuses, S and C Fault Filter, no known equal, sized as scheduled on the drawings.
 - b. Fuses for the service entrance modules shall have inverse-curve-type time-current characteristics. Fuses for the feeder modules protecting transformers in unit substations shall have time-delayed compound-curve-type time-current characteristics.
 3. Voltage-Sensing Devices
 - a. Voltage-sensing devices for use with open-phase detectors shall be capacitively coupled voltage sensors on three phases.
 - b. The voltage sensors shall directly replace apparatus insulators at the hinge end of fuses or the lower terminal of interrupter switches. Voltage sensors shall be constant-current-output devices that do not require primary fuses.
 - c. The output voltage of the voltage sensors shall be directly proportional to line-to-ground-voltage and shall have relay accuracy over an ambient temperature of -40°F to +160°F.
 - d. The output of the voltage sensors shall be connected to a secondary burden that does not require adjustment to compensate for a difference between system line-to-ground voltage and the sensor's rated nominal line-to-ground voltage.
 - e. There shall be test jacks and adjustment screws to allow for measuring and adjusting the voltage-sensors signal inputs.
 4. Arrestors
 - a. Cable terminations shall be furnished with each switch and shall be made with modular non - tracking rubber cable terminators with integral internal stress relief device. Terminators for use on 15 kV grounded wye system shall be rated at 15 kV with 110 kV, 1.2 x 50 wave and 30 kV corona extinction.
Provide cable terminations for the quantity and size of cables for each switch.

LOW-VOLTAGE TRANSFORMERS

26 22 00

A. GENERAL

1. The distribution system will be a grounded delta with two circuits, A and B.
2. The ratings for the integrated switchgear assembly shall be as designated below.
 - a. Transformer cooling fans or moving parts may not be used, except in unit substation equipment.
 - b. All dry type transformers rated 15 kVA and larger shall have two 2 -1/2 percent full capacity taps above normal (FCAN) and four 2-1/2 percent full capacity taps below normal (FCBN) rated primary voltage.
3. Dry type transformers shall be copper-wound. Temperature rise ratings shall comply with:
 - a. 25 KVA and smaller; Insulation Class 185 degrees C, 115 degrees C temperature rise.
 - b. 30 KVA and larger; Insulation Class 220 degrees C, 150 degrees C temperature rise.
4. Transformer manufacturers shall be:

- a. PowerSmith
 - b. UCDH PO&M approved equal
5. Provide hinged lockable doors on transformers with 360 degree rotatable IR port.
 6. Transformers shall meet the following sound level ratings:
 - a. 0 – 9 KVA 40 dB
 - b. 10 – 50 KVA 45 dB c. 51 – 150 KVA 50 dB
 - c. 151 – 300 KVA 55 dB
 - d. 301 – 500 KVA 60 dB
 - e. 501 – 750 KVA 62 dB
 7. Provide minimum K-4 rated transformer. Where transformer will serve nonlinear loads, prepare power system to study harmonics.
 8. Provide K rated transformers where required in the contractor prepared power system study harmonics section or where known nonlinear loading exists.
 9. Housekeeping pads are required for floor mounted transformers. Provide external vibration isolators for non-HCAI facilities.
 10. Transformers shall meet US Department of Energy's Candidate Standard Level Three (CSL-3) efficiency. Transformers shall be designed to exceed the latest requirements of the California Code of Regulations Title 20 and Title 24 and NEMA TP-1 efficiency standards. Transformer efficiency shall meet or exceeds the January 1, 2016 energy efficiency levels listed in DOE 78 FR 23335 (April 18, 2013), 10 CFR 431.196 or the most current energy standards if more stringent
 11. Use flexible conduit indoors in dry locations or liquid -tight flexible conduit in damp/wet locations, two-foot minimum in length, for primary and secondary connections to transformer case. Make connections to side panels of enclosure, except for floor mounted transformers fed from directly below enclosure.
 12. Transformers not specifically designed for wall mounting, shall be spaced a minimum of 6" from adjacent walls, ceiling and equipment.
 13. Install the transformers on the noise and vibration isolation pads designed to suppress the transformer noise from the building structure. Select and arrange the pads in accordance with the weight and mounting of the transformers. These pads are in addition to any internal vibration pads. Provide a neoprene sleeve over the portion of the bolt that passes through the transformer base or mounting bracket. Provide a rubber washer between the bolt head and the mounting channel.
 14. Provide noise and vibration analysis when transformers are installed above ground level.

SWITCHBOARD AND PANELBOARDS

26 24 00

A. GENERAL

1. All switchboard and panelboard bussing shall be copper.

- a. All neutral bussing shall be 200% rated. Increase neutral ratings of feeders to 150% or 200% when K rated transformers are used or as coordinated with the expected harmonic profile of the loads served.
- b. Provide a listed surge protective device (SPD) on all emergency power system panels and switchboards.
- c. Boards breakers shall match the kAIC rating and manufacturer of the enclosure.
- d. Switchboard and panelboard manufacturers shall be:
 - i. Square D (Schneider Electric)
 - ii. UCDH PO&M approved equal
- e. Panels shall not be located behind doors.
- f. All factory connections including factory installed breakers must be torque tested and verified.

B. PANELBOARDS

1. Panelboards shall be furnished with door in door style hinged trims.
2. Provide board with integral lock. All boards on the project shall be keyed alike.
3. Ground bus shall be full size, include an isolated ground bus when isolated grounding equipment is utilized.
4. Boards shall be rated for fault current as coordinated with results of contractor prepared power system study, and minimums as follows:
 - a. 120/208 volt branch circuit panels 10,000 AIC
 - b. 120/208 volt distribution panels 18,000 AIC
 - c. 277/480 volt branch circuit panels 35,000 AIC
 - d. 277/480 volt distribution panels 42,000 AIC
5. Main circuit breakers shall be bus connected to the panel, vertically mounted, and not group aligned in branch breaker positions, include lockoff hardware.
6. When required provide a digital Panelboard metering System. The system shall be provided with all features and requirements necessary to interface with the existing infrastructure. Upgrades in the existing BMS, GE PMCS, or Metasys systems shall be provided as necessary to integrate the panelboard metering system.
7. Branch breakers shall be bolt on style molded case, thermal magnetic trip type.
8. Include adjustable trip breakers where required to achieve selective coordination or limit fault current as coordinated with the results of the contractor prepared power system study.
9. Stub (2) spare one-inch conduits to accessible location above ceiling out of each recessed panelboard.
10. Provide a typewritten index of circuits inside the door of the panelboard. Type directing to indicate actual field installation, with odd numbering on left and even numbering on right.
 - a. Load descriptions must be accurate. Do not just label loads as “receptacles or lighting”.
 - b. The room numbers and locations of the loads/devices MUST be included in the description.

- c. Index must include what panel and circuit or breaker feeding the panel along with the room location of the panel or breaker feeding the panel.
11. Provide electronic version of panel schedule to PO&M. Utilize PO&M panel schedule template.

C. SWITCHBOARDS

1. All switchboard sections shall be front or rear accessible factory-assembled, dead front, metal- enclosed, and self-supporting.
2. Switchboard short circuit withstand rating shall be minimum 65,000AIC unless otherwise coordinated.
3. Main circuit breaker shall be power drawout type or insulated case circuit breakers, individually mounted.
4. Feeder circuit breakers shall be group mounted, 100% rated for continuous duty.
5. Include electronic fully adjustable trip breakers where required to achieve selective coordination or limit fault current as coordinated with the results of the contractor prepared power system study.
6. Provide a microprocessor-based power metering System. The system shall be provided with all features and requirements necessary to interface with the existing GE PMCS Systems and the existing JCI Metasys system. Upgrades in the existing GE PMCS and Metasys systems shall be provided as necessary to integrate the panelboard metering system.
7. When installing new switchboards in Type 1 OSHPD projects provide power drawout circuit breakers for all breakers in the switchboards.
8. Double ended main and tie breakers shall be individually mounted and arranged for drawout construction. Feeder devices shall be individually mounted for drawout construction and compartmentalized. All circuit breaker devices shall be individually removable from the front of the switchboard.
9. Provide a trolley system at the top of switchboards when utilizing power drawout style circuit breakers.
10. Include neutral to ground disconnect link at service rated equipment installations.

WIRING DEVICES

26 27 26

A. GENERAL

1. All devices installed at medical facilities shall be hospital grade, 20 amp minimum.
2. All devices installed at teaching and non OSHPD office facilities shall be heavy duty industrial grade, 20 amp minimum.
3. All electrical devices and switches shall have engraved device covers, Critical, life safety, and equipment branch devices shall have devices in red and nameplates engraved in red text. Normal branch devices shall have nameplates engraved in black text. All other device colors shall be as coordinated with the project architect or the University Representative.

4. Ground fault circuit interrupter (GFCI) receptacles: 3 wire grounded, white, or match existing finish, rated 20 amps, 125V. All GFCI devices shall be standalone type, not feed through protected.
5. Provide locking in use metallic covers for exterior weatherproof outlets. All exterior receptacles shall be weather resistant type, GFCI.
6. Device covers shall be stainless steel type and engraved for panel and circuit. In tamper proof areas such as pediatrics and psychology and public waiting areas provide tamper proof devices and screws.
7. Mount receptacle vertically with the grounding U at the top. For horizontally mounted receptacles mount receptacle with neutral side up.
8. Branch circuiting for the life safety, critical, and equipment branch devices shall have dedicated neutrals. All circuits in patient rooms shall have dedicated neutrals.
9. Provide controlled receptacles as coordinated with California Title 24. An optional strategy using any alternate compliance via computer software shutdowns may be discussed with the AHJ.
10. Unless otherwise noted on drawings, mounting heights to center of devices shall be as follows:
 - a. Switches: 42 inches
 - b. Receptacles: 18 inches
11. Provide welding equipment receptacles in Central Utility Plant. Coordinate exact locations with UCDH.
12. No pre-wired switches or receptacles allowed.

B. TELECOMMUNICATIONS SPACE ELECTRICAL REQUIREMENTS

1. Convenience duplex receptacles shall be installed on a 20A/1P dedicated circuit in the room.
2. Where Equipment Rack and Cabinets exist with active electronics, power connections are required. Coordinate with the University Representative and IT to confirm how many powered rack locations are required in each telecom space. At a powered rack location provide:
 - a. One (1) duplex 20 Amp, 120V AC NEMA 5-20R-receptacle on normal power above the rack.
 - b. One (1) 120/208V, 3 phase, 5 wire, NEMA L21-30R-receptacle on normal power above the rack.
 - c. One (1) 120/208V, 3 phase, 5 wire, NEMA L21-30R-receptacle on UPS power above the rack.
 - d. All UPS power configurations shall be evaluated on a case by case basis with the University Representative and IT to determine desired UPS system configuration (central vs. rack mount vs. other). UPS must be able to function on generator power.

LOW-VOLTAGE CIRCUIT PROTECTION DEVICES**26 28 00****A. GENERAL**

1. Overcurrent protective devices shall satisfy all CEC mandated selective coordination requirements (e.g. CEC Articles 517, 620, 645, 695, 700, 701, 708) in addition to any project specific selective coordination requirements above and beyond CEC requirements.
2. Series ratings of breaker devices shall not be used.
3. Breakers installed in equipment shall match the manufacturer and kAIC rating of the equipment.
4. Mounting shall be “bolt-on” type, removable without disturbing any other breaker.
5. Molded case circuit breakers shall not be used above 800 amps.
6. Insulated case circuit breakers shall be used above 800 amps.
7. Power circuit breakers shall be used in service switchboards, unit substations, and OSHPD type 1 buildings.
8. Circuit breakers serving the fire alarm system shall be red in color (by factory, no painted) with breaker locking device on.
9. Include lock off hardware for maintenance and lock out tag out.
10. Over current protective devices shall be provided with trip styles, adjustability features, frames, kAIC ratings, and coordination characteristics as coordinated with the results of the contractor prepared power system study. All adjustable breaker settings shall be field set by the contractor and tested.

ENCLOSED CONTROLLERS (MOTOR STARTERS)**26 29 13****A. GENERAL**

1. Provide single phase manual motor switches (MMS) for all motors smaller than ½ hp unless indicated otherwise. For all motors ½ HP and larger or as indicated on the drawings, provide 3 phase full voltage magnetic across the line starters or variable frequency drive (VFD) with low harmonics. VFD shall have auxiliary points for connection to the existing Building Management System.
2. Auxiliary Contacts - Each starter to have a minimum of two Normally Open (NO) auxiliary contacts with provision to add a minimum of two more.
3. Selector Switch -To have HOA (Hand-Off-Auto) selector switch mounted in cover.
4. Pilot Light – Red LED pilot light mounted in cover to be activated through a starter auxiliary contact, (not across the coil, or parallel with the coil).
5. Acceptable manufacturers shall be:
 - a. ABB for variable frequency drives (VFDs)
 - b. Square D for motor control centers (MCCs)
 - c. UCDH PO&M approved equal

AUTOMATIC TRANSFER SWITCHES (ATS)**26 36 00****A. GENERAL**

1. Transfer switches shall be closed transition bypass isolation type. The transfer switch shall be Draw-out with self-aligning jaws.
2. Switches shall be closed transition type but capable of programming for open and/or adjustable time delayed transitions.
3. Switches shall be four pole type everywhere when a neutral accompanies the feeder, as coordinated by the electrical engineer, with facility ground fault protection scheme and separately derived sources.
4. Switches shall be UL 1008 listed.
5. Coordinate new transfer switch withstand and closing rating (WCR) with all circuit breaker settings to ensure selective coordination of breaker short time settings.
6. Switch shall be provided with a separated and isolated digital user control panel. Panel shall be mounted at the face of the switch, have visual display for current switch status, with touch screen to
 - a. Adjustments for all separate time delays, exerciser, transfer status, ATS statistics, and historical event log.
 - b. Power quality meter monitoring information for voltage, frequency, phase, KW, KVA, PF, and trending.
7. Include communications modules capable of integration to the building management system via RS485, Modbus TCP/IP, BACnet IP and SNMP protocols.
8. Switches shall be furnished with normally open/closed 125V DC contacts (use the closed contacts) for integration with the central plant 125V DC start/stop signaling system.
9. New ATS equipment shall have position monitoring via the BMS and be furnished with selective load shed capabilities for interface to the future UC Davis Health campus load shed add scheme. Per CEC 517.31(B) Optional standby CUP served ATS equipment shall be shed in the event of overloading.
10. Provide generator start circuit monitoring system.
11. Manufacturer shall be ASCO, series 7000 or UCDH PO&M approved equal.
12. In the Hospital, a Remote Status Panel is located in the Fire Command Center and communicates via RS 485 port from each transfer switches respective microprocessor control panel. Provide LED indicators for each automatic transfer switch in the Fire Command Center. These LED's shall consist of a red lamp to indicate connection to the emergency source and a green lamp to indicate connection to the normal source, one lamp of each color for each automatic transfer switch. Clearly label each pair of red/green lamps as to which ATS they are indicating, pole branch of the ATS and the floors or area served, i.e., "ATS-EQ, equipment branch."
13. Transfer switch to have a full rated neutral with lugs for NORMAL, EMERGENCY and LOAD neutral conductors inside cabinet (4 pole with a switched neutral). Equipped with direct acting linear operators for simple, reliable and fast acting during automatic operation.

SURGE PROTECTION DEVICES
26 43 13
A. GENERAL

1. Provide surge protective device (SPD) equipment having the electrical characteristics, ratings, and modifications as specified herein and as shown on the drawings. To maximize performance and reliability and to obtain the lowest possible let-through voltages, the ac surge protection shall be integrated into electrical distribution equipment such as switchgear, switchboards, and panelboards.
2. The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition. Device shall have an audible alarm under any fault condition.
3. SPD units shall be furnished in two Types. Type 1 and Type 2 as outlined below:
 - a. Type 1: Permanently connected SPDs installed on the line or load side of main disconnect device(s), at main switchboards. This type closely relates to the devices previously referred to as secondary surge arrestors. These Type 1 SPDs should be specially suited to conduct the high energy impulses from lightning strikes.
 - b. Type 2: Permanently connected SPD installed on the load side of the service panel main disconnect device(s). This type most closely relates to devices that were previously classified as Transient Voltage Surge Suppression (TVSS). These Type 2 SPDs are especially suited for distribution boards and panelboard applications.
4. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments. The minimum surge current capacity the device is capable of withstanding shall be as shown in the following table:

Minimum Surge Current Capacity Table			
Category	Application	Per Phase	Per Mode
C	Service Entrance Locations	250kA	125kA
B	High Exposure Roof Top Locations (Switchboards and Panelboards)	160kA	80kA
A	Branch Locations (Panelboards)	120kA	60kA

5. All SPDs installed on the line side of the service entrance disconnect shall be Type 1 SPDs. All SPDs installed on the load side of the service entrance disconnect shall be Type 1 or Type 2 SPDs.

INTERIOR LIGHTING
26 51 00
A. GENERAL

1. All interior lighting fixtures shall be LED type. UL 8750 recognized or listed as applicable. UL listed or Nationally Recognized Testing Laboratory (NRTL) listed.
2. All interior lighting shall have a Kelvin color temperature of 3,500K.
3. A minimum Color Rendering Index (CRI) of 90 shall be used for all fixtures.

4. Fixtures shall utilize 0-10v dimming (for dimming from 100% to 1%) as the standard controls protocol but other technologies may be implemented, as coordinated with the project's lighting control system.
5. IESNA L70 lifetime minimum 80,000 hours. Tested in accordance with IESNA LM-79 and IESNA LM-80 test data.
6. Minimum efficiency of 90 lumens per watt and on the Design Lighting Consortium's (DLC) current qualified Products list (QPL).
7. Recessed luminaires in suspended ceilings shall be supported by connecting two support wires to the luminaire at diagonal opposite corners for luminaires weighing 56 pounds or less. Connect four wires, one at each corner for luminaires weighing more than 56 pounds.
8. All concealed junction box cover plates for the lighting branch circuit system shall be clearly marked with a permanent black ink felt pen identifying the branch circuit (both panel designation and circuit number) contained in the box. Refer to Box Identification requirements under Campus Design Guidelines.
9. Lighting levels shall conform to Illuminating Engineering Society of North America (IESNA) standards (see the IESNA Lighting Handbook: Reference & application or the IESNA Lighting Ready Reference). Zone lighting or task lighting shall be utilized whenever energy efficiency can be improved by these measures. Comply with current California Title 24 Energy Code published by the California Building Standards Commission.
10. Furnish spare quantity of installed luminaires per luminaire type as follows:
 - a. For 1-20 of a luminaire type, provide [1] extra luminaire.
 - b. For 21-50 of a luminaire type, provide [5] extra luminaires.
 - c. For 51-100 luminaire type, provide [10] extra luminaires.
 - d. For any quantities of 101 or more, coordinate with UCDH PO&M for quantity of extra luminaires required.
11. Typical Lighting Levels:

Room/Space	Lighting Level (footcandle, FC)
Patient Room	50
Nurses Station	30 (General)/50 (Workstation)
Corridor	5-10
Waiting Area	10
Lobby	5
Office	30-50
Pharmacy (Work/prep area)	100 (at horizontal work plane)

B. FIXTURES

1. All fixtures shall utilize LED modules and compatible drivers unless otherwise noted. Provide recessed and surface fixtures with all mounting hardware and mounting ceiling trims for a

complete installation in the type of ceiling which they are intended to be installed. Provide access to LED modules and drivers through the lens or below the ceiling, without the removal of the entire fixture or permanent ceiling.

2. Pendant mounted fixtures to be provided with mounting cable, stems, ball aligners, feed cable, canopies, swivel hangers, safety cables and all mounted hardware to conform to the state of California Seismic safety standards. In indirect linear systems provide clear dust covers to facilitate cleaning. Covers to be manufacturer provided, not field fabricated.
3. All light fixtures in Utilities and Central Plant mounted over 15' from the floor shall be mounted with lowering system to service the light fixture.

C. LED LIGHTING DRIVERS

1. LED type. UL 8750 recognized or listed as applicable. UL listed or Nation ally Recognized Testing Laboratory (NRTL) listed.
2. Drivers to be UL listed or NRTL listed for the type of load that they are used. Compliant with California Energy Code requirements.
3. Compatibility of driver and LED light engine must be tested and ensured by fixture manufacturer. Warranty of the fixture, driver and light engine by the fixture manufacturer. Provide manufacturer's warranty covering 5 years on drivers from date of installation.
4. Inaudible in a 27 dBA ambient.
5. No visible change in light output with a variation of +/- 10 percent line voltage input.
6. Make replacements available for minimum of ten years from date of manufacture.
7. Drivers shall have a maximum THD of 20%.

D. SPECIALTY APPLICATIONS

1. In MRI rooms provide luminaires with high CRI and low level dimming 100-1% and off. Utilize only LED fixtures to meet or exceed TESLA rating of MRI machines within the procedure rooms. Dimming 100-1% and off in control area. All luminaires to have cleanable surfaces.
2. In radiology, ultrasound, Nuclear Camera, CT Scanner, mammography and other similar use rooms, provide high CRI and low level dimming 100-1% and off. Multi-system preferred. Dimming 100-1% and off in control area. All luminaires to have cleanable surfaces.

E. EXIT SIGNS

1. LED color shall be red. Face color white, painted metal. Provide clear polycarbonate vandal resistant shields outdoors, in parking structures and where required by the use of the space.
2. Provide face configurations, chevron directional arrows, and canopy or wall mounting provisions (universal installation type) as coordinated with the egress plan.
3. Tritium exit signs shall not be used on the UC Davis Health cam pus. Where existing tritium exits signs are found in areas of remodel, they shall be disposed of following EPA guidelines. And replaced with LED type.
4. Connect exit signs to unswitched emergency circuit where available in the building. Where emergency circuits or inverter are not available provide self-powered exit signs.

EXTERIOR LIGHTING
26 51 10
A. GENERAL

1. All exterior lighting fixtures shall be LED type with a kelvin color temperature of 3,000K.
2. Minimum color rendering index (CRI) of 90, with a minimum of 80,000 hours, and an efficiency of 80 lumens per watt and be on the DLC's QPL.
3. Provide fully gasketed, exterior fixture lens and diffuser frames to prevent moisture, debris, and insects from entering the fixture housing.
4. Site lighting fixtures shall be provided to match the existing UC Davis Health campus standard fixtures: Gardco style CA. Include concrete foundations.
5. All junction box cover plates for site lighting shall be clearly marked on the inside with a permanent black ink felt pen identifying the branch circuit (both panel designation and circuit number) contained.
6. All fixtures shall be designed to minimize light pollution and glare, while meeting the light distribution requirements for a given area. A designation of full cutoff shall be considered, but not the sole criteria in evaluating a fixture's ability to minimize light pollution and glare.
7. Typical Lighting Levels:

Area	Lighting Level (footcandle, FC)
Primary Egress Pedestrian Pathway	2
Other Pedestrian Pathway	1
Parking Lots	0.5 to 1

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

BASIC PROJECT INFORMATION			
Project Name: Behavioral Health Cypress Relocation	Project Number: M059993	Today's Date 01/04/2024	
Impacted Department(s): Vacant	Building Number and Name: Cypress Building	Floor: 1st Floor	Suite/Room: D
Estimated Construction Start Date: 01/22/2024		Estimated Completion Date: 03/01/2024	
UCDH Project Manager: Thomas Kaiser	UCDH PM Mobile Phone #: 279.386.9930	UCDH PM Email: tkaiser@ucdavis.edu	
Construction Manager: n/a	CM Mobile Phone: n/a	CM Mobile Email: n/a	
GENERAL PROJECT SCOPE			
<p>Perform minimal make-ready and refresh work to the Cypress Building 1st Floor D Suite being vacated by CTSC Clinical Research Center and the Crisis Stabilization Unit relocated into. Scope of work includes:</p> <ol style="list-style-type: none"> 1. Replace some areas of carpet & VCT with LVT resilient flooring. 2. Remove all wall mounted and ceiling hung electrical conduit/receptacles, equipment, fixtures, curtains/tracks, pictures and accessories. 3. Furnish & install stainless steel blank covers on receptacles 4. Patch & paint all wall surfaces per UCDH approved specification. 5. Remove all hanging window coverings and install acrylic panels & privacy film over single pane glass. 6. Remove all patient room casework, doors/closures. 7. Furnish & install corner guards on brick walls and padded covers on exposed steel support 			
ATTACH DESCRIPTIVE PROJECT SCHEMATIC OR IMAGE TO PACKET			
MULTIDISCIPLINARY TEAM			
Identify the multidisciplinary team included in this review and agree with the requirements identified within the package.			
Department	Name	Email	
UCDH Project Manager	Thomas Kaiser	tkaiser@ucdavis.edu	
Fire Marshal's Office	Casey Irving	cairving@ucdavis.edu	
Infection Prevention	Colin Mcglynn	ccmcglynn@ucdavis.edu	
Environmental Health & Safety	Ashley Brown	ashbrown@ucdavis.edu	
Contractor Representative	Chris Williams	c.williams@streamlineconstruction.net	
Other Multidisciplinary Team Members			

INFECTION CONTROL RISK ASSESSMENT

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

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

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

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

Describe key patient risks: While area is technically for patient care, it is vacant during construction.

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 checked="" 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:	None	Roof	Medical Records & 1500 Transplant Clinic	Exterior	Exterior
Risk Group:	Low	Low	Low	Low	Low
Unit Contact:					
Phone:					
Email:					
Additional Controls:	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input checked="" type="checkbox"/> Dust control <input checked="" type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input checked="" type="checkbox"/> Dust control <input checked="" type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input checked="" type="checkbox"/> Dust control <input checked="" type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input checked="" type="checkbox"/> Dust control <input checked="" type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization	<input type="checkbox"/> Noise <input type="checkbox"/> Vibration <input checked="" type="checkbox"/> Dust control <input checked="" type="checkbox"/> Ventilation <input type="checkbox"/> Pressurization
Impact on other systems, such as:	<input type="checkbox"/> Data <input checked="" type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input checked="" type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input checked="" type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input checked="" type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems	<input type="checkbox"/> Data <input checked="" type="checkbox"/> Mechanical <input type="checkbox"/> Med Gases <input type="checkbox"/> Water Systems
Notes:	Work space is vacant				

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

NOISE AND VIBRATION ASSESSMENT

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

AIR QUALITY IMPACT

Type	Suggested Control Measures
<input checked="" 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 checked="" type="checkbox"/> Asbestos <input type="checkbox"/> Paint Solvent/Cleaner <input type="checkbox"/> Roofing Tar <input type="checkbox"/> Other:	<input checked="" type="checkbox"/> Restrict/shut down air handlers for the duration of the activity <input type="checkbox"/> Install temporary partitions <input type="checkbox"/> Install charcoal filters in HVAC or portable units <input type="checkbox"/> Install temporary ductwork and portable units <input type="checkbox"/> Prohibit idling of heavy equipment engines <input type="checkbox"/> Provide local exhaust ventilation <input type="checkbox"/> Substitute material with low VOC product <input type="checkbox"/> Notify area staff and EH&S before construction activity that may impact air quality <input checked="" type="checkbox"/> Provide negative pressure/HEPA filtration <input checked="" type="checkbox"/> Exhaust HEPA–99.97% to exterior <input checked="" type="checkbox"/> Relocate members/staff to another area of the facility for the duration of the activity <input type="checkbox"/> Schedule activities during hours that minimize patient, visitor, and staff impact. Hours: <input type="checkbox"/> Provide Safety Data Sheets to EH&S for other recommended actions <input type="checkbox"/> Other:

HAZARDOUS MATERIALS

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


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

ACKNOWLEDGEMENT OF HAZARDOUS MATERIALS


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

CONTAINMENT REQUIREMENTS WORKSHEET

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

ICRA Permit Number	ICRA Class
24-11	IV 

Project Number: M059993	Project Name: Behavioral Health Cypress Relocation		
Impacted Department: Vacant	Building Number and Name: Cypress	Floor: 1st Floor	Suite/Room: D
UCDH Project Manager: Thomas Kaiser	UCDH PM Mobile Phone #: 279.386.9930	UCDH PM Email: tkaiser@ucdavis.edu	
Construction Manager: n/a	CM Mobile Phone: n/a	CM Mobile Email: n/a	
General Contractor: Streamline Construction	General Contractor Mobile Phone: 530.263.6609	General Contractor Mobile Email: c.williams@streamlineconstruction.net	
Containment will be set up and maintained by: Streamline Construction		Third-Party Containment Consultant: Select Environmental	

ICRA Class:	IV 	Project Start Date 01/22/2024	Completion Date 03/1/2024
Additional Requirements			
Signatures	Project Manager Thomas Kaiser	General Contractor Chris Williams - Streamline Const.	Infection Control and Prevention <i>Colin McGlynn</i>
Downgrade Request – ICRA Class	Choose an item	Project Start Date	Completion Date
Additional Requirements			
Signatures	Project Manager	General Contractor	Infection Control and Prevention
Extension Request – ICRA Class	Choose an Item	Project Start Date	Completion Date
Additional Requirements			
Signatures	Project Manager	General Contractor	Infection Control and Prevention

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

INFECTION PREVENTION REQUIREMENTS - CLASS I

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

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

INFECTION PREVENTION REQUIREMENTS - CLASS III

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

INFECTION PREVENTION REQUIREMENTS - CLASS III

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

Removal of Critical Barriers:

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

Negative Air Requirements:

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

HVAC systems:

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

Additional Infection Prevention Requirements:

INFECTION PREVENTION REQUIREMENTS - CLASS IV

Prior to and During Construction:

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

INFECTION PREVENTION REQUIREMENTS - CLASS IV

Upon Completion of Work:

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

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

Work Area Cleaning:

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

Removal of Critical Barriers:

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

Negative Air Requirements:

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

HVAC systems:

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

Additional Infection Prevention Requirements:

INFECTION PREVENTION REQUIREMENTS - CLASS V

Prior to and During Construction:

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

INFECTION PREVENTION REQUIREMENTS - CLASS V

Upon Completion of Work:

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

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

Work Area Cleaning:

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

Removal of Critical Barriers:

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

Negative Air Requirements:

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

HVAC systems:

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

Additional Infection Prevention Requirements:

INFECTION PREVENTION REQUIREMENTS – EXTERIOR

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



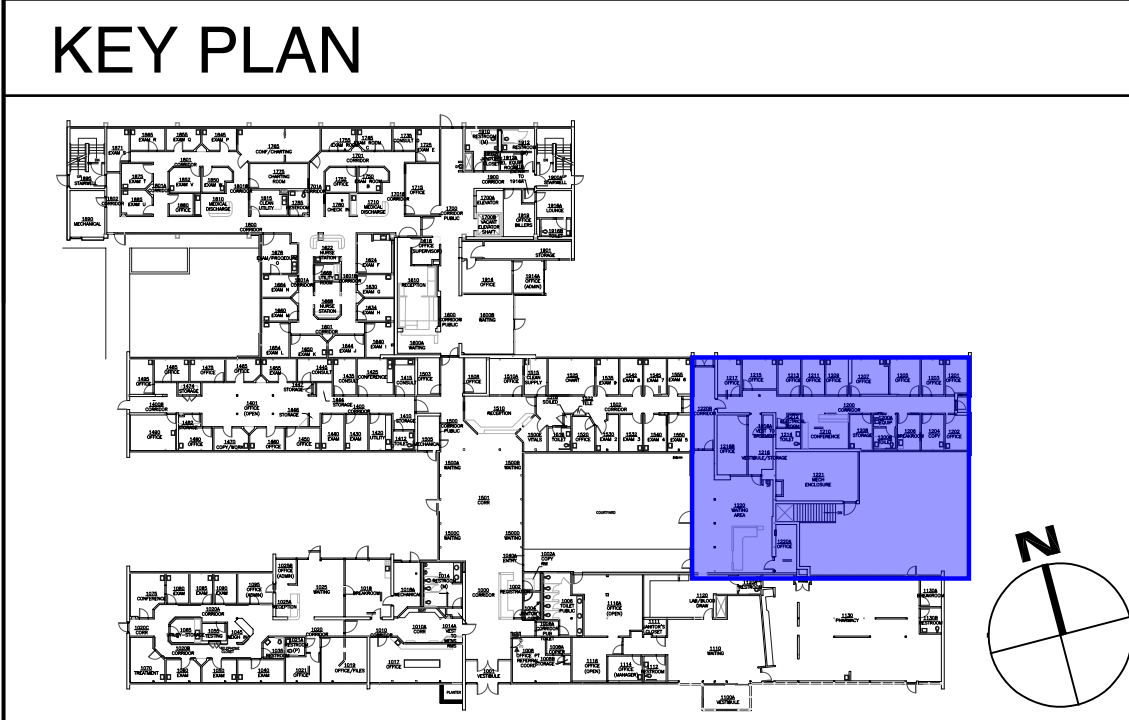
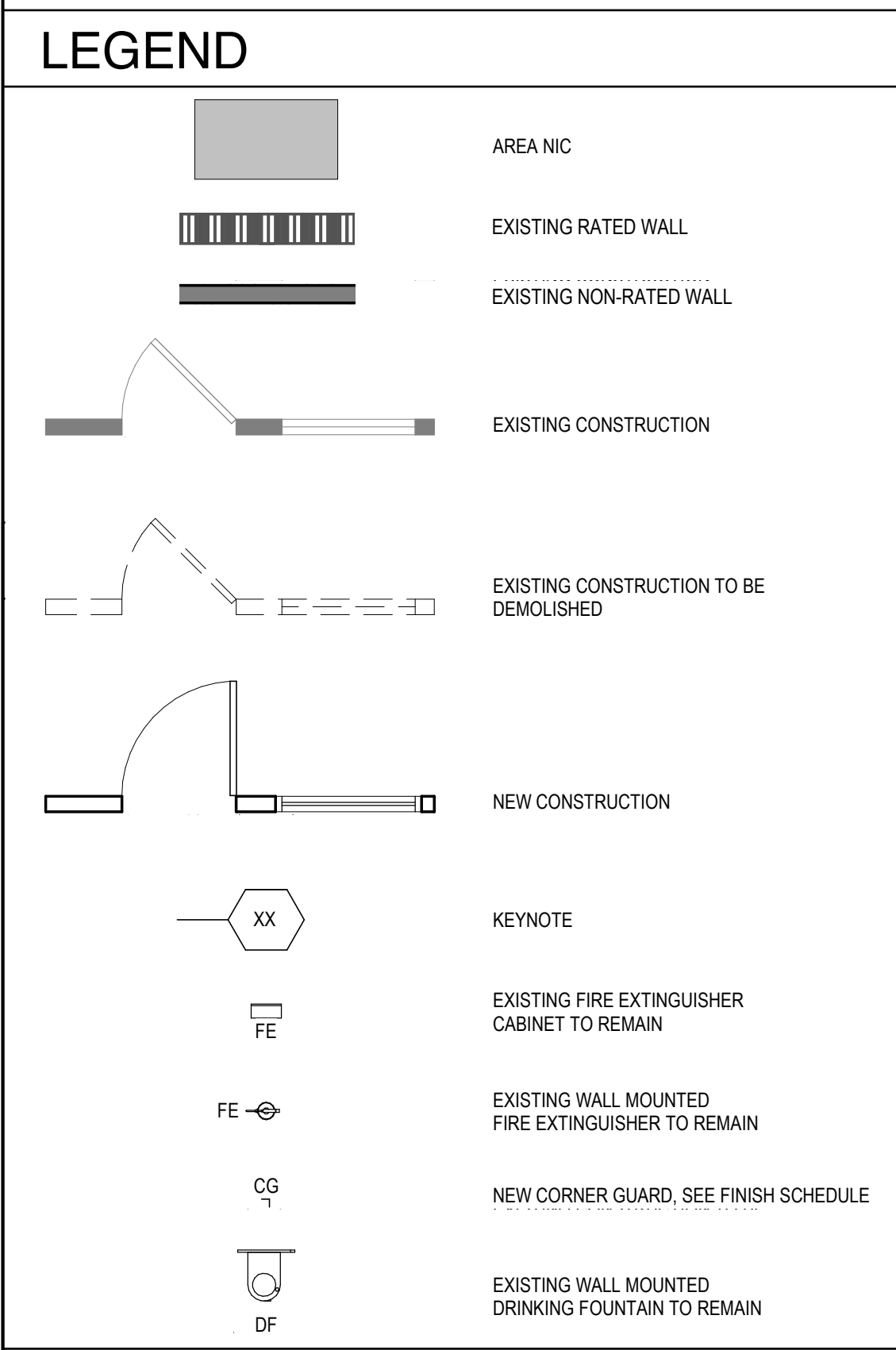
- ### PLAN KEYNOTES
- REMOVE EXISTING DOOR AND DOOR HARDWARE. PATCH AND REPAIR. CONTRACTOR TO COVER EXISTING HINGES, PATCH AND REPAIR AS NEEDED
 - REMOVE ALL EXISTING WALL MOUNTED ACCESSORIES I.E. DISPENSERS, AND CONTAINERS INCLUDING MIRRORS, CURTAIN CEILING TRACKS, WINDOW SHADES, AND TV MOUNTING BRACKETS, PATCH, REPAIR AND PAINT AS NEEDED
 - REMOVE/COVER EXISTING WALL SURFACE MOUNTED OUTLETS, DATA PORTS AND CONDUITS, PATCH AND REPAIR AS NEEDED, COORDINATE WITH UC/DH IT DEPARTMENT
 - REMOVE ALL EXISTING FIXED TABLES, DESKS, CASEWORK, CABINETS AND UPPER CABINETS, PATCH AND REPAIR AS NEEDED
 - ALL IT RELATED DEVICES TO BE RELOCATED, CONTRACTOR TO COORDINATE WITH UC/DH IT DEPARTMENT
 - CONTRACTOR TO PROVIDE PRIVACY, SUN CONTROL AND IMPACT RESISTANT WINDOW FILM, SEE FINISH SCHEDULE (GF-1)
 - NEW WALL BASE TO EXTEND AND TERMINATE INTO INSIDE CORNERS
 - ALL WALL SERVICE DEVICES/ACCESSORIES INCLUDING WALL MOUNTED FILE PLACEMENTS AND HAND SANITIZER DISPENSERS TO BE REMOVED, PATCH AND REPAIR AS NEEDED
 - EXISTING ROOM IDENTIFICATION SIGNAGE TO REMAIN, UC/DH DEPARTMENT TO COORDINATED NEW SIGNAGE ROOM NAME TEMPLATES.
 - WALL MOUNTED FIRE EXTINGUISHER FLAG SIGNAGE TO BE REMOVED, PATCH WALL AS NEEDED
 - NEW SURFACE MOUNTED FIRE EXTINGUISHER CABINET, CENTER ON WALL, SPEC TO MATCH EXISTING
 - REMOVE ALL SURFACE/WALL-MOUNTED DISPENSERS IN WAITING ROOM 1220
 - STEEL POST TO BE PADDED, TYP., SPEC: 1" THICK OPEN CELL FOAM, ROUND, 7'-0" HIGH, WHITE
 - REMOVE ALL EXTERIOR WINDOW SHADES IN THIS ROOM AND INSTALL CLEAR IMPACT RESISTANT WINDOW FILM, SEE FINISH SCHEDULE (GF-2)
 - EXISTING WALL BUMPERS TO REMAIN
 - SEE 2/- FOR CORNER GUARD INSTALLATION DETAIL AT BRICK WALL

- ### FINISH LEGEND
- EXISTING VCT FLOORING AND WALL BASE TO REMAIN. EXTENT TO BE COORDINATED WITH SHERENE COOPER (UC/DH)
 - EXISTING CARPET FLOORING AND WALL BASE TO REMAIN
 - EXISTING FLOOR FINISH AND WALL BASE TO BE REMOVED AND REPLACED WITH RESILIENT FLOORING AND WALL BASE, RF-1 AND RB-1, SEE FINISH SCHEDULE
 - EXISTING FLOOR FINISH AND WALL BASE TO BE REMOVED AND REPLACED WITH RESILIENT FLOORING AND WALL BASE, RF-2 AND RB-1, SEE FINISH SCHEDULE

FINISH SCHEDULE

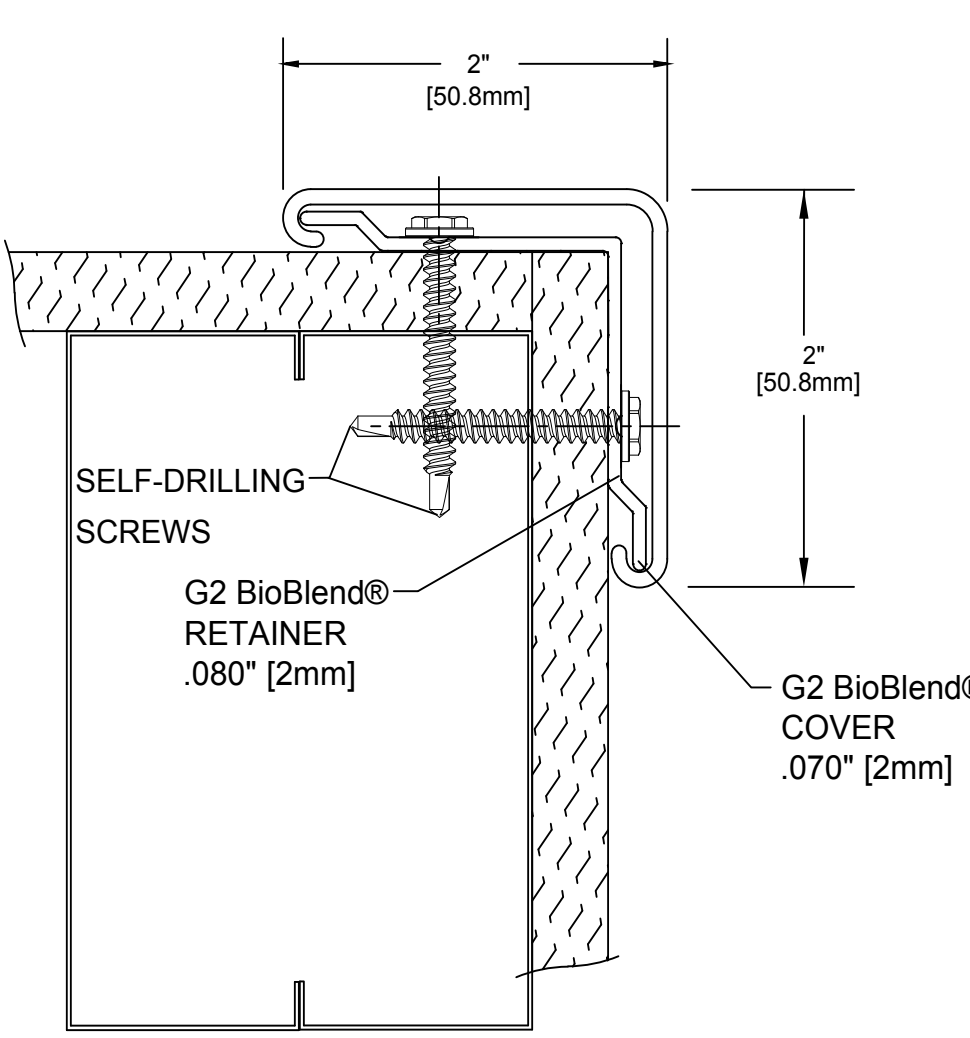
FINISH CODE	MANUFACTURER	DESCRIPTION	NOTES	CLASS
PAINT				
PT-1	KELLY MOORE	COLOR: TBD (BUILDING STANDARD WHITE)	PROJECT WHITE	CLASS A
PT-2	KELLY MOORE	COLOR: ELECTRIC SLIDE, KM4872	NURSE STATION ACCENT	CLASS A
PT-3	KELLY MOORE	COLOR: WHALE'S MOUTH, KM4997	EXAM / TREATMENT ROOM ACCENT	CLASS A
PT-4	KELLY MOORE	COLOR: TBD (BUILDING STANDARD GREY)	DOOR AND TRIM PAINT	CLASS A
RESILIENT FLOORING				
RF-1	PATCRAFT	STYLE: ECO SYSTEM, MEANING SHEET, COLOR: REACT 0070	NURSE STATIONS / CORRIDOR	CLASS A
RF-2	SHAW CONTRACT	STYLE: INNATE 095V, COLOR: FLAX	EXAM / TREATMENT ROOM ACCENT	CLASS A
SPECIALTY PRODUCT				
GF-1	3M	SCOTCHSHIELD SAFETY & SECURITY WINDOW FILM ULTRA ULTRA PRESTIGE SERIES, TINTED	AT EXTERIOR PATIENT ROOM WINDOWS	CLASS A
GF-2	3M	SCOTCHSHIELD SAFETY & SECURITY WINDOW FILM ULTRA ULTRA PRESTIGE SERIES, CLEAR	AT EXTERIOR WAITING ROOM 1220 WINDOWS	CLASS A
WALL BASE				
WB-1	TARKETT	COLOR: WALSH CASTLE T48	6"	CLASS 1
WALL PROTECTION				
CG-1	INPRO	STYLE: G2160R G2, BIOBLEND CORNER GUARD, COLOR: TO MATCH PT-1	2"x2"x48"	CLASS A

NOTE: ALL WALLS TO BE PAINTED PT-1 THROUGHOUT PROJECT SCOPE, U.O.N.



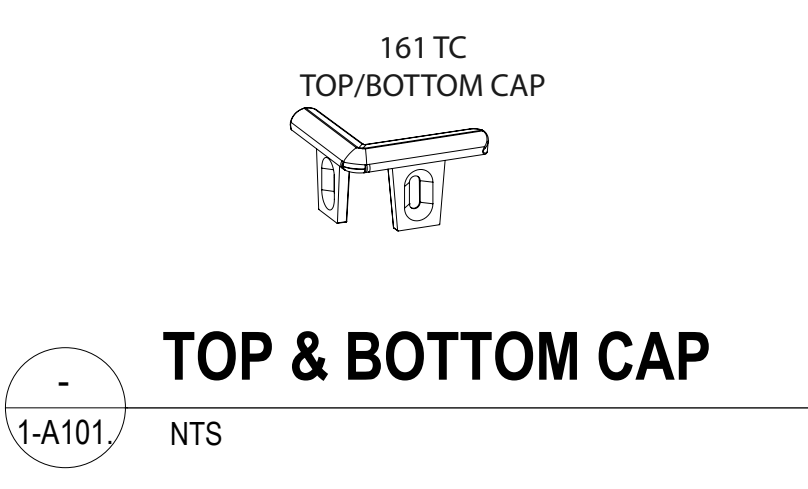
1 LEVEL 1 - ENLARGED BEHAVIORAL HEALTH UNIT PLAN

1-A101, 1/4" = 1'-0"



- Important**
- Acclimate materials 24 hrs before installation. Maintain temperature controlled environment after installation
 - Install in accordance with manufacturer's installation instructions. Failure to do so will void the warranty.

- Installation tips**
- Cut covers up to 1/16" (1.6mm) longer to ensure a tight fit.



Wall Condition	Specified Fasteners	Intro Part #
Drywall/Wood	#8 x 1-1/4" Phillips Flat-Head Self-Tapping Screw, #8 x 1-1/2" Phillips Indented hex washer head self-drilling screw	HWK-HIGC4DW (4 foot) HWK-HIGC8DW (8 foot) HWK-HIGC12DW (8 and 12 foot)
Concrete/Concrete Block / Brick	#8 x 1-1/2" Phillips Flat Head Sheet Metal Screw, #10 x 1-3/4" Phillips Pan Head Sheet Metal Screw and 1/4" Alligator Anchor	HWK-HIGC4C (4 foot) HWK-HIGC8C (8 foot) HWK-HIGC12C (9 and 12 foot)

2 CORNER GUARD INSTALLATION DETAIL AT BRICK WALL

1-A101, 1" = 1'-0"

Revision	By	Appd	YYYY.MM.DD
PRELIMINARY SD PACKAGE	HYVING	CM	2028.01.04

Agency Approval

Facility
UC Davis Health
Project
UCDH PTF Research Relocation

2315 Stockton Blvd
Sacramento, CA 95817
Title
ENLARGED PLAN - LEVEL 1

Issuing D: _____ Floor Lev: _____
Scale: 1/4" = 1'-0"
Drawn By: _____ Author: _____ Stantec No.: 201430400
Checked By: _____ Checker: _____
Issue Date: _____ Sheet: **1-A101.**



**ENTEK
CONSULTING GROUP, INC.**

4200 Rocklin Road, Suite 7, Rocklin, CA 95677 Phone (916) 632-6800 Fax (916) 632-6812 www.entekgroup.com

**HAZARDOUS MATERIALS SURVEY
FINAL REPORT**

OWNER/CLIENT

**UC Davis Medical Center
Facilities Planning & Development
4800 2nd Avenue, Suite 3010
Sacramento, CA 95817**

CONTACT

**Thomas Kaiser
Project Manager 4**

SURVEY ADDRESS

**Cypress Building, 1st Floor, Suite D
2221 Stockton Boulevard
Sacramento, CA 95817**

BUILDING(S) SURVEYED

**Cypress Building, 1st Floor, Suite D
Crisis Stabilization Relocation Project**

PREPARED BY

**Karl Suarez
CAC #23-7390 & CDPH IA #11068
Entek Consulting Group, Inc.
4200 Rocklin Road, Suite 7
Rocklin, CA 95677**

Entek Project #23-7012

January 2, 2024



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Executive Summary

The United States Environmental Protection Agency, National Emission Standards for Hazardous Air Pollutants (US EPA NESHAP), 40 CFR Part 61 - Nov. 20, 1990, requires an owner or operator of a demolition or renovation project to thoroughly inspect the affected facility or part of the facility where the demolition or renovation operation will occur for the presence of asbestos-containing materials (ACM) prior to the commencement of that project.

This inspection report was requested by Mr. Thomas Kaiser, Project Manager 4 with UC Davis Medical Center Facilities Planning & Development (UCDMC FP&D).

The purpose of the inspection was to comply with US EPA NESHAP requirements and the Sacramento Metropolitan Air Quality Management District (SMAQMD) which has jurisdiction for this project site to determine if asbestos containing materials are present which may be impacted during the upcoming Crisis Stabilization Relocation Project, which will include renovation of select areas within Suite D on the first floor of the UCDMC Cypress Building located at 2221 Stockton Boulevard in Sacramento, California. That the Cypress Building was constructed in the 1970s.

The attached drawing shows approximate sample locations and identify those bulk sample materials analyzed and found to contain asbestos greater than 1% with a (+) after the sample number. Materials analyzed and found to contain less than 1% asbestos or reported as none detected have a (-) after each sample number. However, in some cases when several samples of one homogenous material are collected, sometimes not all samples are analyzed by the laboratory. In this instance, if one sample for a homogeneous material is reported as containing asbestos greater than 1%, then the remaining samples in the series that are not analyzed are assumed to contain asbestos greater than 1%. For the purposes of this report, all samples that were not analyzed in a series are assumed to contain asbestos greater than 1% and are identified on the attached drawing with a (+) after the sample number.

Materials are classified in the tables of this report as regulated asbestos containing material (RACM), Category I (CAT-I) or Category II (CAT-II) ACM, or asbestos containing construction material (ACCM), which included collecting multiple samples of some materials. Contractors and other individuals who view the sample locations and associated results indicated with either a (-) or a (+) on the drawing to make determinations take the risk of misidentifying a material and may arrive at determinations which are in direct conflict with the written findings of this report. This use of the drawing and the information provided on it relating to individual sample results in determining if a material does or does not contain asbestos is not recommended.

This is a summary of the report. The report must be read in its entirety, and the reader must review all the detailed information provided in the body of the report prior to making any interpretations, or conclusions pertaining to the information. Any conclusions made by the reader about the information provided in the body of this report which are contradictory or not included in this report are the responsibility of the reader.



Asbestos

On December 28, 2023, Entek conducted a survey specific to areas designated by Mr. Thomas Kaiser, Project Manager 4 with the UCDCM FP&D which included: Suite D on the first floor of the UCDCM Cypress Building.

The results of testing for asbestos during this survey indicate asbestos is present in the black mastic found underneath the beige vinyl floor tile (VFT) (assumed to be present throughout all patient rooms). Specifics pertaining to individual materials can be found in later sections of this report.

Lead

Entek investigated existing paints and applied coatings in an effort to determine if lead was present in these materials. All paints were analyzed to be below the laboratory's detectable limit of less than 100 parts per million (ppm) for lead. This means applicable lead regulations will not apply to the upcoming Crisis Stabilization Relocation Project.

Other Hazardous Materials

Entek did not specifically inspect for mercury containing fluorescent light tubes or light ballast which may contain polychlorinated biphenyls (PCBs), thermostats which may contain mercury switches, equipment or systems which may contain Freon or other fluorocarbons, or smoke detectors which may contain a radioactive element. However, information pertaining to these materials is included in this report for your use and reference, since these light systems are present on the project.

Introduction

This report presents results of an asbestos and lead survey performed by Entek which included specific interior and exterior designated areas included in an upcoming project. Renovation is planned to occur within the following locations of Suite D on the first floor of the UCDCM Cypress Building: Corridor 1200, Rooms 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1209, 1210, 1211, 1213, and alcove 1216. Fluorescent lights were observed at this project site; therefore, this report also includes references to regulations pertaining to handling practices and waste disposal of PCB light ballasts and mercury containing light tubes and thermostats which may be impacted during this project.

The inspection was conducted by Mr. Karl Suarez on December 28, 2023. Mr. Suarez is a Cal/OSHA Certified Asbestos Consultant (CAC) and a State of California Department of Public Health (CDPH) certified Lead Inspector/Assessor.

This report was prepared for Mr. Thomas Kaiser, Project Manager 4 with the UCDCM FP&D.



Building Description

The UCDCM Cypress Building is a multistory combination wood framed and concrete beam supported building on a concrete slab foundation. Interior finishes within Suite D includes, carpeting in the corridors, various layers of vinyl floor tile with mastic, vinyl cove base mastic, finished drywall wall systems, and 2' x 4' drop-in acoustical ceiling tiles.

For purposes of this survey, the following areas were excluded from the survey as they are not expected to be impacted during the upcoming renovation project, as defined by Mr. Thomas Kaiser: Rooms 1217, 1215, 1216B, 1216A, 1214, 1212, 1208, 1200B, and the plenum space above the acoustical ceiling tiles.

Asbestos Inspection and Sample Collection Protocols

Entek included all specific designated interior areas of the building included in this report.

Entek did not use any demolition methods to look within enclosed wall or ceiling cavities during this investigation. Entek did include all suspect materials observed in, on, or associated with the areas included in this report.

Bulk samples were collected of various materials suspected to contain asbestos by utilizing a power drill and coring tube, cutting the materials with a razor knife, or use of other appropriate hand tools.

Surfacing materials were collected in a statistically random manner representative of the associated homogenous area as required in 40 CFR Part 763, Asbestos-Containing Materials in Schools; Final Rule and Notice, published October 30, 1987, and the Sacramento Metropolitan Air Quality Management District (SMAQMD) Compliance Assistance Advisory published in June 2010.

Miscellaneous materials were collected from each homogenous area in a manner sufficient to determine whether the material is or is not ACM as required in 40 CFR Part 763, Asbestos-Containing Materials in Schools; Final Rule and Notice, published October 30, 1987.

Approximate locations of all samples collected during this inspection are indicated on the "Bulk Asbestos Material Analysis Request Form for Entek", which served as the chain of custody for the samples, and on the building diagram(s) attached to this report.

Asbestos Bulk Sample Results

There were several materials observed which are considered "suspect" under US EPA guidelines. Under current US EPA guidelines for conducting building inspections for ACM, all "suspect" materials must be assumed to contain asbestos until otherwise determined by laboratory testing.

The samples of materials suspected of containing asbestos were submitted to Asbestech, a laboratory located in Rancho Cordova, California. These samples were subsequently analyzed by polarized light microscopy (PLM) with dispersion staining.



The US EPA NESHAP and SMAQMD uses the terms Regulated Asbestos Containing Material (RACM), Category I, and Category II when identifying materials which contain asbestos in amounts greater than 1%. Cal/OSHA uses the term ACCM which indicates a manufactured construction material contains greater than 0.1% asbestos by weight by the PLM method. This definition can be found in Title 8, 1529.

A total of 21 bulk samples were collected of all the materials considered to be "suspect", which had not been previously sampled, and which were observed during this investigation. Some of those samples contained multiple layers which were individually analyzed to determine their asbestos content. Analysis of all samples collected was by PLM with dispersion staining. Results of the analysis are listed in the following tables:

Suspect Materials Found to Contain Asbestos UCDMC Cypress Building, 1 st Floor, Suite D					
Sample ID#'s	Suspect Material	Asbestos Content/Type (%) by PLM	Location	NESHAP - Cal/OSHA Classification	Total Estimated Quantity
01A-B	Blue With White Pattern 12" x 12" Vinyl Floor Tile (VFT) Over Beige Vinyl Floor Tile with Black Mastic	None Detected (Blue With White Pattern 12" x 12" Vinyl Floor Tile) None Detected (Beige Vinyl Floor Tile-Previous Flooring Tile) 1-5% Chrysotile (Black Mastic)	Throughout All Patient Rooms	Category 1 (Black Mastic)	~5,000 SF
03A-B	Beige 12" x 12" Vinyl Floor Tile with Clear/Tan and Black Mastic	None Detected (Beige 12" x 12" Vinyl Floor Tile) None Detected (Clear/Tan Mastic) Assumed >1% Chrysotile (Black Mastic)	Throughout All Patient Rooms	Category 1 (Black Mastic)	~5,000 SF

All sample number noted in the tables above start with EGG-23-7012-

NOTE: Any CAT-I or CAT-II materials identified in the previous tables which will be subjected to mechanical removal, must be considered RACM for the purposes of notification to US EPA Region IX, CARB, or Local AQMD and classification of waste. Removal of any CAT-I or CAT-II materials prior to demolition of a building



is dependent upon how the materials will be impacted and if the impact will cause the materials to become friable. If any remaining CAT-I or CAT-II materials will become friable they must be removed prior to the initiation of demolition.

NOTE: Cal/OSHA regulates all materials containing greater than 0.1% asbestos. As a result, impact to materials identified as ACCM and ACM must be performed by properly asbestos trained personnel utilizing appropriate personal protection, work practices, as well as, properly constructed and demarcated work areas or containments, in accordance with Cal/OSHA asbestos regulations.

All other suspect building materials were determined by the laboratory to not contain asbestos. Please refer to Appendix A for more information on specific locations and materials.

The tables above provide an estimate of the amount of materials in square feet or linear feet. Contractors are responsible for quantifying the exact quantity of materials impacted by the renovation or demolition and shall not rely on the quantities in the above tables.

US EPA AHERA uses three terms when determining the classification of a material for the purpose of sampling. These terms include miscellaneous, surfacing, and thermal system insulation (TSI).

Miscellaneous materials are building materials on structural components, structural members, or fixtures, such as floor and ceiling tiles, and do not include surfacing material or TSI.

Surfacing materials are materials that are sprayed-on, troweled-on, or otherwise applied to surfaces, such as acoustical plaster on ceiling and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

TSI is material applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain, water condensation, or for other purposes.

The information provided in the tables of this report are for use by the Owner in determining where asbestos containing materials are located, and whether or not any future work may impact those materials. The information is also provided for use by any contractor who may perform work in areas impacting the materials listed in this report, and for use as appropriate by asbestos abatement contractors to provide costs related to work impacting ACM.

Any building materials which are considered “suspect” for containing asbestos which have not been identified in this report must be assumed to contain asbestos in amounts >1% until properly investigated and/or tested.

Materials commonly excluded from being suspected of containing asbestos include, but are not limited to: unwrapped pink and yellow fiberglass insulating materials or products, foam insulation, wood, metal, plastic, or glass. All other types of building materials or coatings on the materials listed above are commonly listed as “suspect” and must be tested prior to impact by a Contractor. Work impacting these untested or newly discovered



materials must cease until an investigation can be completed.

Asbestos Regulatory Requirements

US EPA

The property included in this survey report is located in Sacramento County. Sacramento Metropolitan Air Quality Management District (SMAQMD) has been given authority for enforcement of the NESHAP regulations by means of their own rules (Rule 902 Asbestos).

A demolition is the wrecking, taking out, or burning of any load supporting structural member. A renovation is everything else. 10 day written notification to the US EPA Region IX, CARB or local AQMD is required prior to the performance of any demolition project regardless of asbestos being present or not. This notification would also apply to any renovation project which involves the wrecking, taking out, or burning of any load bearing structural member during a renovation as well.

There is a sufficient amount of ACM present to require a 10 day notification to the US EPA Region IX, CARB or local AQMD be submitted prior to starting work which will impact materials identified as RACM or CAT-I and CAT-II materials if they are made friable. If more than 160 square feet, 260 linear feet or 35 cubic feet of RACM is planned for removal on the project, formal written notification to US EPA Region IX, CARB or local AQMD is required.

Ten day advance written notification is required when >160 square feet, 260 linear feet or 35 cubic feet of RACM will be disturbed or if this amount of CAT-I or CAT-II ACM will be rendered friable during removal. Prior notice to SMAQMD will be required if more than 160 square feet, 260 linear feet or 35 cubic feet of RACM is removed for this renovation or if the total amount of RACM removed from all buildings located at the same address will cause the total sum of removed RACM to exceed 160 square feet, 260 linear feet or 35 cubic feet within the same calendar year.

Cal/OSHA

Disturbance of any ACM or ACCM could generate airborne asbestos fibers and would be regulated by Cal/OSHA. Cal/OSHA worker health and safety regulations apply during any disturbance of ACM or ACCM by a person while in the employ of another. This is true regardless of friability or quantity disturbed. Since it has been estimated more than 100 square feet of ACCM does exist and will be impacted during the upcoming project, a licensed asbestos contractor, certified by the State of California, and registered with Cal/OSHA is required to perform the asbestos related removal work. Entek recommends a licensed asbestos contractor be used to remove ACCM even if less than 100 square feet of ACCM is being disturbed.

For compliance with Title 8, Section 341.9, the asbestos contractor must send written notice at least one day (24 hours) prior to start of any work which will impact any amount of asbestos to the local office for the State of California, Department of Occupational Safety and Health, and perform all work in accordance with Cal/OSHA requirements.



Lead Inspection, Sampling, & Results

Two (2) bulk samples of the painted surfaces from list information here were collected and submitted to Asbestech laboratory. These samples were subsequently analyzed by atomic absorption spectrometry (AAS). Results of the analysis are listed in the following tables:

Paints/Coatings/Materials Determined NOT TO Contain Lead (<100 ppm)	
Paint/Coating Color or Material	Building Component
White Paint	Drywall Throughout
Blue-Grey Paint	Metal Doors and Metal Trim

Paints determined “NOT TO” contain lead for the purposes of this report are those samples which when analyzed did not indicate lead to be present at or above the limit of detection for the analysis method used. This limit of detection was 100 parts per million (ppm). As a result, any paints shown “NOT TO” contain lead will not require any special training or work practices related to lead when impacted.

Lead Regulatory Compliance

Any upcoming project which may result in the disturbance of lead containing products or surfaces but is not intended to remediate a lead hazard or specifically designed to remove LBP to reduce or eliminate a known hazard, would be considered “lead related construction work”.

Lead related construction work does not fit the classification of a “lead abatement project” under CDPH Title 17 regulations. “*Abatement*” is defined in Title 17, Division 1, Chapter 8, Article 1 as “any set of measures designed to reduce or eliminate lead hazards or LBP for public and residential buildings but does not include containment or cleaning.” A *lead hazard* is defined in Title 17, Division 1, Chapter 8, Article 1 as “deteriorated LBP, lead contaminated dust, lead contaminated soil, disturbing LBP or presumed LBP without containment, or any other nuisance which may result in persistent and quantifiable lead exposure.”

Lead related construction work means any “construction, alteration, painting, demolition, salvage, renovation, repair, or maintenance of any residential or public building, including preparation and cleanup, that, by using or disturbing lead-containing material or soil, may result in significant exposure of adults or children to lead”. (Title 17, California Code of Regulations, Division 1, Chapter 8, Article 1).

Currently, Cal/OSHA has not established a definition for LBP, nor have they established minimum concentrations where their regulations do not apply. Cal/OSHA regulates all construction activities involving materials containing lead, including LBP. These regulations are found in CCR, Title 8 Section 1532.1 (§1532.1) Lead in Construction.

Cal/OSHA has not established a concentration of lead in a product where their regulations do not apply, therefore, any disturbance to products containing lead come under the jurisdiction of Cal/OSHA and their regulations. Disturbance of paints/coatings or materials



determined to be LBP may trigger a pre-work notification to Cal/OSHA if “trigger tasks” disturb 100 square feet or more of those paints/coatings or materials. Trigger tasks are described in Title 8 CCR 1532.1.

Fluorescent Light Tubes and Polychlorinated Biphenyls (PCBs)

Fluorescent light tubes which contain mercury are considered a universal waste and must be packaged and recycled appropriately if they are removed from a building and not used again. The regulation, called the Universal Waste Rule, are in the California Code of Regulations (CCR), Title 22, Division 4.5, Chapter 23.

Fluorescent light tubes are the bulb or tube portion of an electric lighting device and are commonly referred to as “lamps”. Examples of other common electric lamps considered to be universal wastes include, but are not limited to, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide lamps. Any lamp which is not spent and has been designated to be reused is not classified as a waste and does not meet the requirements of hazardous waste or a universal waste.

Spent lamps typically contain concentrations of mercury exceeding the established Total Threshold Limit Concentration (TTLC) and/or the Soluble Threshold Limit Concentration (STLC) values. Therefore, these lamps must be sent to an authorized recycle facility or to a universal waste consolidator for shipment to an authorized recycling facility.

At a minimum, if removed lamps will not be reused, they must be packaged in boxes/packages/containers which are structurally sound, adequate to prevent breakage, and compatible with the content of the lamps. These packages must remain closed and be free of damage which could cause leakage under foreseeable conditions. Each container must be labeled or marked clearly with one of the following phrases: “Universal Waste Lamp(s),” or “Waste Lamp(s),” or “Used Lamp(s).” Entek recommends shipping any lamp not designated for reuse to a universal waste recycling facility once they have been packaged.

PCB containing light ballasts are to be considered a hazardous waste and must be properly manifested for transport to a hazardous waste facility. Any contractor who may perform PCB related work (inspection, removal, clean-up) must be trained and qualified to do so. All workers must also follow current OSHA regulations including 29 CFR 1910.120 and 8 CCR 5192, as well as, other applicable federal, state, and local laws, and regulations. While light ballasts marked “No PCB” are not considered a hazardous waste, they are considered a universal waste. As a result, removal, packaging, and disposal/recycling of these types of ballasts must be conducted in accordance with current regulations of Title 22.

Thermostats with Mercury Switches

It is possible existing thermostats may utilize switches containing mercury. The mercury in these switches would be considered a hazardous waste if removed and disposed. Any work requiring removal of thermostats containing mercury switches, must include having the switches inspected for the presence of mercury, and subsequently following all requirements for packaging and disposal of any switch found to contain mercury.



Freon and Fluorocarbons

Freon and other fluorocarbon products associated with HVAC systems, refrigerators, etc. may be present in or on the exterior of the buildings included in this investigation. Prior to demolition of a structure or removal of existing HVAC systems, refrigerators, or any other type of equipment which typically uses these types of coolant products shall have the coolant materials investigated prior to their demolition and removed from the mechanical systems and recycled in accordance with Cal/EPA requirements.

Smoke Detectors Which May Contain a Radioactive Element

It is possible existing smoke detectors may contain a radioactive element. These types of detectors are easily identified by reviewing the label which is usually found on the back of the detector. Older units may display the international radiation symbol (three bladed propeller) and the radioactive content. Newer units state the radioactive content and their Nuclear Regulatory Agency (NRC) license number.

Any work requiring the removal of smoke detectors with a radioactive element must include contacting the manufacturer of the smoke detector to determine their return policies. The California Department of Toxic Substance Control (DTSC) has stated that it is a condition of the manufacturers NRC license they must accept returned units for disposal.

Limitations

Entek inspected only the specific designated areas identified by My Thomas Kaiser, Project Manager 4 with the UCDCM FP&D of the UCDCM Cypress Building with regards to the upcoming Crisis Stabilization Relocation Project. As a result, the information provided in this inspection report may not be used to extend the inspection results to areas not included in this report without additional review and sampling, as necessary.

Entek did not perform any destructive sampling to look into ceiling and wall cavities. As a result, it may be possible for materials to be hidden in these areas which are not included in this report. Entek also did not employ any destructive measures on floors of interior spaces or exterior areas covered with asphalt, concrete, or dirt.

If any new materials not listed as having been sampled or listed as assumed for containing asbestos in this report are discovered, the new material must be assumed to contain asbestos until properly inspected and tested for asbestos content.

Entek's policy is to retain a full copy of these written documents for three (3) years once the file is closed. At the end of the 3-year period the written files will be destroyed without further notice. It is suggested copies of the file(s) are maintained as per your policy.

Entek will be providing only this electronic copy of the report and its attachments for your use. However, if you would like a hard copy of this report please do not hesitate to ask. Entek will be happy to mail the report upon receipt of your request.



Thank you for choosing Entek for your environmental needs. Please call me at (916) 632-6800 if you have any questions regarding this report.

Prepared By:

A handwritten signature in black ink, appearing to be "KS" or similar initials.

Karl Suarez, ASP
Assistant Project Manager
Cal/OSHA CAC #23-7390
CDPH I/A #11068

Reviewed By:

A handwritten signature in black ink, appearing to be "Blake Howes".

Blake Howes
Vice President
Cal/OSHA CAC #13-5015
CDPH I/A #3315

Appendices

- A. Asbestos Related Documents
- B. Lead Related Documents
- C. Backup Documentation



APPENDIX A

ASBESTOS RELATED DOCUMENTS

- Bulk Asbestos Analysis Report From Asbestech
- Bulk Asbestos Material Analysis Request Form for Entek
- Asbestos Bulk Sample Location Drawing
- SMAQMD Asbestos Survey Form
- SMAQMD Demolition/Renovation Form
(To be completed by Owner)

ASBESTECH
 11151 Sun Center Drive, Suite B
 Rancho Cordova, California 95670
 Tel.(916) 481-8902 asbestech@sbcglobal.net

Client:

Entek Consulting Group, Inc.
 4200 Rocklin Rd., Suite 7
 Rocklin, CA 95677

Job:

23-7012 UCDCM FP&D
 UCDCM Cypress Bldg. Suite D
 2221 Stockton Blvd., Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 70903-1

Date/Time Collected: 12/28/23

Date Received: 12/29/23

NVLAP Lab Code 101442-0

CDPH # 1153

Date Analyzed: 12/29/23

<i>Sample No.</i>	<i>Color/Description</i>	<i>% Type Asbestos</i>	<i>Other Materials</i>
ECG-23-7012-01A	Blue w/white pattern 12"x12" vinyl floor tile, room 1202 west within room	NONE DETECTED	Calcite
	Yellow mastic	NONE DETECTED	Synthetics
	Beige vinyl floor tile	NONE DETECTED	Calcite
	Black mastic	1-5 CHRYSOTILE	Tar Binder
01B	Blue w/white pattern 12"x12" vinyl floor tile, room 1202 north within room	NONE DETECTED	Calcite
	Yellow mastic	NONE DETECTED	Synthetics
	Beige vinyl floor tile	NONE DETECTED	Calcite
	Black mastic	1-5 CHRYSOTILE	Tar Binder
02A	Multicolor carpet, east within corridor 1200	NONE DETECTED	Synthetics
	Yellow mastic	NONE DETECTED	Calcite
02B	Multicolor carpet, west within corridor 1200	NONE DETECTED	Synthetics
	Yellow mastic	NONE DETECTED	Calcite

THE ANALYSIS USES POLARIZED LIGHT MICROSCOPY AND DISPERSION STAINING FOLLOWING E.P.A. METHOD 600/R-93/116. NON-FRIABLE MATERIALS WERE ANALYZED APPLYING THE SAME METHOD. THE LOWER DETECTION LIMIT IS <1 % WITH THE PROVISION THAT PLM MAY NOT DETECT FIBERS <0.25 MICRONS IN DIAMETER THAT MAY BE PRESENT IN SAMPLES SUCH AS FLOOR TILES. IN ACCORDANCE WITH TITLE 22, CCR, SECTION 66261.24(a)(2)(A), THE MCL IS 1%. SAMPLES WERE NOT COLLECTED BY ASBESTECH. THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE APPROVAL OF ASBESTECH. THIS REPORT RELATES ONLY TO THE ITEMS TESTED. THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY N.V.L.A.P. OR ANY AGENCY OF THE U.S. GOVERNMENT. ASBESTECH ACCEPTS TECHNICAL RESPONSIBILITY FOR THIS REPORT AND DATE OF ISSUE.

ASBESTECH
 11151 Sun Center Drive, Suite B
 Rancho Cordova, California 95670
 Tel.(916) 481-8902 asbestech@sbcglobal.net

Client:

Entek Consulting Group, Inc.
 4200 Rocklin Rd., Suite 7
 Rocklin, CA 95677

Job:

23-7012 UCDCM FP&D
 UCDCM Cypress Bldg. Suite D
 2221 Stockton Blvd., Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 70903-2

Date/Time Collected: 12/28/23

Date Received: 12/29/23

NVLAP Lab Code 101442-0

CDPH # 1153

Date Analyzed: 12/29/23

<i>Sample No.</i>	<i>Color/Description</i>	<i>% Type Asbestos</i>	<i>Other Materials</i>
ECG-23-7012-03A	Beige 12"x12" vinyl floor tile, west within room 1207	NONE DETECTED	Calcite
	Clear/tan mastic	NONE DETECTED	Synthetics
03B	Beige 12"x12" vinyl floor tile, east within room 1205	NONE DETECTED	Calcite
	Clear/tan mastic	NONE DETECTED	Synthetics
	Black mastic	<1 CHRYSOTILE	Tar Binder
04A	Beige 4" vinyl base cove on drywall, west within room 1202	NONE DETECTED	Calcite Opagues
	Tan mastic	NONE DETECTED	Calcite
04B	Beige 4" vinyl base cove on drywall, north within room 1202	NONE DETECTED	Calcite Opagues
	Tan mastic	NONE DETECTED	Calcite
	White joint compound	NONE DETECTED	Calcite
05A	Gray 6" vinyl base cove on CMU brick, corridor 1200 near east entrance	NONE DETECTED	Calcite Opagues
	Tan mastic	NONE DETECTED	Calcite

THE ANALYSIS USES POLARIZED LIGHT MICROSCOPY AND DISPERSION STAINING FOLLOWING E.P.A. METHOD 600/R-93/116. NON-FRIABLE MATERIALS WERE ANALYZED APPLYING THE SAME METHOD. THE LOWER DETECTION LIMIT IS <1 % WITH THE PROVISO THAT PLM MAY NOT DETECT FIBERS <0.25 MICRONS IN DIAMETER THAT MAY BE PRESENT IN SAMPLES SUCH AS FLOOR TILES. IN ACCORDANCE WITH TITLE 22, CCR, SECTION 66261.24(a)(2)(A), THE MCL IS 1 %. SAMPLES WERE NOT COLLECTED BY ASBESTECH. THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE APPROVAL OF ASBESTECH. THIS REPORT RELATES ONLY TO THE ITEMS TESTED. THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY N.V.L.A.P. OR ANY AGENCY OF THE U.S. GOVERNMENT. ASBESTECH ACCEPTS TECHNICAL RESPONSIBILITY FOR THIS REPORT AND DATE OF ISSUE.

ASBESTECH
 11151 Sun Center Drive, Suite B
 Rancho Cordova, California 95670
 Tel.(916) 481-8902 asbestech@sbcglobal.net

Client:

Entek Consulting Group, Inc.
 4200 Rocklin Rd., Suite 7
 Rocklin, CA 95677

Job:

23-7012 UCDCM FP&D
 UCDCM Cypress Bldg. Suite D
 2221 Stockton Blvd., Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 70903-3

Date/Time Collected: 12/28/23

Date Received: 12/29/23

NVLAP Lab Code 101442-0

CDPH # 1153

Date Analyzed: 12/29/23

<i>Sample No.</i>	<i>Color/Description</i>	<i>% Type Asbestos</i>	<i>Other Materials</i>
ECG-23-7012-05B	Gray 6" vinyl base cove on CMU brick, corridor 1200 near east entrance	NONE DETECTED	Calcite Opagues
	Tan mastic	NONE DETECTED	Calcite
06A	Gray 4" vinyl base cove on drywall , north within room 1206	NONE DETECTED	Calcite Opagues
	Tan mastic	NONE DETECTED	Calcite
06B	Gray 4" vinyl base cove on drywall , south within room 1211	NONE DETECTED	Calcite Opagues
	Tan mastic	NONE DETECTED	Calcite
07A	White drywall , NW corner within room 1206	NONE DETECTED	Gypsum Fibrous Glass
	White joint compound 1	NONE DETECTED	Calcite
	White joint compound 2	NONE DETECTED	Calcite
07B	White joint compound , SE corner within room 1206	NONE DETECTED	Calcite
08A	White orange peel skim coat wall texture on drywall , south wall within room 1213	NONE DETECTED	Calcite

THE ANALYSIS USES POLARIZED LIGHT MICROSCOPY AND DISPERSION STAINING FOLLOWING E.P.A. METHOD 600/R-93/116. NON-FRIABLE MATERIALS WERE ANALYZED APPLYING THE SAME METHOD. THE LOWER DETECTION LIMIT IS <1 % WITH THE PROVISO THAT PLM MAY NOT DETECT FIBERS <0.25 MICRONS IN DIAMETER THAT MAY BE PRESENT IN SAMPLES SUCH AS FLOOR TILES. IN ACCORDANCE WITH TITLE 22, CCR, SECTION 66261.24(a)(2)(A), THE MCL IS 1%. SAMPLES WERE NOT COLLECTED BY ASBESTECH. THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE APPROVAL OF ASBESTECH. THIS REPORT RELATES ONLY TO THE ITEMS TESTED. THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY N.V.L.A.P. OR ANY AGENCY OF THE U.S. GOVERNMENT. ASBESTECH ACCEPTS TECHNICAL RESPONSIBILITY FOR THIS REPORT AND DATE OF ISSUE.

ASBESTECH
 11151 Sun Center Drive, Suite B
 Rancho Cordova, California 95670
 Tel.(916) 481-8902 asbestech@sbcglobal.net

Client:

Entek Consulting Group, Inc.
 4200 Rocklin Rd., Suite 7
 Rocklin, CA 95677

Job:

23-7012 UCDCM FP&D
 UCDCM Cypress Bldg. Suite D
 2221 Stockton Blvd., Sacramento, Ca

BULK ASBESTOS ANALYSIS REPORT

LAB JOB # 70903-4

Date/Time Collected: 12/28/23

Date Received: 12/29/23

NVLAP Lab Code 101442-0

CDPH # 1153

Date Analyzed: 12/29/23

<i>Sample No.</i>	<i>Color/Description</i>	<i>% Type Asbestos</i>	<i>Other Materials</i>
ECG-23-7012-08B	White orange peel skim coat wall texture on drywall , south wall within room 1211	NONE DETECTED	Calcite
08C	White orange peel skim coat wall texture on drywall , south wall within room 1207	NONE DETECTED	Calcite
08D	White orange peel skim coat wall texture on drywall , south wall within room 1204	NONE DETECTED	Calcite
08E	White orange peel skim coat wall texture on drywall , north wall within room 1202	NONE DETECTED	Calcite
09A	Gray concrete foundation under carpet, east within corridor 1200	NONE DETECTED	Granular Mins.
09B	Gray concrete foundation under carpet, NE within 1210 nurse station	NONE DETECTED	Granular Mins.

THE ANALYSIS USES POLARIZED LIGHT MICROSCOPY AND DISPERSION STAINING FOLLOWING E.P.A. METHOD 600/R-93/116. NON-FRIABLE MATERIALS WERE ANALYZED APPLYING THE SAME METHOD. THE LOWER DETECTION LIMIT IS <1 % WITH THE PROVISO THAT PLM MAY NOT DETECT FIBERS <0.25 MICRONS IN DIAMETER THAT MAY BE PRESENT IN SAMPLES SUCH AS FLOOR TILES. IN ACCORDANCE WITH TITLE 22, CCR, SECTION 66261.24(a)(2)(A), THE MCL IS 1 %. SAMPLES WERE NOT COLLECTED BY ASBESTECH. THIS REPORT MUST NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE APPROVAL OF ASBESTECH. THIS REPORT RELATES ONLY TO THE ITEMS TESTED. THIS REPORT MUST NOT BE USED TO CLAIM PRODUCT ENDORSEMENT BY N.V.L.A.P. OR ANY AGENCY OF THE U.S. GOVERNMENT. ASBESTECH ACCEPTS TECHNICAL RESPONSIBILITY FOR THIS REPORT AND DATE OF ISSUE.



BULK ASBESTOS MATERIAL *Analysis Request*

20903

ENTEK CONSULTING GROUP, INC.

4200 ROCKLIN ROAD, SUITE 7

ROCKLIN, CA 95677

(916) 632-6800 PHONE

(916) 632-6812 FAX

mainoffice@entekgroup.com**Date of Sampling:** December 28, 2023**Job Number:** 23-7012**Client Name:** UCDCM FP&D

Site Address: UCDCM Cypress Building, Suite D
2221 Stockton Boulevard
Sacramento, CA 95817

Lab: Asbestech**Collected by:** Karl Suarez**Turnaround Time:** ASAP, Rush

ANALYSIS REQUESTED: Asbestos by PLM
with Dispersion Staining

Special Instructions: Stop analysis upon first positive result (>1%) for sample in a series. Also stop analysis upon first positive result (>1%) in the joint compound for sample series.

Please e-mail results at mainoffice@entekgroup.com and ksuarez@entekgroup.com as soon as available and include copy of submittal with those results.

SAMPLE #	MATERIAL DESCRIPTION/LOCATION
ECG-23-7012-01A	Blue With White Pattern 12" x 12" Vinyl Floor Tile with Tan Mastic, Over Beige Vinyl Floor Tile with Black Mastic, Room1202, West within Room
ECG-23-7012-01B	Blue With White Pattern 12" x 12" Vinyl Floor Tile with Tan Mastic, Over Beige Vinyl Floor Tile with Black Mastic, Room1202, North within Room
ECG-23-7012-02A	Multicolor Carpet with Blue Mastic, East Within Corridor 1200
ECG-23-7012-02B	Multicolor Carpet with Blue Mastic, West Within Corridor 1200
ECG-23-7012-03A	Beige 12" x 12" Vinyl Floor Tile with Clear/Tan Mastic, West within Room 1207
ECG-23-7012-03B	Beige 12" x 12" Vinyl Floor Tile with Black Mastic, East within Room 1205
ECG-23-7012-04A	4" Beige Vinyl Base Cove with Tan Mastic on Drywall, West within Room 1202
ECG-23-7012-04B	4" Beige Vinyl Base Cove with Tan Mastic on Drywall, North within Room 1202
ECG-23-7012-05A	6" Grey Vinyl Base Cove on CMU Brick with Tan Mastic, Corridor 1200 Near East Entrance
ECG-23-7012-05B	6" Grey Vinyl Base Cove on CMU Brick with Tan Mastic, Corridor 1200 Near East Entrance
ECG-23-7012-06A	4" Grey Vinyl Base Cove with Tan Mastic on Drywall, North within Room 1206
ECG-23-7012-06B	4" Grey Vinyl Base Cove with Tan Mastic on Drywall, South within Room 1211
ECG-23-7012-07A	Drywall and Joint Compound, Northwest Corner within Room 1206

<https://entekgroupinc.sharepoint.com/sites/Entekgroup/Shared Documents/Clients/UCDCM - FP&D/23-7012 Cypress, Behavioral Health - AsbPbH/Bulk Asb/Bulk Asb Rqst Portrait 00-00-00.docx>

Delivered by:

Karl Suarez

Date:

12/29/23

Time:

8:24

AM/PM

Received by:

Date:

12/29/23

Time:

9

AM/PM

70903


BULK ASBESTOS MATERIAL *Analysis Request*
ENTEK CONSULTING GROUP, INC.

4200 ROCKLIN ROAD, SUITE 7

ROCKLIN, CA 95677

(916) 632-6800 PHONE

(916) 632-6812 FAX

mainoffice@entekgroup.com**Date of Sampling:** December 28, 2023**Lab:** Asbestech**Job Number:** 23-7012**Collected by:** Karl Suarez**Client Name:** UCDCM FP&D**Turnaround Time:** ASAP, Rush
Site Address: UCDCM Cypress Building, Suite D
 2221 Stockton Boulevard
 Sacramento, CA 95817

ANALYSIS REQUESTED: Asbestos by PLM
 with Dispersion Staining

Special Instructions: Stop analysis upon first positive result (>1%) for sample in a series. Also stop analysis upon first positive result (>1%) in the joint compound for sample series.

Please e-mail results at mainoffice@entekgroup.com and ksuarez@entekgroup.com as soon as available and include copy of submittal with those results.

SAMPLE #	MATERIAL DESCRIPTION/LOCATION
ECG-23-7012-07B	Drywall and Joint Compound, Southeast Corner within Room 1206
ECG-23-7012-08A	Orange Peel Skim Coat Wall Texture on Drywall, South Wall within Room 1213
ECG-23-7012-08B	Orange Peel Skim Coat Wall Texture on Drywall, South Wall within Room 1211
ECG-23-7012-08C	Orange Peel Skim Coat Wall Texture on Drywall, South Wall within Room 1207
ECG-23-7012-08D	Orange Peel Skim Coat Wall Texture on Drywall, South Wall within Room 1204
ECG-23-7012-08E	Orange Peel Skim Coat Wall Texture on Drywall, North Wall within Room 1202
ECG-23-7012-09A	Concrete Foundation Under Carpet, East within Corridor 1200
ECG-23-7012-09B	Concrete Foundation Under Carpet, Northeast within 1210 Nurse Station

<https://entekgroupinc.sharepoint.com/sites/Entekgroup/Shared Documents/Clients/UCDCM - FP&D/23-7012 Cypress, Behavioral Health - AsbPbIH/Bulk Asb/Bulk Asb Rqst Portrait 00-00-00.docx>

Delivered by:

Karl Suarez

Date:

12/29/23

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8:21 AM/PM

Received by:

Jim Gjk

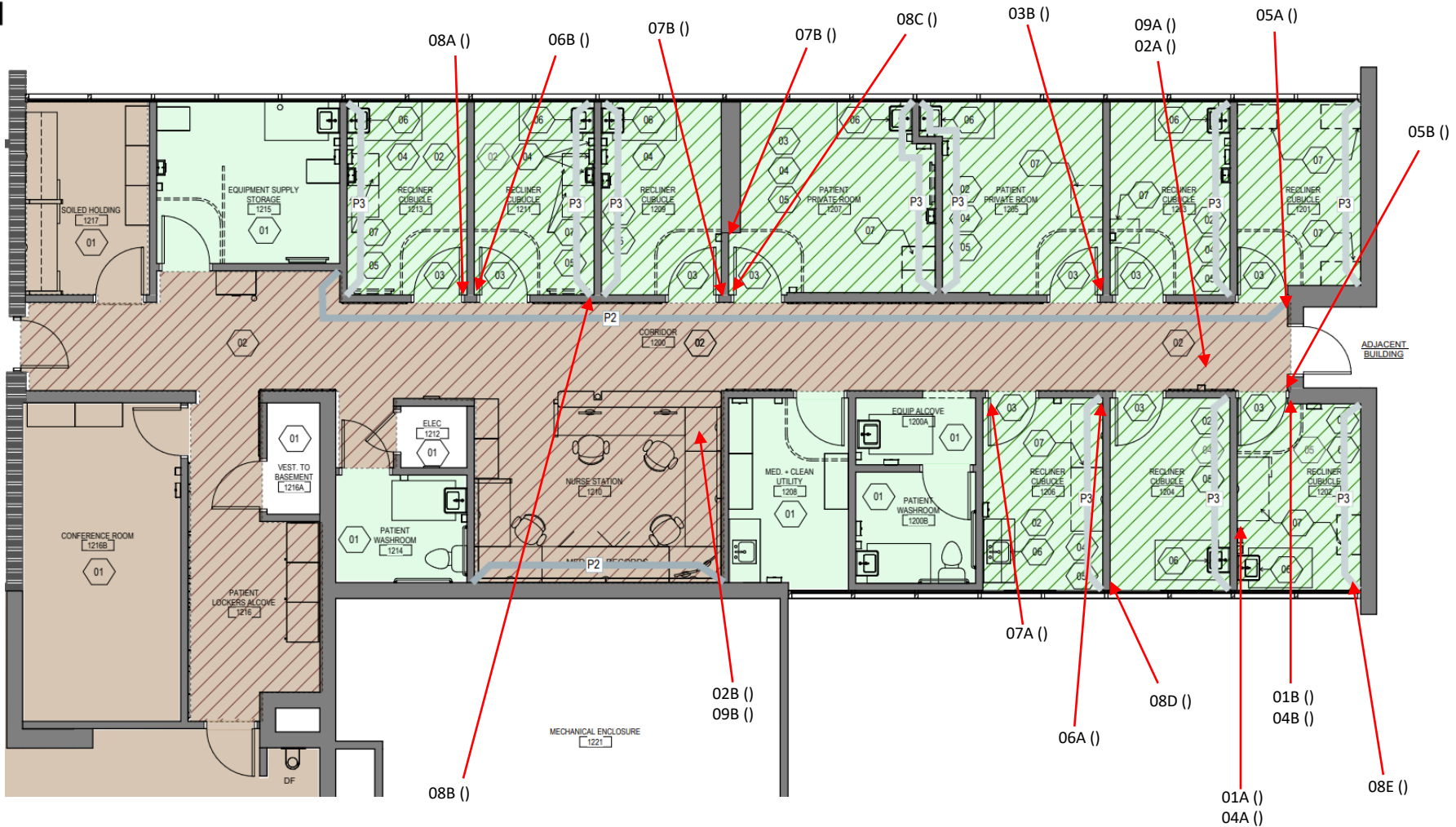
Date:

12/29/23

Time:

9 AM/PM

UCDMC Cypress Building, Suite D



UCDMC FP&D
 Cypress Building, Suite D
 2221 Stockton Boulevard
 Sacramento, CA 95817

Entek Consulting Group, Inc.
 4200 Rocklin Road, Suite 7
 Rocklin, CA 95677
 Map Not to Scale


Bulk Asbestos Sampling Map
 Collected by Karl Suarez
 On December 28, 2023
 Project Number 23-7012



Asbestos Survey Form

(See Instructions)

777 12th Street, 3rd Floor
 Sacramento, CA 95814
 Office (916) 874-4800
 Fax (916) 874-4899
 Email:
asbestos@airquality.org

1. Purpose of Survey		<input type="checkbox"/> Renovation	<input checked="" type="checkbox"/> Demolition			
2. Facility Information						
Project Area(s) Description Cypress Building, Suite D						
Address 2221 Stockton Bouevard		City Sacramento	# of Structures 1			
3. Owner Information						
Name UC Davis Medical Center - Facilities Design & Construction						
Address 4800 2nd Avenue, Suite 3010		City/State Sacramento/California	Zip 95817			
Contact Thomas Kaiser	Phone (279)386-9930	Fax	Email tkaiser@ucdavis.edu			
4. Consultant Information		Survey Date(s): December 28, 2023				
Company Name Entek Consulting Group, Inc.						
Name Karl Suarez			DOSH # 23-7390			
Address 4200 Rocklin Road, Suite 7		City/State Rocklin, California	Zip 95677			
Phone (916) 632-6800	Fax (916) 632-6812	Email ksuarez@entekgroup.com	Signature 			
5. Client Information (If different than owner)		<input type="checkbox"/> General Contractor	<input type="checkbox"/> Insurance Company			
<input type="checkbox"/> Architect		<input type="checkbox"/> Property Manager	<input type="checkbox"/> Other _____			
Name						
Address		City/State	Zip 95678			
Contact	Phone	Fax	Email			
6. Have all of the suspect materials that will be disturbed been sampled?			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
If no, explain why:						
7. Summary of Total Asbestos Containing Material (ACM) Findings						
Regulated Asbestos Containing Material (RACM) (Includes materials subject to known mechanical removal and fire damaged materials)			Category II	Category I		
Square Ft.	Linear Ft.	Cubic Ft.	Square Ft.	Linear Ft.	Square Ft.	Linear Ft.
0	0	0	0	0	5,000	0
To receive future SMAQMD Rule updates and changes affecting your industry (check one box):						
<input type="checkbox"/> Please send e-mail notices to			<input type="checkbox"/> I will sign up myself at www.airquality.org/listserve/ to receive emailed notices.			
<input checked="" type="checkbox"/> I am already subscribed.		<input type="checkbox"/> I want the District to mail notices to the address on this application:		<input type="checkbox"/> Owner	<input type="checkbox"/> Consultant	



Asbestos Renovation/Demolition Notification Form

777 12th Street, 3rd Floor
 Sacramento, CA 95814
 Office (279) 207-1122
 Fax (279) 207-1144
 Asbestos@airquality.org

1	Building Department Permit Application # (if known) : _____	<input checked="" type="checkbox"/> Renovation (Do not complete Section 5) <input type="checkbox"/> Demolition (Complete all sections) <input type="checkbox"/> Ordered Demo - Attach ordered demo letter <input type="checkbox"/> Emergency Demo - SMAQMD Emergency #: _____
----------	--	--

2	Contractor	Owner UC Davis Medical Center - FP&D
	Address	Address 4800 2nd Avenue
	City, State / Zip	City, State / Zip Sacramento, CA / 95817
	Email	Email tkaiser@ucdavis.edu
	Telephone	Telephone (279) 386-9930

3	Structure Name Cypress Building	Renovation Area Suite D	# of Floors 1
	Project Address 2221 Stockton Boulevard	City / Zip Sacramento / 05817	Year Built 1980s

4	Preference for return of form	<input type="checkbox"/> E-mail :	<input type="checkbox"/> Other :
----------	-------------------------------	-----------------------------------	----------------------------------

DEMOLITION ONLY – Start date must be at least 10 working days from the day of your postmark or hand delivery of this form.

5	Start Date _____	Revision # 1 2 3 4 5 6 7 8 9 (circle)
	Completion Date 03/1/2024	New Start Date _____
		New Completion Date _____
Method of Demo (Check Applicable): <input type="checkbox"/> Manual/Hand Tools <input type="checkbox"/> Mechanical/Heavy Equipment <input type="checkbox"/> Other		
Procedure to be followed if RACM is found or Category II material becomes friable:		

*I have read and understand the directions. The information on this form is true and accurate.
 I certify that the asbestos survey conducted represents the facility as built.*

6	Applicant Name (Print)	<input type="checkbox"/> Owner	Permit may be issued on:
	Phone Number	<input type="checkbox"/> Rep / Agent	
	Applicant's Signature	<input type="checkbox"/> Contractor	
	Date		

Have DOSH Consultant complete and sign below OR attach completed Asbestos Survey Form and Consultant's report.

CONSULTANT USE ONLY	Company Name Entek Consulting Group, Inc.	Telephone (916) 632-6800		
	Surveyor Name Karl Suarez	DOSH # 23-7390	Survey Date 12/28/23	
	Analytical Method PLM by Dispersion Staining	Pt Count Materials <10%? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Declined by Client		
	Amount of RACM	Square Feet 0	Linear Feet 0	Cubic Feet 0
	Amount of Category I 5,000 SF		Amount of Category II 0	
	Project Address 2221 Stockton Boulevard		City Sacramento	Zip 95817
	Suspect Materials Present? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Consultant's Signature	

SMAQMD USE ONLY

Date Received / Date Postmarked _____ Date Approved & Returned _____

Project # _____ Check # _____ Receipt # _____ Amount Paid _____ Staff _____



APPENDIX B

LEAD RELATED DOCUMENTS

- Lead in Paint Samples Analysis Report From Microtest
- Bulk Lead Material Analysis Request Form for Entek
- Lead Bulk Sample Location Drawing
- Lead Hazard Evaluation Report (CDPH 8552)



MicroTest Laboratories, Inc. | AIHA ELPAT #160934
 3110 Gold Canal Dr, Ste. A, Rancho Cordova, CA 95670
 PH 916.567.9808 | FX 916.404.0302
 www.microtestlabsinc.com | service@microtestlabsinc.com

for office use only

Project ID

L33922-23

CLIENT INFORMATION

Company Entek Consulting Group, Inc
Name Ryan Metzen
Address 4200 Rocklin Road, Suite 7
 Rocklin, CA 95677
Phone 916.632.6800
Email mainoffice@entekgroup.com
 rmetzen@entekgroup.com

SAMPLE

Date Thursday, December 28, 2023
Time

MicroTest Laboratories

Analytical Data

JOB SITE INFORMATION

Sampler Karl Suarez
Project UCDCM FP&D
Site UCDCM Cypress Building,
 Suite D
Address 2221 Stockton Boulevard
 Sacramento, CA 95817
Job # 23-7012

EPA METHOD 7420/7000B

Client	Laboratory	Client	Reporting	Results	Units	Limits	Comments	Units
Sample ID	Sample ID	Sample Location / Description	Matrix	Results	Units	Limits	Comments	
ECG-23-7012-01Pb	L33922	White Paint on Drywall, South Wall Within Corridor 1200	Paint	<0.01%	Wt %	0.01%	<100	PPM
ECG-23-7012-02Pb	L33923	Blue-grey Paint on Metal Doors and Metal Trim, Door Threshold of Room 1202	Paint	<0.01%	Wt %	0.01%	<100	PPM

Date Received: Friday, December 29, 2023
Date Analyzed: Friday, December 29, 2023
Date Reported: Friday, December 29, 2023

Samples Received: 2
 Samples Analyzed: 2

Analyst: Erich Bowman

Authorized Signatory:
 Kelly Favero - Lab Manager

This report applies to the standards and procedures indicated and to the specific samples analyzed. Samples have NOT been corrected for blank values. EPA 3050B Hotblock Preparation Method


BULK LEAD MATERIAL *Analysis Request*

Project ID: L33922-23
Client: Entek
Receipt Date: 12/29/23
Count: 2 TAT: 6 hour

ENTEK CONSULTING GROUP, INC.

4200 ROCKLIN ROAD, SUITE 7

ROCKLIN, CA 95677

(916) 632-6800 PHONE

(916) 632-6812 FAX

mainoffice@entekgroup.com
Date of Sampling: December 28, 2023**Lab:** MicroTest**Job Number:** 23-7012**Collected by:** Karl Suarez**Client Name:** UCDCM FP&D**Turnaround Time:** 12/29/23, Same Day Rush

Site Address: UCDCM Cypress Building, Suite D
 2221 Stockton Boulevard
 Sacramento, CA 95817

ANALYSIS REQUESTED: Lead by Flame
 Atomic Absorption Spectroscopy

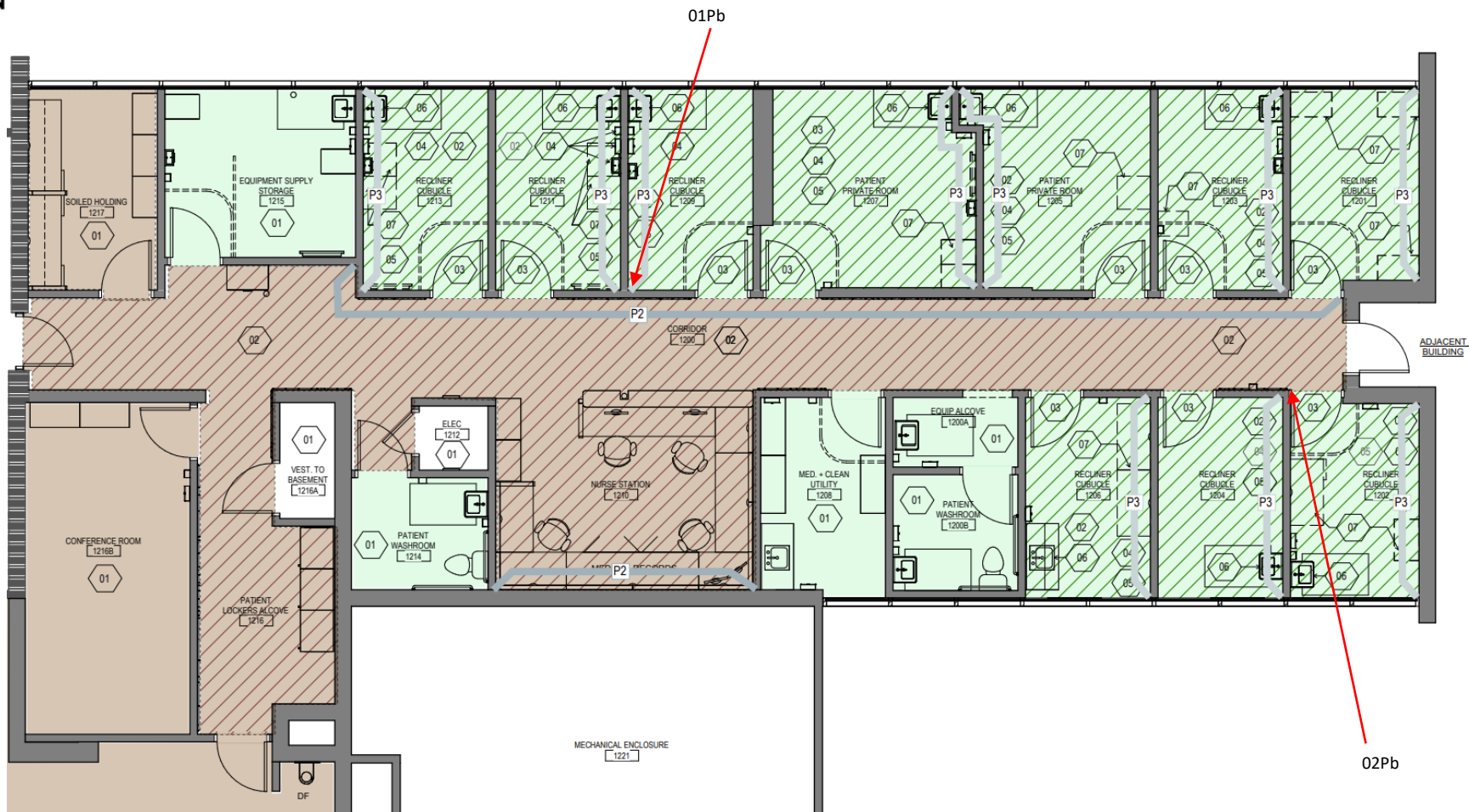
Special Instructions: *Please report result in PPM and % by weight. Please email results as soon as possible.*

SAMPLE #	MATERIAL DESCRIPTION/LOCATION
ECG-23-7012-01Pb	White Paint on Drywall, South Wall Within Corridor 1200
ECG-23-7012-02Pb	Blue-Grey Paint on Metal Doors and Metal Trim, Door Threshold of Room 1202

[https://entekgroupinc.sharepoint.com/sites/Entekgroup/Shared Documents/Clients/UCDCM - FP&D/23-7012 Cypress, Behavioral Health - AsbPbIh/Bulk Pb/Bulk Pb Rqst Portrait 00-00-00.docx](https://entekgroupinc.sharepoint.com/sites/Entekgroup/Shared%20Documents/Clients/UCDCM%20-%20FP&D/23-7012%20Cypress,%20Behavioral%20Health%20-%20AsbPbIh/Bulk%20Pb/Bulk%20Pb%20Rqst%20Portrait%2000-00-00.docx)

Delivered by: Karl Suarez **Date:** 12/29/23 **Time:** 8:26 AM/PM
Received by: [Signature] **Date:** 12/29/23 **Time:** 9:00 AM/PM

UCDMC Cypress Building, Suite D



UCDMC FP&D
Cypress Building, Suite D
2221 Stockton Boulevard
Sacramento, CA 95817

Entek Consulting Group, Inc.
4200 Rocklin Road, Suite 7
Rocklin, CA 95677
Map Not to Scale

Bulk Lead Sampling Map
Collected by Karl Suarez
On December 28, 2023
Project Number 23-7012

LEAD HAZARD EVALUATION REPORT**Section 1 – Date of Lead Hazard Evaluation** December 28, 2023**Section 2 – Type of Lead Hazard Evaluation (Check one box only)**

Lead Inspection Risk assessment Clearance Inspection Other (specify) _____

Section 3 – Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]		City	County	Zip Code
2221 Stockton Boulevard		Sacramento	Sacramento	95817
Construction date (year) of structure	Type of structure		Children living in structure?	
1970s	<input type="checkbox"/> Multi-unit building <input type="checkbox"/> School or daycare <input type="checkbox"/> Single family dwelling <input checked="" type="checkbox"/> Other <u>Clinic</u>		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Don't Know	

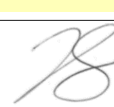
Section 4 – Owner of Structure (if business/agency, list contact person)

Name		Telephone number		
UC Davis Medica Center - Facilities Planning & Development		(279) 386-9930		
Address [number, street, apartment (if applicable)]		City	State	Zip Code
4800 2nd Avenue, Suite 3010		Sacramento	California	95817

Section 5 – Results of Lead Hazard Evaluation (check all that apply)

No lead-based paint detected Intact lead-based paint detected Deteriorated lead-based paint detected
 No lead hazards detected Lead-contaminated dust found Lead-contaminated soil found Other _____

Section 6 – Individual Conducting Lead Hazard Evaluation

Name		Telephone number		
Entek Consulting Group, Inc. - Karl Suarez		(916) 632-6800		
Address [number, street, apartment (if applicable)]		City	State	Zip Code
4200 Rocklin Road, Suite 7		Rocklin	CA	95677
CDPH certification number	Signature		Date	
11068			12-28-23	

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

N/A

Section 7 – Attachments

- A. A foundation diagram or sketch of the structure indicating the specific locations of each lead hazard or presence of lead-based paint;
 B. Each testing method, device, and sampling procedure used;
 C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
 Childhood Lead Poisoning Prevention Branch Reports
 850 Marina Bay Parkway, Building P, Third Floor
 Richmond, CA 94804-6403
 Fax: (510) 620-5656

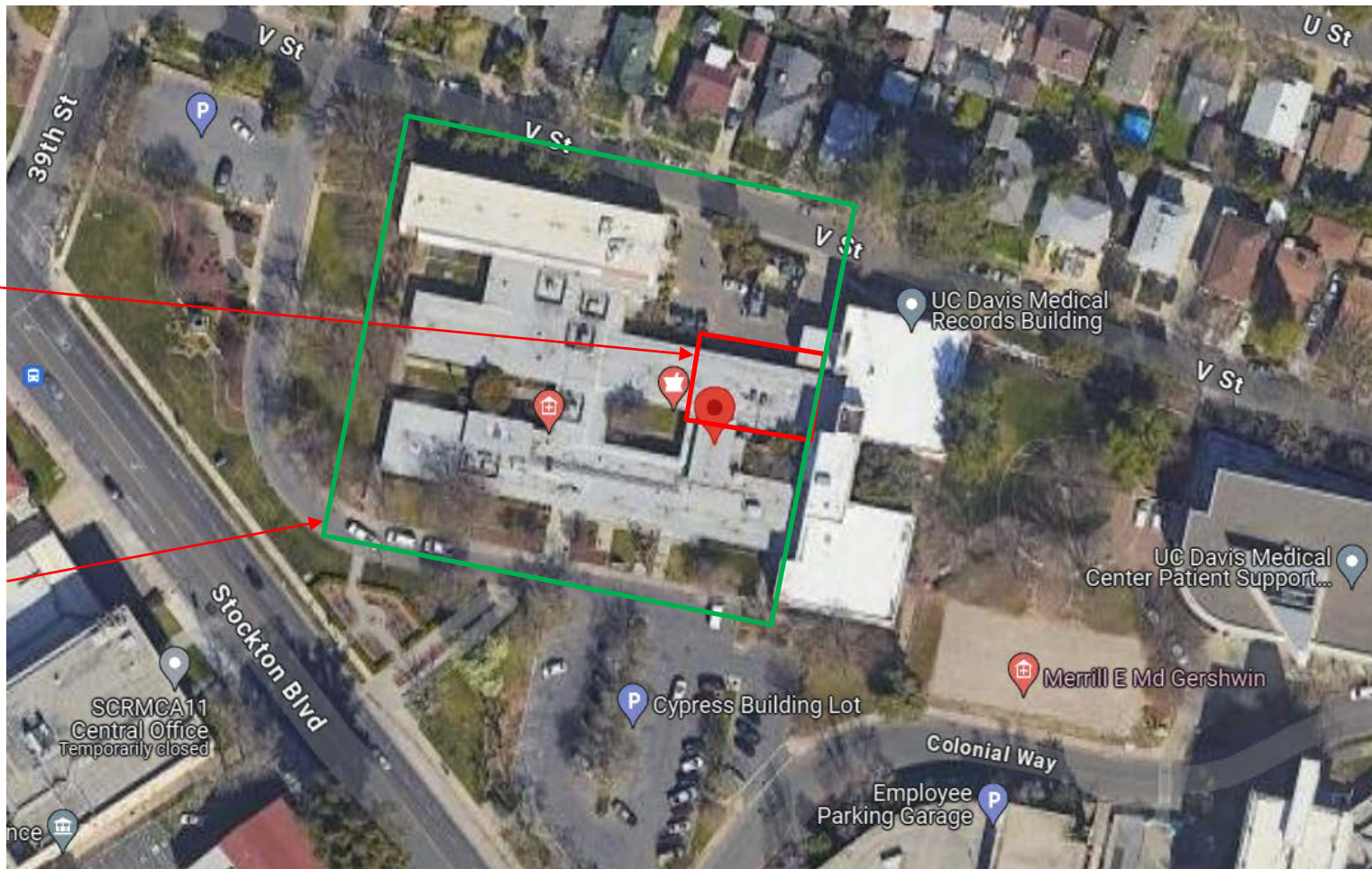


APPENDIX C

BACK UP DOCUMENTATION

- Site Map
- Photo Log
- Inspector Accreditations and Certifications
- Laboratory Accreditations for Asbestos and Lead Analysis

Site Map



Approximate
Location of
Suite D

UCDMC
Cypress
Building

UCDMC FP&D
Cypress Building, Suite D
2221 Stockton Boulevard
Sacramento, CA 95817

Entek Consulting Group, Inc.
4200 Rocklin Road, Suite 7
Rocklin, CA 95677
Map Not to Scale

Site Map
Project Number 23-7012

Photo Log

Job Number:	23-7012	Date:	December 28, 2023
Client:	UCDMC FP&D		
Site Address:	Cypress Building, Suite D – 2221 Stockton Boulevard, Sacramento, CA 95817		



View of the Cypress Building Signage



View Down Corridor 1200 Inside Suite D



Additional View of Corridor 1200 Inside Suite D



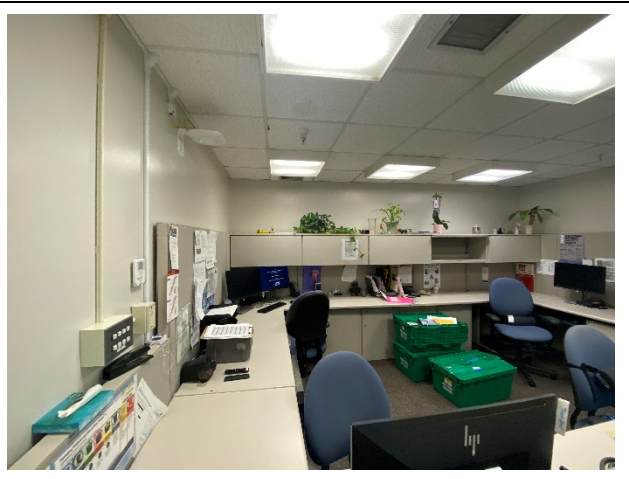
View of the Multicolor Carpet 4" Grey Vinyl Cove Base

Photo Log

Job Number:	23-7012	Date:	December 28, 2023
Client:	UCDMC FP&D		
Site Address:	Cypress Building, Suite D – 2221 Stockton Boulevard, Sacramento, CA 95817		



View of the Concrete Foundation Underneath the Multicolor Carpet



View of the Nurse's Station



View of the White 12'x 12" Vinyl Floor Tile



View of Rooms 1211 and 1213



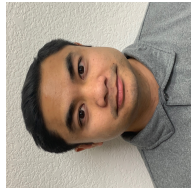


STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH



LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:



Karl Suarez

CERTIFICATE TYPE:

Lead Inspector/Assessor

Lead Sampling Technician

NUMBER:

LRC-00011068

LRC-00008454

EXPIRATION DATE:

4/7/2024

3/25/2024

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD