

# Construction Safety Manual



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## Table of Contents

I. Contractor and Project Manager Responsibilities.....	3
II. General Safety Instructions for Contractors.....	3
III. Interim Life Safety Measures.....	4
IV. Reporting Unsafe Conditions.....	5
V. Hazard Identification.....	5
VI. Personal Protective Equipment.....	8
VII. Management of Hazardous Materials.....	9
VIII. Compressed Gas Cylinders.....	10
IX. Air Compressors.....	11
X. Silica Dust.....	11
XI. Asbestos Awareness.....	12
XII. Lead Awareness.....	14
XIII. Fluorescent Light Ballasts.....	16
XIV. Confined Space Entry .....	17
XV. Lockout/Tagout.....	18
XVI. Electrical Safety.....	18
XVII. Machine Guarding.....	19
XVIII. Power Tools.....	20
XIX. Hot Work Permits.....	20
XX. Ramps .....	21
XXI. Fall Protection.....	21
XXII. Elevating Work Platforms.....	24
XXIII. Scaffolding.....	24
XXIV. Ladder Safety.....	33
XXV. Roofing Operations.....	34
XXVI. Forms and Falsework.....	35
XXVII. Concrete Construction.....	36
XXVIII. Trenching and Shoring.....	38
XXIX. Flaggers.....	39
XXX. Forklifts.....	40
XXXI. Heavy Construction Equipment.....	41
XXXII. Cranes.....	43
XXXIII. Pile Driving.....	46
XXXIV. Demolition.....	47
XXXV. Emergencies.....	48

## **Appendices**

Appendix A: Example of a Construction Alert Sign

Appendix B: Requirements for Asbestos Abatement Contractors

Appendix C: Requirements for Lead Abatement Contractors

Appendix D: List of UCSF Confined Spaces

Appendix E: Hot Work Permit Form

## **Introduction**

UCSF is a research and teaching facility with a unique work environment. There are certain safety precautions that must be observed by everyone who enters UCSF-governed facilities. UCSF expects its vendors and contractors to fully comply with all federal, state, and local occupational health and safety regulations as well as all environmental protection standards. The Office of Environmental Health and Safety is authorized to stop all operations which are not compliant with health and safety or environmental regulations.

### **I. General Responsibilities**

- a. All UCSF project managers shall:
  - i. Ensure that contractors are aware of their responsibilities outlined in the Contractor Safety Manual.
  - ii. Ensure that contractors have their own environmental health and safety programs including, but not limited to, an Injury and Illness Prevention Program (IIPP) and a Hazard Communication Program in accordance with all federal, state, and local regulations.
  - iii. Post “Construction Alert” Signs (See Appendix A) in all areas where construction, renovation, or demolition projects will occur and notify all affected UCSF employees in writing or e-mail prior to the start of each project.
- b. All contractors shall:
  - i. Provide all necessary training, initial and on-going. Training will include technical, system, equipment, communications and safety training, and will be in compliance with all applicable codes, legislation and regulations.
  - ii. Maintain documentation of employee training.
  - iii. Have in place a Hazard Communication Program and ensure that all individuals working on the site are trained and aware of potential chemical hazards.
  - iv. Have in place an Injury and Illness Prevention Program (IIPP) which complies with Cal-OSHA requirements.
  - v. Assess the worksite for potential hazards prior to beginning work.
  - vi. Provide employees with the proper safety equipment to prevent accidental injury.
  - vii. Ensure that all environmental health and safety precautions are followed in accordance with all federal, state, and local regulations and UCSF policy.
  - viii. Submit chemical Material Safety Data Sheets (MSDS) for review and approval if a project will affect UCSF employees.

### **II. General Safety Instructions for Contractors and Vendors working at UCSF**

- a. Smoking is strictly prohibited at UCSF.

- b. No eating or drinking is permitted in any laboratory; never discard food containers, cups, or food wrappers in laboratory waste containers.
- c. Upon entry to any UCSF facility, introduce yourself to the occupants and explain the work you will be performing.
- d. Laboratories and clinical/patient care areas have warning signs posted on doors, benches, fume hoods, and cabinets which indicate restricted areas. For your own protection, before entering or performing work in these areas, please ask the laboratory personnel for clarification.
- e. Make prior arrangements with the building manager and project manager for after hours and weekend access to facilities and procedures to secure work sites.
- f. Coordinate with the building/project manager and the affected building occupants before planning any utilities interruption.
- g. Do not remove the ceiling tiles or open any access panels without consulting the building/project manager about potential asbestos hazards.
- h. The UCSF Medical Center has a specific written ceiling access policy which must be followed. Consult with the charge nurse or the infection control department about infection control procedures.
- i. If the job requires removal of ceiling tiles, ask laboratory personnel if ongoing experiments or sensitive equipment need to be moved, covered or protected. Consult with the building/project manager regarding required safety procedures.
- j. Before commencing work, notify the building/project manager if the work will produce vibration or excessive noise
- k. Do not discard construction debris in waste containers located inside laboratories. Remove construction waste from labs, offices, hallways, and elevators.
- l. Do not stand or walk on any furniture or equipment.
- m. Do not string extension cords across hallways.
- n. Do not turn off fume hood fans without first consulting the laboratory personnel. Before a fume hood fan is shut down, a notice must be posted at the affected fume hood.
- o. Do not block exits, elevators, corridors, emergency showers, eye washes, fire extinguishers or other safety equipment.
- p. Report any accidents, hazardous materials spills, or damage to the work site to the building/project manager and to the occupants immediately.
- q. Do not open windows or prop doors open.
- r. Do not unplug or move any laboratory equipment or computers unless authorized by the appropriate laboratory personnel.

### **III. Interim Life Safety Measures (ILSM)**

If a construction project will compromise major life safety components, the project manager must provide a set of alternative life safety measures or ILSM equivalent to the original life safety components:

- a. Ensure exits provide free and unobstructed egress. Personnel shall receive training if alternate exits must be designated. NFPA 101-1997 requires

daily inspections of the means of egress for reliability during construction (NFPA 101-1997, Sections 1-3.11 - 3.11.1; 5-1.9.1; 12/13-7.8.1 and 12113-7.8.2).

- b. Ensure free and unobstructed access for emergency services and emergency forces (police and fire departments).
- c. Ensure fire alarm detection and suppression systems are not impaired. A temporary equivalent, system shall be provided when any fire system is impaired. If a temporary system is required, it must be inspected and tested monthly. Whenever the fire alarm or automatic sprinkler system is taken out of service, the UCSF fire marshal must be notified in advance and a fire watch must be provided.
- d. Ensure temporary construction partitions are smoke tight and built of noncombustible materials
- e. Provide additional fire fighting equipment and fire safety training for personnel
- f. Smoking is not allowed.
- g. Develop and enforce storage, housekeeping, and debris removal procedures and procedures that reduce the flammable and combustible fire load to the lowest level necessary for daily operations
- h. Conduct a minimum of two (2) fire drills per shift, per quarter in the affected areas.
- i. Increase hazard surveillance of buildings, grounds, and equipment with special attention to construction areas, construction storage, and excavations.
- j. Train personnel when structural or compartmentation features of fire safety are compromised.
- k. Conduct organization-wide safety education programs to ensure awareness of any Life Safety Code deficiencies and construction hazards for the ILSM.

#### **IV. Reporting Unsafe Conditions**

Contractors concerned about the potential presence of biological, chemical, radioactive, or physical hazards at or near a work site may contact EH&S. EH&S may be reached by telephone at 476-1300. To report unsafe conditions after hours or on weekends call the UCSF Police Department at 476-1414 and you will be directed to the 24-hour emergency hazardous materials responder.

#### **V. Hazard Identification**

Operations at UCSF often involve the use of biological, chemical and radioactive hazards. All locations where these hazards are used are clearly marked with appropriate signs warning people of the specific hazards. Never enter these areas and never handle biological, chemical, and radioactive material unless it is part of your contracted work and you are specifically trained to do so.

- a. All UCSF project managers shall:
  - i. If work is to be conducted in a laboratory area, obtain written approval from EH&S that it is safe prior to commencing work.



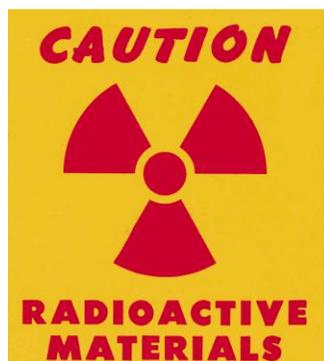


- Before beginning work in an area containing any of these signs, ask the laboratory supervisor if it is safe to do so.

### Radioactive Hazards

Radioactive hazards at UCSF include radioactive material used in laboratories, x-ray and imaging equipment used in laboratories and the medical center, and other radiation producing equipment. Before entering or beginning work in a room or area labeled with radioactive warning signs, contractors must obtain permission from the laboratory supervisor or principal investigator.

The following signs indicate the presence of radiation:





## VI. Personal Protective Equipment

- a. UCSF project managers shall ensure that contractors understand that personal protective equipment must be used whenever hazards are encountered which are capable of causing injury or impairment through absorption, inhalation, or physical contact.
  - b. All contractors shall
    - i. Provide their employees with personal protective equipment where appropriate and in accordance with Cal-OSHA Title 8 regulations.
    - ii. Provide their employees with training on the proper use of personal protective equipment.
    - iii. Be responsible for complying with the guidelines shown below, for communicating the information to their employees and subcontractors, and ensuring that their employees employ safe work practices and wear personal protective equipment per CCR:
- Respiratory Protection. (Cal/OSHA Standard 5144)  
Each employee shall use appropriate respiratory protection when potentially exposed to air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors and when such hazards cannot be reduced or eliminated by effective engineering controls.

Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protection program.

Common sources of hazards which may require respiratory protection include the following:

- Blasting (carbon dioxide, asbestos, silica, dust)
- Concrete and rock cutting (asbestos, silica, dust)
- Fuel storage tanks (harmful vapors)
- Lead abatement (lead particles)
- Asbestos abatement (asbestos fibers, vapors)
- Demolition (asbestos, silica, lead, dust, etc.)
- Welding (fumes)
- Painting and spraying (vapors, lead)
- Sand blasting (asbestos, silica, lead, dust)

- **Eye and Face Protection.** (Cal/OSHA Standard 3382)  
Each employee shall use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. Employers shall provide and ensure that employees use protection suitable for the exposure.
- **Head Protection.** (Cal/OSHA Standard 3381)  
Each employee shall wear protective helmets when working in areas where there is a potential for injury to the head from flying or falling objects or electrical shock and burns. Protective helmets shall also be worn to reduce electrical shock hazards when near exposed electrical conductors which could contact the head. Where there is a risk of injury from hair entanglement in moving parts of machinery, combustibles or toxic contaminants, employees shall confine their hair.
- **Foot Protection.** (Cal/OSHA Standard 3385)  
Each employee shall wear protective footwear when working in areas where there is a danger of foot injuries from electrical hazards, hot, corrosive, poisonous substances, falling objects, crushing or penetrating actions.
- **Hearing Protection.** (Cal/OSHA Standard 5096; 5098)  
Each employee shall wear the devices whenever noise exposures equal or exceed the levels listed below:

Sound Level (dBA)	Hours per Day
85	8
95	4
100	2
105	1
110	30 min
115	15 min

- **Hand Protection.** (Cal/OSHA Standard 3384)  
Each employee shall wear protective gloves when working in areas where hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes. Hand protection shall not be worn when there is a danger of the hand protection becoming entangled in moving machinery or materials.

**VII. Management of Hazardous Materials**

- a. UCSF project managers shall:
  - i. Ensure that contractors manage all hazardous materials brought on UCSF property in accordance with the requirements described below.
  - ii. Notify EH&S of all hazardous material releases to the environment through drains, sumps or soil.
- b. All contractors shall:

- i. Notify the building project manager or, where appropriate, the building occupants if chemicals (oil, adhesives, pesticides, paints, solvents, etc.) will be used on a project
- ii. Provide the building manager or project manager with Material Safety Data Sheets of all chemicals used and stored at UCSF facilities, including those used on construction sites.
- iii. Notify the UCSF project manager of any hazardous waste that will be generated during a project. All hazardous waste generated by a contractor is the responsibility of the contractor. Contractors must ensure that:
  - 1. All hazardous waste is labeled, stored, transported and disposed of in accordance with all local, state and federal laws
  - 2. All employees handling hazardous waste are properly trained in accordance with all local, state, and federal laws.
  - 3. No hazardous waste is left abandoned on site after the project is completed
  - 4. Hazardous waste is disposed of in a timely manner. In instances where temporary on-site storage of hazardous materials is necessary, the contractor must ensure that all containers are properly labeled, adequate secondary containment is provided, and incompatible materials are segregated.
- iv. Depending on the inventory of chemicals brought on site, have suitable equipment to clean up a spill. In addition, the contractor shall:
  - 1. Identify any potential environmental release points such as drains, sumps, and soil, and adequately minimize spill potential to these areas.
  - 2. Contain and clean up any spill provided doing so does not endanger anyone.
  - 3. Ensure employees engaged in spill response and clean-up are adequately trained.
  - 4. Notify the project manager of all incidental spills and or releases to the environment.
  - 5. Post an emergency contact phone number for a person available 24 hours a day, seven days a week.

#### Requirements for specific hazards:

#### **VIII. Compressed Gas Cylinders (All classes) (Cal/OSHA Standard 1740-1743)**

- a. UCSF Project Managers shall ensure that contractors are aware of their responsibilities regarding compressed gas cylinders and use and maintain compressed gas cylinders in accordance with the requirements outlined below.
- b. All contractors shall:
  - i. Clearly identify all gas cylinders by content and owner.

- ii. Ensure that valve protection caps are in place whenever compressed gas cylinders are transported or stored.
- iii. Secure compressed gas cylinders in an upright position in a welding or cylinder cart or to a solid object using appropriate straps, chains or retaining bars.
- iv. Cylinders tied to railings are not considered secured. All gas cylinders found unsecured will be disposed of as hazardous waste at the owner's expense.
- v. Close cylinder valves and replace valve covers when work is complete or when cylinders are empty or moved.
- vi. Ensure cylinders are kept at a safe distance from welding and cutting operations and away from contact with an electrical circuit.
- vii. Ensure that gas regulators for oxygen and flammable gases are in proper working order.
- viii. If they are not connected by manifold, separate oxygen and flammable gas cylinders by 20 ft. or a 5 foot tall fireproof barrier.
- ix. If a leak develops in a cylinder or valve and it can not be immediately corrected, the contractor must move the cylinder to a safe location outside the building.

**IX. Air Compressors (Cal/OSHA Standards 3320, 1696)**

- a. UCSF project managers shall ensure that contractors using an air compressor on UCSF property have a permit to operate where required by Cal-OSHA.
- b. All UCSF contractors shall:
  - i. Obtain Department of Safety and Health (DOSH) for air tanks on compressors operated a UCSF worksite. No permit is required for tanks with diameters less than 6 in and equipped with a safety valve set to open at 15 psi or tanks having a total volume of 1.5 cf or less and a safety valve set to open at no more than 150 psi.
  - ii. Post warning signs for air compressors with an automatic start function.
  - iii. Have a mechanism in place to prevent portable air compressors on wheels from rolling.
  - iv. Pop safety valves weekly.
  - v. Drain air tanks per the manufacturer's recommendation.

**X. Silica Dust (Cal/OSHA Standard 5155, 1530, 5144, 5194)**

Construction work that involves exposure to airborne sand and rock dust may expose employees to crystalline silica. Exposure to crystalline silica has been shown to cause silicosis, a lung disease. Although most cases of silicosis develop after years of exposure, instances of extremely high exposure have resulted in illness and even death in a matter of weeks. Hazardous activities include sand blasting; and loading, dumping, chipping, hammering, cutting, and drilling of rock, sand, or concrete. Airborne permissible exposure limits (PEL) are established for several different forms

of crystalline silica. These limits range from 0.05 to 0.1 mg/m<sup>3</sup> of respirable dust, expressed as an 8 hour Time Weighted Average (TWA).

Generally, while working on materials such as rock or concrete that contain a significant amount of silica (20% or greater), continuous exposure to a visible cloud of dust will result in levels of exposure that exceed the PEL. However, in some cases, the PEL can be exceeded when there is no visible cloud of dust.

- a. UCSF project managers shall ensure contractors have a Silica Exposure Control Plan in place
- b. All contractors shall have such a plan that contains, at a minimum, the following elements:
  - i. Contractors must measure and control employees' exposure to airborne contaminants. Control measures must include:
  - ii. Contractors must train employees in the hazards of crystalline silica exposure and the measures used to control risk, including the proper use of respirators when required.
    1. Replacing silica sand or other substances containing more than 1% crystalline silica as abrasive blasting materials. Substitute less hazardous materials.
    2. The use of engineering controls and containment methods such as blast-cleaning machines and cabinets, wet drilling or wet sawing of silica- containing materials to control the hazard and protect adjacent workers from exposure.
    3. Routinely maintaining dust control systems to keep them in good working order.
    4. Wearing disposable or washable protective clothes at the worksite.
    5. Conducting air monitoring to measure worker exposures and ensure the controls are providing adequate protection for the workers.
    6. Employing adequate respiratory protection when source controls cannot keep silica exposure below the PEL.
    7. Post warning signs to mark the boundaries of work areas contaminated with respirable crystalline silica.

#### **XI. Asbestos Awareness (Cal/OSHA 5208.1, 1529)**

The majority of UCSF-owned buildings contain asbestos in some areas. Prior to 1979, asbestos, which is a naturally occurring mineral fiber, was used in a wide variety of construction products including; spray-applied fireproofing; pipe, boiler and air duct insulation; roofing materials; cements and wallboard; surfacing plasters and acoustical treatments; vinyl floor tile and linoleum; adhesives; ceiling tile; counter tops; and fire doors. The University has conducted numerous building surveys and has implemented stringent control measures in order to identify and safely manage asbestos-containing materials or products.

Prior to undertaking any construction, renovation, demolition, or removal at UCSF, trained asbestos specialists from EH&S are required to inspect and survey the area for asbestos fibers and contamination. The purpose of this section is to ensure that the university provides appropriate control measures for asbestos abatement and to prevent asbestos exposure to building occupants, maintenance personnel, and renovation contractors. This section applies to all contractors who may come in contact with or disturb asbestos-containing building materials. For a detailed explanation of the responsibilities for asbestos abatement contractors, please see Appendix B.

- a. UCSF project managers shall:
  - i. Prior to undertaking any construction, renovation, demolition or disturbance projects, obtain written assurance from EH&S that all work areas are free of asbestos contamination and fibers.
  - ii. If the contractor must enter ceiling space or remove ceiling tiles as part of their contracted work, obtain written assurance from EH&S that it is safe and will not disturb any asbestos containing materials.
  - iii. Notify the building's occupants of any scheduled work.
  - iv. Post asbestos construction notices that describe ongoing work and list an emergency contact number.
  - v. If asbestos materials are encountered at any time during the project, notify EH&S, and instruct the contractor to cease all work immediately and take appropriate measures to protect university employees and visitors.
- b. EH&S shall:
  - i. Visually inspect all building materials and areas for asbestos fibers and contamination.
  - ii. Collect samples for analysis to determine if asbestos is present.
  - iii. Provide written assurance that all work areas are free of asbestos contamination and fibers, prior to allowing any construction, renovation, or demolition projects.
- c. All contractors shall:
  - i. Ensure that their employees and subcontractors have the appropriate level of asbestos awareness training as mandated by Cal-OSHA.
  - ii. Inquire from the project manager the location of asbestos containing building materials in the work area. If work is to be done in a ceiling space, the contractor must obtain permission from the contractor manager that it is safe to do so.
  - iii. Ensure all work is compliant with all applicable federal, state and local regulations.
  - iv. If a material suspected of containing asbestos is encountered, immediately cease all work and notify the project manager and EH&S. The contractor shall also take all necessary precautions to ensure that university employees, students, and visitors are not exposed to asbestos contamination.

## **XII. Lead Awareness (Cal/OSHA Standard 1532.1)**

UCSF buildings constructed before 1978 are assumed to contain lead-based paint. Although lead-based paint materials may not present any health hazards while intact, any impact created by demolition or other activities related to renovations or repair projects may present significant health hazards. Some locations at UCSF may also contain elemental lead shielding incorporated into building structures for the purpose of inhibiting the penetration of ionizing radiation. For a detailed explanation of the responsibilities for lead abatement contractors, please see Appendix C.

The permissible exposure limits (PEL) for airborne lead are 0.05 milligrams per cubic meter (mg/m<sup>3</sup>) of air and an action level of 0.03 mg/m<sup>3</sup>, both as an 8 hour time weighted average (TWA).

- a. Trigger tasks are certain highly hazardous tasks that carry the presumption of airborne exposure above the PEL. They require special protective measures until it is determined that worker airborne exposures to lead are below levels specified in [1532.1](#). The following are the three levels of trigger tasks involving lead-containing materials and associated respirator requirements:
  - i. Level 1 trigger tasks: spray painting, manual demolition, manual scraping or sanding, using a heat gun, and power tool cleaning with dust collection system.
    1. Minimum respirator requirement: a half-mask respirator with N - 100, R - 100, or P - 100 filters
  - ii. Level 2 trigger tasks: using lead containing mortar; burning lead; rivet busting; cleaning power tools without a dust collection system; using dry, expendable abrasives for clean-up procedures; moving or removing an abrasive blasting enclosure
    1. Minimum respirator requirement: a full-face mask respirator with N-100, R-100, or P-100 filters; a supplied-air hood or helmet; or a loose-fitting hood or helmet with a powered air purifying respirator with N - 100, R - 100, or P - 100 filters
  - iii. Level 3 trigger tasks: abrasive blasting, welding, cutting, or torch burning on structures
    1. Minimum respirator requirement: a half mask, supplied-air respirator in a positive pressure mode
  - iv. Protective requirements for all trigger tasks and any other task that may cause a lead exposure above the PEL include the following:
    1. Respirators, protective equipment, and protective clothing
    2. Clothing change areas and a shower
    3. Initial blood tests for lead and zinc protoporphyrin
    4. Basic lead hazard, respirator, and safety training
    5. The establishment of a regulated area and warning signs that read "Warning: Lead Work Area- Poison- No smoking or eating"

Blood lead monitoring is especially important to evaluating work and hygiene practices that may result in lead ingestion. Employees whose blood

lead levels exceed specified limits must be removed from the work with exposure to lead at or above the action level. These workers must be provided with normal earnings, seniority, and other employee rights and benefits for 18 months or until the job from which they were removed is discontinued, whichever occurs first. Starting in January 2002, mandatory medical removal of an employee due to lead exposure (or exposure to other regulated chemicals) must be recorded on the Log 300 with a check in the “poisoning” column

- b. UCSF project managers shall:
  - i. Obtain written assurance from EH&S that all work areas are free of lead and lead based paint, prior to undertaking any construction, renovation, or demolition.
  - ii. Post signs at all approaches to work area entrances where lead abatement work is being undertaken to read “Caution Lead Hazard - Keep Out Unless Authorized,” In addition, the project manager shall post the Cal-OSHA Lead Hazard Warning Poster at the immediate work area entrance
  - iii. If at any time during a construction project it is brought to the attention of the project manager that the building materials are suspected of containing lead, it is the project manager’s responsibility to inform the contractor to cease all work immediately, ensure the contractor takes appropriate measures to protect UCSF employees and visitors, and to inform EH&S within 24 hours.
- c. EH&S shall:
  - i. Inspect areas for the presence of lead incorporated into building materials and lead based paint.
  - ii. Where paint is suspected of containing lead, collect paint samples for lead analysis.
  - iii. Provide written assurance that all work areas are free of asbestos contamination and fibers, prior to allowing any construction, renovation, or demolition projects.
- d. All contractors shall:
  - i. Be thoroughly knowledgeable about the requirements of Construction Safety Orders [§1532.1](#).
  - ii. Assess the lead hazards at each job site
  - iii. Inquire from the project manager the location of lead containing building materials and lead based paint in the work area.
  - iv. Ensure all work is compliant with all applicable federal, state and local regulations.
  - v. If a material suspected of containing lead is encountered, immediately cease all work and notify the project manager immediately. The contractor shall also take all necessary precautions to ensure that university employees, students, and visitors are not exposed to asbestos or lead contamination.
  - vi. Post an emergency contact phone number on the work site in which a live person can be contacted 24 hours a day, seven days a week.

- vii.** Where lead is present the following is required:
  1. Lead dust must be controlled by HEPA vacuuming, wet cleanup or other effective methods.
  2. Workers must be provided with washing facilities that are supplied with soap and clean water.
  3. The employer must implement a written compliance program to ensure the control of hazardous lead exposures.
  4. The employer must provide the worker with and require the use of appropriate personal protective equipment.
- viii.** Implement feasible engineering and work practice controls to maintain exposures to lead below the PEL.
- ix.** Generate a written compliance program that details how lead exposures will be controlled.
- x.** On jobs at residential and public access buildings, workers whose exposures to lead measure above the PEL and their supervisors must receive state-approved training and certification by the California Department of Health Services.
- xi.** Maintain records of air monitoring, blood lead testing and medical removal.
- xii.** Notify DOSH in [writing](#), at least 24 hours before the start of work.

### **XIII. Fluorescent Light Ballasts**

Prior to 1978, electrical light ballasts were commonly manufactured with polychlorinated biphenyls (PCBs) in the capacitor oil and in a tar-like substance that surrounds ballast components called potting compound. Ballasts made after 1978 are usually marked “NO PCB”, however, they may contain a PCB replacement called DEHP, a probable human carcinogen. Given this possibility, the best option for No-PCB ballasts is to dispose of them as electronic waste.

- a. UCSF project managers shall inform the contractor of UCSF policies on the handling and recycling of fluorescent light ballasts and ensure the contractor follows the policies outlined below.
- b. All contractors shall:
  - i.** Notify the UCSF Project Manager of any work that will involve working with or disposing of fluorescent light ballasts
  - ii.** Plan to detach ballasts from lamp fixtures and strip all wiring.
  - iii.** Plan to collect and segregate PCB ballasts and Non-PCB ballasts for disposal/recycling purposes. (All light ballasts made prior to 1978 and not marked “NO PCB” are assumed to contain PCBs)
  - iv.** If ballasts/capacitors are leaking, contain and seal them in a strong clear plastic bag and call EH&S 476-0546 for pick up.
  - v.** Coordinate with the UCSF project manager for the recycling of the ballasts:

If not recycled through EH&S, copies of all disposal/recycling records including, but not limited to, waste manifests, Department of Transportation (DOT) shipping records, and recycling or disposal certificates must be forwarded to Hazardous

Materials Manager at EH&S no more than 30 days following the transportation, disposal, or recycling activity.

**XIV. Confined Space Entry (Cal/OSHA Standards 5156-5159)**

- a. UCSF project managers shall:
  - i. Notify contractors of all permit-required confined spaces in their designated work areas. For a list of UCSF confined spaces, please see appendix D.
  - ii. Ensure that contractors are aware of the UCSF confined space entry program and that all contract work must be performed in compliance with the program. The UCSF [confined space program](#) is located on the EH&S website.
  - iii. Apprise the contractor of the elements including the hazards identified and the host employer's experience with the space that make the space in question a permit space
  - iv. Inform contractors of procedures that have been implemented for employee protection in or near the permit space where contractor personnel will be working
  - v. Coordinate entry operations whenever employees of more than one employer are simultaneously working in the area so that employees of one employer do not endanger the employees of any other employer.
  - vi. Debrief the contractor when work is completed regarding any hazard encountered or created in the permit space during entry
- b. All contractors shall:
  - i. Identify confined spaces that require a permit.
  - ii. Inform the project manager of entry procedures that will be followed and provide the project manager with documentation of the company's entry procedures before beginning work.
  - iii. Evaluate all confined spaces where work is to be conducted for the following:
    - 1. Presence of explosive gases equal to or greater than 10% if the lower explosive limit
    - 2. Oxygen deficient or rich atmospheres.
    - 3. Concentrations of carbon monoxide and hydrogen sulfide.
    - 4. Walking and working surfaces; electrical shock, burn, noise, and heat stress hazards
  - iv. Control all potential hazards with the following measures:
    - 1. Wear appropriate personal protective equipment (goggles, gloves, respirator) when a potential hazard exists.
    - 2. Use proper lockout/tagout procedures
    - 3. Use non-sparking equipment when working in an oxygen rich or potentially explosive environment
    - 4. Use ventilation fans in confined spaces with oxygen deficient environments or in situations where there may be a heat stress hazard
  - v. In the event of an emergency requiring rescue, the contractor shall immediately call 911 or 9-911 from a campus phone. Only a trained

rescue team supplied by the local fire department may perform emergency rescue.

**XV. Lockout/Tagout** (Cal/OSHA Standards 3314, 2320.4)

The UCSF Lockout/Tagout Program requires that standard locks and tags are used to control the start-up of equipment that is being serviced or maintained by its employees. It applies to the installation, service, maintenance, and removal of any type of machinery, equipment, or components, in which the unexpected start-up or release of stored energy could cause injury. Energy sources that are not neutralized and locked out have the potential to cause severe injury, disfigurement, or death from electric shock, contact with rotating machinery, burns, or other causes. A copy of the UCSF Lockout/Tagout Program is available for download on the EH&S website ([www.ehs.ucsf.edu](http://www.ehs.ucsf.edu)). Specific written lockout/tagout procedures for equipment requiring lockout/tagout are also available from UCSF Facilities Management.

- a. UCSF Project managers shall ensure that all contractors follow the requirements of the UCSF lockout/tagout program in any work involving the installation, service, maintenance, and removal of any type of machinery, equipment, or components, in which the unexpected start-up or release of stored energy could cause injury
- b. All contractors shall:
  - i. Develop; implement and maintain their own Lockout/Tagout Program in accordance with Cal-OSHA regulations as it applies to the work of their contract
  - ii. Never override any locks or tags that they encounter during the performance of their work
  - iii. Submit a copy of their Lockout/Tagout Program to the Project Manager before the start of any work where Cal-OSHA Title 8 regulations apply

**XVI. Electrical Safety** (Cal/OSHA Standards 2300-2983)

- a. UCSF project managers shall:
  - i. Ensure that only qualified electricians work on electrical systems at UCSF
  - ii. Ensure that all electrical work is conducted in accordance with the National Fire Protection Agency 70E Standard for Electrical Safety in the Workplace
- b. All contractors shall:
  - i. Refrain from operating electrical tools or equipment in wet areas or areas where potentially flammable dusts, vapors, or liquids are present, unless specifically approved for that location
  - ii. Protect portable lighting used in wet or conductive locations, such as tanks or boilers, with ground fault circuit interrupters (GFCI).
  - iii. Inspect all extension cords for defects prior to use
  - iv. Ensure that all temporary wiring is grounded

- v. Ground all power tools and electrical equipment with exposed, non-current carrying metal parts; the only exception is for double-insulated powered tools which do not require grounding
- vi. Use skirted attachment plugs on all equipment operating at more than 300 volts
- vii. Ground all generators which are multipurpose or rated greater than 5,000 volts. Portable or vehicle mounted generators do not need to be grounded if they are single phase and rated less than 5,000 volts if the grounding terminals of its receptacle are bonded to the vehicle frame, the generator frame, and to the plugged-in equipment.
- viii. Use receptacles to plug in equipment that have a grounding contact that is connected to an equipment grounding conductor
- ix. Ensure that a qualified electrician checks the circuit of a tripped breaker or other protective device and corrects problems before resetting the breaker.
- x. Erect barriers and post warning signs to ensure non-authorized personnel stay clear of the work area. Report hazards (lack of protective guards or covers, damaged equipment, etc.) to the UCSF project manager immediately.
- xi. Never leave electrical boxes, switch gear, cabinets, or electrical rooms open when unattended. Insulate energized parts when covers have been removed or doors are ajar. The use of cardboard, plywood, or other flammable materials to cover energized circuits is prohibited.
- xii. Never allow unqualified individuals to work on electrical equipment.
- xiii. Use only dry chemical, carbon dioxide, or halon fire extinguishers to fight electrical fires.
- xiv. Use GFCI on receptacles that are not connected to the site's permanent wiring, and which have a rating of 15 or 20 amps, 120 volts and are single-phase.

**XVII. Machine Guarding** (Cal/OSHA Standards 3999, 4002, 4050, 4051, 4070, 4075)

- a. UCSF project managers shall ensure all contractors comply with machine guarding requirements of this section.
- b. All contractors shall se machine guarding on all moving parts when the operation of a machine or accidental contact with the parts could injure the operator or other workers. The following is a list of moving parts which must be guarded:
  - i. Gears, sprockets, and chain drives
  - ii. Belt and pulley drives
  - iii. Belt conveyor head and tail pulleys
  - iv. Screw conveyers
  - v. Exposed shafts and shaft. ends
  - vi. Collars and couplings
  - vii. Hazardous revolving and reciprocating parts

### **XVIII. Power Tools**

- a. UCSF project managers shall ensure that power tool use by UCSF contractors complies with the requirements of this section.
- b. All contractors shall comply with the following safety precautions when using power tools:
  - i. Always wear the manufacturer's recommended personal protective equipment when using power tools.
  - ii. Ensure that all guards on equipment are in place and working properly.
  - iii. Do not wear rings, ties, or loose clothing that can get caught in rotating equipment.
  - iv. Make sure that materials to be worked on are secure before activating power tools.
  - v. Route electrical cords in a manner that reduces trip hazards.
  - vi. Always disconnect power when changing accessories.
  - vii. Ensure that electrical cords are not frayed or broken prior to beginning work.
  - viii. Ensure that plugs and receptacles are in safe working condition.
  - ix. Disconnect the power supply before leaving the job site.

### **XIX. Hot Work Permits (Cal/OSHA Standards 1740, 1742, 1743)**

- a. UCSF project managers shall ensure that all contractors have hot work permits from the Designated State Fire Marshal's Office for work involving the following:
  - i. Brazing
  - ii. Soldering
  - iii. Cutting
  - iv. Gas or arc welding
  - v. Grinding
- b. All contractors shall:
  - i. Not conduct gas welding or cutting in or near rooms or locations where flammable liquids or vapors, lint, dust or loose combustible stocks are located.
  - ii. Provide fire-extinguishers of an approved type at locations where welding or cutting is performed.
  - iii. Maintain a fire watch for at least one-half hour after completion of cutting or welding operations to detect and extinguish smoldering fires. Call 476-0570 to have the site inspected by a UCSF Fire Division representative.
  - iv. Comply with Cal/OSHA and California Code of Regulations requirements for hot work in confined spaces.
  - v. Post a copy of signed hot work permits on the premises where work is being conducted. For any questions, call 415-476-6519.
  - vi. Ramps

Please see Appendix E for UCSF Hot Work Permit Form

**XX. Ramps** (Cal/OSHA Standards 1623-1626)

- a. UCSF project managers shall ensure that ramps used by contractors meet the minimum requirements detailed below.
- b. All contractors shall use ramps which are properly designed to provide a safe means of access for foot or vehicle traffic (Cal OSHA Stds 1623-1625). The following are general requirements for ramps:
  - i. Guardrails are required on the open sides of ramps, runways, platforms, surfaces or other elevations 7 ½ ft. or more above the ground.
  - ii. Foot ramps must be at least 20 in wide and secured and supported to avoid deflection and springing action.
  - iii. On ramps with slopes exceeding 2 ft. of rise for every 10 ft. of run, cleats must be 8 in. or more in length and be placed no more than 16 in. apart.
  - iv. Wheelbarrow ramps and runways must be firmly secured against displacement.

**XXI. Fall Protection** (Cal/OSHA Standards 1669-1671.2)

- a. UCSF project managers shall ensure that all contractors at UCSF working at heights greater than 6 ft. have a fall protection program which meets the requirements outlined below.
- b. All contractors shall:
  - i. Have a fall protection program in place for the site where work is being performed.
  - ii. Work to reduce fall hazards through the use of engineering controls.
  - iii. Use personal fall arrest and restraint systems, administrative controls, and receive training when engineering controls such as guardrails are not feasible.
  - iv. Train employees in the use and inspection of fall protection equipment.
- c. Types of fall protection systems:

**Guardrails** – Guardrails are required on all work surfaces that exceed 7.5 ft. in elevation. Standard guardrails must consist of a top rail, located 42-45 in. above the floor and a mid-rail halfway between the floor and the top rail. Supporting posts must be placed every 8 ft. Screens and mesh may be used to replace the mid-rail, so long as they extend from the top rail to the floor.

**Personal Fall Arresting (PFA) Systems** - A personal fall arrest (PFA) system is used to stop an employee during a fall from a working level and to keep him or her from hitting a lower level or structure. Components of a personal fall arresting system include a body harness, lanyard, lifeline, connector, and an anchorage point.

**Personal Fall Restraint (PFR) Systems** - A personal fall restraint system is used to prevent an employee from falling. It consists of anchorages, connectors, and a body belt or harness. It may include lanyards, lifelines, and rope grabs designed for that purpose. A fall restraint system should only be used where a worker likely can regain footing or otherwise self-rescue immediately after a slip or fall.

- d. A personal fall protection system must be used if guard railing or safety nets are not installed for the following fall distances and work activities:
  - i. A fall distance of more than 6 ft. placing or tying rebar in walls, columns, piers, etc.
  - ii. A fall distance of 7 ½ ft. or greater during the following:
    - 1. Work from the perimeter of a structure, through shaft.-ways and openings
    - 2. Work anywhere on roofs with slopes greater than 7:12.
    - 3. Work from thrust-outs or similar locations when the worker's footing is less than 3 ½ in wide
    - 4. Work on suspended staging, floats, catwalks, walkways, or advertising sign platforms
    - 5. Work from slopes steeper than 40 degrees.
  - iii. A fall distance of 15 ft. or greater during the following:
    - 1. Work from buildings, bridges, structures on construction members, such as trusses, beams, purlins, or plates that are of at least 4 in nominal width.
    - 2. Ironwork other than connecting.
    - 3. Work on structural wood framing systems and during framing activities on wood or light gauge steel frame residential/light commercial construction
  - iv. An eave height of 20 ft. or greater, during all roofing operations
  - v. A fall distance of 30 ft. or greater when ironworkers are connecting structural beams
  - vi. Any height during work:
    - 1. On roofs having a pitch of 4:12 or greater while workers use pneumatic nail guns.
    - 2. On roofs while an operator uses a felt-laying machine or other equipment that requires the operator to walk backwards
    - 3. From float scaffolds
    - 4. From needle-beam scaffolds
    - 5. From suspended scaffolds
- e. The following are requirements for personal fall arresting systems:
  - i. The maximum arresting force on an employee must be limited to 1,800 lb.
  - ii. It must not allow an employee to freefall for more than 4 ft. or to come into contact with a lower level
  - iii. Anchorage points must meet one of the following requirements:
    - 1. Be capable of supporting 5,000 lb per employee attached.
    - 2. Be designed, installed, and used as par of a complete PFA system with a safety factor of two and be under the supervision of a qualified person.
  - iv. The PFA system lifeline must meet the following requirements:
    - 1. It must be able to support 5,000 lbs.

2. Each employee must be attached to a separate lifeline. The only exception is during the construction of elevator shafts in which two employees may be attached to a lifeline that is able to support 10,000 lb.
  3. The lower end of the vertical lifeline must extend to within 4 ft. from the ground.
  4. The horizontal lifeline system must be designed, installed and used under the supervision of a qualified person and maintained with a safety factor of at least two.
  5. The use of a body belt or safety belt as part of a PFA system is prohibited. Safety belts and body belts are to be used only as positioning devices or with PFR systems.
  6. Safety nets may be used in place of all other fall protection systems if the nets are installed properly.
- f. The following are requirements for personal fall restraint (PFR) systems:
- i.** Body belts or harnesses may be used for personal fall restraint.
  - ii.** Body belts shall be at least 1 5/8 in wide.
  - iii.** Anchorage points used for fall restraint shall be capable of supporting 4 times the intended load.
  - iv.** Restraint protection shall be rigged to allow the movement of employees only as far as the sides of the working level or working area.
- g. A fall protection plan (FPP) must be implemented when a fall protection system is required but cannot be used because the system creates a greater hazard or is impractical. The fall protection plan must:
- i.** Be prepared by a qualified person who is identified in the plan.
  - ii.** Be developed for a specific site or developed for essentially identical operations.
  - iii.** Document why a conventional fall protection system cannot be used.
  - iv.** Identify the competent person to implement and supervise the fall protection plan.
  - v.** Identify the controlled access zone for each location where a conventional fall protection system cannot be used.
  - vi.** Identify employees allowed in the controlled access zone.
  - vii.** Be implemented and supervised by the competent person.
  - viii.** An up-to-date copy of the fall protection plan must be at the job site.
- h. A controlled access zone (CAZ) must be established and maintained as follows:
- i.** A control line or its equivalent must control access to the CAZ and must:
    1. Consist of ropes, wires, tapes, or equivalent materials and be supported by stanchions.
    2. Be flagged or marked at not more than 6 ft. o.c.
    3. Be rigged not fewer than 39 in. and not more than 45 in from the working surface.

4. Have a breaking strength of 200 lb min See 1671.2 for greater detail.
- ii. Signs must be posted to keep out unauthorized persons.
- iii. A safety monitoring system is required and must include a designated safety monitor who is able to:
  1. Monitor the safety of other employees.
  2. Recognize fall hazards
  3. Warn an employee when it appears that the employee is unaware of a fall hazard or acting in an unsafe manner.
  4. Stay in sight of and in communication with the employee being monitored.
  5. Have no other responsibilities.

**XXII. Elevated Work Platforms (Cal/OSHA Standards 3210, 3638, 3642, 3643)**

Elevated work platforms are defined as devices designed to elevate a platform in substantially vertical axis.

- a. UCSF project managers shall ensure that all contractors comply with the elevating work platform requirements of this section.
- b. All contractors shall comply with the following requirements whenever elevating work platforms are used at UCSF:
  - i. An operations and instruction manual must be available whenever the platform is in use.
  - ii. Employees must be provided with proper training on the safe use of the equipment.
  - iii. The platforms must have guardrails between 39 and 45 in. high. If guardrails are less than 39 in. high, suitable fall protection as outlined on page must be used.
  - iv. The platform must be a minimum of 16 in. wide.
  - v. Powered units must be equipped with and emergency lowering means.
  - vi. All rotating and moving parts and pinch and shear points must be guarded
  - vii. All devices must comply with ANSI standards.
  - viii. The following must be displayed on each unit:
    1. Safe operation restrictions
    2. Manufacturer's name, model, and serial number
    3. Rated capacity
    4. Maximum travel height
    5. Operating instructions
    6. A statement that the unit is in compliance with ANSI standards

**XXIII. Scaffolding (Cal/OSHA Standards 1635.1-1667)**

- a. UCSF Project Managers shall ensure that all contractors comply with the scaffolding requirements of this section.
- b. All contractors shall comply with the following requirements for the design, erection, dismantling, and use of scaffolds:

- c. General requirements:
- i. Scaffolds must be provided for work that cannot be done safely by employees standing on ladders or on solid construction that is at least 20 in. wide. Exception: A 12-inch wide plank on members that are on 24 in. (or closer) centers is permitted.
  - ii. The design of scaffolds must conform to design standards, or scaffolds must be designed by a licensed engineer. Standards are based on stress grade lumber. Metal or aluminum may be substituted if the structural integrity of the scaffold is maintained.
  - iii. Each scaffold must be designed to support its own weight and 4 times the maximum load. Maximum working loads are:
    1. Light-duty scaffolds: 25 pounds per square foot (psf) of work platform
    2. Medium-duty scaffolds: 50 psf of work platform
    3. Heavy-duty scaffolds: 75 psf of work platform.
    4. Special-duty scaffolds exceeding 75 psf as determined by a qualified person or a California registered Civil Engineer with scaffold design experience.
  - iv. The erecting and dismantling of scaffolds are regulated as follows:
    1. Scaffold erection and dismantlement must be supervised by a qualified person.
    2. Scaffolds must be erected and dismantled according to design standards, engineered specifications, or manufacturer's instructions.
    3. A DOSH permit is required for erecting and dismantling scaffolds that exceed three stories or 36 ft. in height.
  - v. Scaffold access: Ladders, horizontal members, and stairways must provide safe and unobstructed access to all platforms. The equipment must be located so that its use will not disturb the stability of the scaffold.
    1. Ladders may be used if the following applies:
      - a. Ladder use must comply with the ladder safety portion of this document.
      - b. Ladders must be securely attached to scaffolds.
      - c. Ladders must extend 3 ft. above the platform or handholds must be provided
    2. Horizontal members built into the end frame of a scaffold may be used to access platforms if the following applies:
      - a. The horizontal members are parallel and level.
      - b. The horizontal members make a continuous ladder, bottom to top, with the ladder sides of the frames in a vertical line.
      - c. The horizontal members provide sufficient clearance for a good handhold and foot space.

3. Permanent stairways shall comply with the applicable provisions of the General Industry Safety Orders. Prefabricated scaffold steps or stairs, manufactured on or before May 28, 2005, shall comply with the design, manufacture and installation requirements of either the American National Standard ANSI A10.8-1988, Scaffolding-Safety Requirements, or the ANSI/ASSE A10.8-2001, Safety Requirements for Scaffolding. Prefabricated scaffold steps or stairs, manufactured after May 28, 2005, shall comply with the design, manufacture and installation requirements of ANSI/ASSE A10.8-2001, Safety Requirements for Scaffolding.
- vi.** Scaffolds must be secured as follows:
1. Scaffolds must be tied off with a double-looped No. 12 iron wire or a single-looped No. 10 iron wire or the equivalent. A compression member should prevent scaffold movement toward the structure.
  2. Light duty wooden pole scaffolds must be tied off every 20 ft. horizontally and vertically.
  3. Heavy-trade wooden pole scaffolds must be tied off every 15ft. horizontally and vertically
  4. Metal scaffolds shall be securely tied to the building or structure by means of a double looped No. 12 iron wire, or single looped No. 10 iron wire or equivalent at intervals not to exceed 30 ft. horizontally and subject to the following:
    - a. Ties shall be required at the free ends of the scaffold when the height of the scaffold platform exceeds 3 times the least base dimension. The remaining ties of the first row shall be required when the height of the scaffold platform is four times the least base dimensions.
    - b. Ties for subsequent levels shall be installed at 26-foot intervals vertically, with the last tie no further from the top than four times the least base dimension.
    - c. As an alternate means, scaffolds shall be guyed or outriggers shall be used to prevent tipping or upsetting.
    - d. Wind Loading. When scaffolds are partially or fully enclosed, specific precautions shall be taken to assure the frequency and adequacy of ties attaching the scaffolding to the building.
- vii.** Scaffold platforms must conform to the following:
1. Platforms must be capable of supporting the intended load.

2. Platforms must be planked solid (without gaps) and cover the entire space between scaffold uprights. In solid planking the following gaps are permissible:
    - a. The opening under the back railing
      - i. Wood scaffolds: 8 in. (max) horizontal
      - ii. Metal scaffolds: 10 in. (max) horizontal
    - b. Space between the building and the platform:
      - i. Wood scaffolds: 14in. (max)
      - ii. Metal scaffolds: 16 in. (max.).
    - c. Bricklayers' scaffolds: 7 in. (max) to finished face of building
  3. Platform minimum widths
    - a. Of light duty pole scaffolds used by carpenters, lathers, shinglers, painters, plasterers, sheet metal workers, or other trades not using heavy tools or storing heavy materials on the scaffolds=20 in
    - b. Of heavy trade pole scaffolds used by bricklayers, stonemasons, concrete workers, or other trades using heavy tools or storing heavy material on the scaffold=4 ft.
  4. Platform slope must not exceed 2 ft. vertically to 10 ft. horizontally.
  5. Overhead protection is required when people are working overhead.
  6. Slippery platform conditions are prohibited.
- viii.** Planking must conform as follows:
1. Planking must be made of scaffold grade (structural plank 2200 psi) lumber with a nominal dimension of 2" x 10".
  2. Planking shall not exceed a maximum span as follows:
    - a. Light trades @ 25 psf = 10 ft.
    - b. Medium trades @ 50 psf = 8 ft.
    - c. Heavy trades @ 75 psf = 7 ft.
    - d. Planking shall overhang the ledger or support as follows
  3. Planking shall overhang the ledger or support:
    - a. A minimum of 6 in.
    - b. A maximum of 18 in.
    - c.
  4. A single plank, up to 4 ft. is only permitted on light-trade wooden pole or horse scaffolds.
- ix.** Guard railings must be installed on open sides and ends of platforms that are 7 ½ ft. or higher. The following exceptions apply:
1. X-braces can be substituted for a midrail provided they intersect 20 in. to 30 in. above the platform

2. X-braces can be substituted for a top rail provided they intersect 42 in. to 48 in. above the platform, and a midrail is placed at 19 in. to 25 in. above the platform.
  - x. Toe-boards are required on all railed sides of work surfaces where employees work or pass below.
  - xi. Unless the scaffolding is designed by an engineer (CA/PE), height limits for scaffolding are as follows:
    1. Wood (frame/post) = 60 ft.
    2. Tube and coupler = 125 ft.
    3. Tubular (welded) = 125 ft.
    4. Horse (single) = 10 ft.
    5. Horse (tiered) = 10 ft.
  - xii. The following are prohibited for use as scaffolds and supports:
    1. Shore scaffolds
    2. Jack scaffolds (with brackets attached to single studs)
    3. Lean-to scaffolds
    4. Stilts
    5. Nailed brackets
    6. Brick or blocks
    7. Loose tile
    8. Unstable objects
  - xiii. Maximum scaffold working load must be posted and available from the jobsite supervisor.
  - xiv. Prohibited work practices on scaffolds include:
    1. Work on or from scaffolds during storms or high winds unless a qualified person has determined that it is safe and employees are protected by a personal fall arrest system, or wind screens. Wind screens shall not be used unless the scaffold is secured against the anticipated wind forces.
    2. The wood platforms shall not be painted with opaque finishes, but can be coated with certain clear finishes.
- d. Scaffold- specific requirements are listed below. They are unique to each type of scaffold listed. They replace or augment the general requirements.
- i. Tubular welded scaffold systems are commercially fabricated and must meet the following requirements:
    1. Frames must nest with coupling or stacking pins to provide proper vertical alignment.
    2. Frame panels must be vertically pinned if uplift may occur
  - ii. Tower and rolling scaffolds specifications are as follows:
    1. The “height-to-base” must not exceed 3:1 unless the scaffold is secured
    2. The following conditions must exist if employees ride on a rolling scaffold:
      - a. The minimum dimension of the scaffold base, when the scaffold is ready for rolling, must be at least half

of the height. If outriggers are used to meet this requirement, they must be installed on both sides of the staging.

- b. The floor or surface must be within 3 degrees of level and free from pits, holes, or obstructions.
  - c. A rolling scaffold less than 50 ft. high must be equipped with rubber wheels or similarly resilient tires. Metal wheels may be used for towers 50 ft. or higher.
3. A screw jack must extend 1/3 of its length into the leg tube and the exposed thread must not exceed 12 in.
  4. Two wheels, or casters, must swivel; all four must lock.
  5. A fully planked platform is required.
  6. All frame and center joints shall be locked together by lock pins, bolts, or equivalent fastenings.
  7. The scaffold must have horizontal diagonal bracing
  8. Railings are required if the platform is 7 ½ ft. or more above grade.
- iii. Suspended scaffolds:** Most suspended scaffolding has a two-point suspension supported by hangers or stirrups. The following are general requirements for suspended scaffolds:
1. Each wire must be suspended from a separate outrigger beam or thrust-out.
  2. Multi-stage units or units with overhead protection must be equipped with additional suspension lines to support the scaffolding in case the primary suspension system fails.
  3. The scaffold must be inspected daily and tested frequently.
  4. All hoisting mechanisms and metal platforms must meet nationally recognized standards.
  5. Outrigger beams must be secured in a saddle and anchored at one end to solid structure. The inboard end must be tied back.
  6. The beam must be capable of supporting four times the intended load.
  7. Use of a ladder as a platform is prohibited even if a horizontal work surface is added.
  8. The load limit is one person per suspension rope.
  9. An insulated wire suspension rope is required when workers are welding, sandblasting, or using acid or corrosive solutions.
  10. A separate safety harness and lifeline is required.
  11. Platform dimensions must be as follows:
    - a. Width must be equal to 14 in to 36 in or 24 in to 36 in if the platform is used by cement masons.
    - b. Span must be equal to 10 ft. (2 in x 10 in planks) or equal to 12 ft. (2 in x 12 in planks)

- c. Bolster (ledger) must be equal to a 2 in x 4" in cross section
12. Additional requirements for specific types of suspended scaffolds:
- a. For powered suspended scaffolds, the general rules for swing scaffolds apply. Additional requirements:
    - i. The minimum platform width must be 20 in.
    - ii. Railings are required on open sides and ends and on all sides if the scaffold is suspended by one rope.
    - iii. The load limit is 425 lbs. for a ladder-type platform.
    - iv. Controls must be of the dead-man type.
    - v. Load release units for fast descent are prohibited.
  - b. For interior hung suspended scaffolds suspended from a ceiling or roof structure, the general and suspended scaffold rules apply. Additional requirements:
    - i. Suspension ropes must be wrapped twice around supporting members and ledger
    - ii. Ends of wire rope must be secured with at least three clips.
  - c. Float suspended scaffolds which are intended for such work as welding, riveting, and bolting require the following:
    - i. Platform size must be 3 ft. x 6 ft. x ¾ in. plywood
    - ii. Rope must be 1-in. diameter manila (minimum)
    - iii. Load limit may not exceed three people.
    - iv. Personal fall protection and a separate lifeline are required for each person.
13. The following are requirements for boatswains' chairs:
- a. Employees shall be trained and/or experienced in the use of boatswains' chairs before being permitted to use such equipment.
  - b. When a boatswains' chair is suspended over an area traversed by employees, pedestrians or vehicular traffic, the ground area immediately below shall be effectively blocked by barricades, or an attendant shall be stationed to keep the area clear. Warning signs shall also be posted below.

- c. An employee using a boatswains' chair shall wear a safety belt with attached lanyard secured to a separate drop line or other means affording equivalent safety.
- d. Rope attachment to a block shall be by a thimble and splice.
- e. Hooks shall be provided with a means to prevent accidental disengagement or a shackle shall be used in place of a hook.
- f. Each double block of luff (or watch) tackle shall be branded or otherwise clearly marked so as to indicate the fully extended length in ft. from block to block. A knot or splice shall be made in the end of the line to prevent it from running through the block.
- g. Thimbles shall not be used where the chair connects to the hook.
- h. Tackle shall consist of rope equivalent in strength to at least 5/8 inch rope of first grade Manila as well as properly-sized blocks.
- i. The chair shall be suspended from its four corners by means of rope slings. It shall have a seat not less than 24 in. long by 10 in wide and if of soft. wood, 2 in. thick (1 1/8 in. if of oak or ash). It shall be reinforced across the full width by cleats securely fastened to each end. The seat may be constructed of material other than wood, provided the material used is equivalent in strength to 2 in. of soft. wood or 1 1/8 in. of oak or ash. If constructed of material of equivalent strength, cleats across the full width of the seat shall be provided unless structural analysis indicates that they are not necessary. Other design and construction of equivalent safety and strength may be substituted.
- j. Boatswains' chairs with fiber rope slings shall not be used to support an employee with welding, burning torch, sandblasting equipment, or chemicals harmful to fiber rope. In such cases, the slings shall be at least 3/8 inch wire rope, or equivalent. Further, the wire rope shall be protected against burning or welding arc by covering with a rubber hose or other equally effective means.
- k. Fiber rope seat slings shall be of 5/8 inch Manila rope, or equivalent, reeved through the four seat holes so as to cross each other on the underside of the seat.

- l. Boatswains' chairs, their supports and all accessories shall be capable of supporting, without failure, at least 4 times the maximum load.
  - m. Parapet of cornice hooks or clamps used to support chairs shall be provided with rings for tie-back use.
  - n. The specifications for a boatswain's chair are as follows:
    - i. Platform size must be 10 in. x 24 in. x 2 in.
    - ii. Rope must be 5/8 in. diameter manila (minimum) and 3/8 in. diameter protected wire for welding.
    - iii. Personal fall protection and a separate lifeline are required.
    - iv. The area beneath the boatswain's chair must be barricaded.
14. The specifications for needle beam scaffolds are as follows:
- a. Beam size must be 4 in. x 6 in x 10 ft.
  - b. Rope must be 1 ¼ in diameter manila
  - c. Personal fall protection is required
15. Outrigger scaffolds must meet the following requirements:
- a. Brackets or beams must be anchored or braced against turning, twisting, or tipping.
  - b. The platform must consist of at least two 2 in x 10 in planks.
  - c. Beam size must be a minimum of 3 in. x 12 in.
  - d. For the beam length, the outboard of fulcrum must not exceed 6 ft. and the inboard must be 1 ½ times the outboard section
  - e. For multi-level structures the units must be designed by an engineer (Ca PE).
16. Bracket scaffolds (light trades):
- a. Brackets must be bolted through walls, welded to tanks, properly secured to metal studs, or hooked over a supporting member.
  - b. Minimum platform dimensions are 20 in. x 10 ft. (min.)
  - c. The maximum load limit is two workers and 75 lbs. of equipment.
17. The specifications for horse scaffolds are as follows:
- a. Minimum platform width, for light trades, 20 in and 10 in if the platform is less than 4 ft. high; for heavy trades, 4 ft.  
The width of base legs must be a minimum of ½ the height.

- b. Maximum height for collapsible horse is 6 ft., for single horse, 10 ft., for two tiers, 10 ft. (Note: 2 tiers is the maximum allowed).
18. The specifications for ladder jack scaffold platforms are as follows:
- a. Span = 16 ft. (max)
  - b. Height = 16 ft. (max)
  - c. Width = 14 in. (min)
  - d. Load = two workers (max)
  - e. Ladders must be commercial grade.
  - f. A safety line is required for each worker.

**XXIV. Ladder Safety (Cal/OSHA Standards 1675-1678)**

- a. UCSF project managers shall ensure that all contractors working with ladders comply with the requirements of this section.
- b. All contractors shall comply with the following requirements when working with ladders:
  - i. The maximum ladder length allowed is as follows:
    - 1. Extension ladders=44 ft
    - 2. Single cleat ladders=30 ft.
    - 3. Double cleat ladders=24 ft.
  - ii. Double cleat ladders are required for two-way traffic or when 25 or more people are using a ladder
  - iii. Overlapping sections should not be less than 10% of the working length of the ladder.
  - iv. Prior to use inspect ladders for weak or damaged rails, broken or cracked rungs. Ladders which require repair must be tagged as unsafe and not used.
  - v. Ladders that project into passageways or doorways must be protected by barriers or guards.
  - vi. Always face the ladder when climbing up or down.
  - vii. A safety belt must me worn if the job requires working backwards from a ladder.
  - viii. Only one person at a time should work or climb on a ladder.
  - ix. Do not stand on the top three rungs of a ladder.
    - x. Never carry anything up a ladder that will prevent you from holding on to the ladder with both hands.
  - xi. Always keep both feet on the ladder rungs while stationary or working.
  - xii. Metal ladders shall not be used for electrical work, instead, use an Underwriter’s Laboratories (UL) listed wooden or fiberglass ladder.
  - xiii. The base of a straight ladder should be placed a distance equivalent to 1/4<sup>th</sup> the length of the ladder away from the surface that is being climbed.
  - xiv. Extension ladders shall not be taken apart to use as independent ladders.
  - xv. Ladders must be equipped with non-skid feet.

**XXV. Roofing Operations (Cal/OSHA Standards 1723-1731)**

- a. UCSF project managers shall ensure that all contractors engaged in roofing operations comply with the requirements outlined in this section.
- b. All contractors shall comply with the following requirements
  - i. Work on roofs higher than 20 ft. or work involving equipment that the operator must pull backward, regardless of roof height requires one or more of the following to reduce the fall hazard.
    1. For single-unit roofs (built-up roofing, flat-seam metal roofing, and vinyl roofing) with slopes of 0:12 through 4:12.
      - a. Warning lines and headers
      - b. Personal fall protection systems
      - c. Catch platforms with guardrails.
      - d. Scaffold platforms
      - e. Eave barriers
      - f. Parapets that are 24 in. or higher
      - g. Standard railings and toeboards
    2. For single unit roofs with slopes exceeding 4:12:
      - a. Parapets that are 24 in. or higher
      - b. Personal fall protection systems
      - c. Catch platforms
      - d. Scaffold platforms
      - e. Eave barriers
      - f. Standard railings and toeboards
    3. For multi-unit roofs:
      - a. Parapets that are at least 24 in. high.
      - b. Personal fall protections systems.
      - c. Catch platforms.
      - d. Scaffold platforms.
      - e. Eave barriers.
      - f. Roof jack systems
  - ii. The following are requirements for roofing work involving hot operations
    1. Workers shall not carry buckets containing hot material up ladders.
    2. An attendant must be stationed within 100 ft. of any kettle not equipped with a thermostat
    3. Liquefied petroleum gas cylinders shall not be located where the burner will increase the temperature of the cylinder.
    4. A class BC fire extinguisher must be kept near each kettle in use as shown below:

Kettle Capacity	Fire Extinguisher Capacity
less than 150 gallons	<b>8:BC</b>
150-350 gallons	<b>16:BC</b>
<b>more than 350 gallons</b>	<b>20:BC</b>

5. The fuel tanks of compressed-air-fueled kettles must be equipped with a relief valve set for a pressure not to exceed 60 psi.
6. Coal tar pitch operations are subject to the following requirements:
  - a. Workers must wear skin protection.
  - b. Washing facilities must be made available.
  - c. Workers must wear respiratory and eye protection in confined spaces that are not adequately ventilated
  - d. Hot pitch and asphalt buckets have the following maximum capacities:
    - i. Carry buckets: 6 gallons
    - ii. Mop buckets: 9 ½ gallons

**XXVI. Forms and Falsework** (Cal/OSHA Standard 1717)

Falsework includes concrete forms, support systems for forms, newly completed floors, bridge spans, etc., that provide support until appropriate curing or stressing processes have been completed.

- a. UCSF project managers shall ensure that requirements for forms and falsework described in this section are met by all contractors at UCSF.
- b. All contractors shall comply with the following forms and falsework requirements.
  - i. Design of Falsework
    1. Concrete formwork and falsework must be designed, supported, and braced to safely withstand the intended load.
    2. Falsework design, detailed calculations, and drawings must be signed and approved by a California-certified Professional Engineer (PE). If the falsework height (sill to soffit) exceeds 14 ft., if the individual horizontal span length exceeds 16 ft., or if vehicle traffic goes through the falsework. For other falsework, approval may be provided by a manufacturer’s representative or a licensed contractor’s qualified representative.
    3. Falsework plans must be available at the job site.
    4. Minimum design loads are as follows:
      - a. Total combined live and dead load must be 100 psf.
      - b. Live load and formwork must be 20 psf

5. Additional loads must be considered in the design or any unusual circumstances such as floor hoppers, concentrated piles of reinforcing steel bars, or similar loads.
- ii. Erection of falsework
  1. Falsework must be erected on a stable, level, compacted base supported by adequate pads, plates, or sills.
  2. Shore clamps (metal) must be installed in accordance with the manufacturer's instructions
- iii. Inspection
  1. Before pouring concrete on falsework requiring design approval, an engineer (Ca PE) or the engineer's representative must inspect for and certify compliance with plans. For other falsework, the inspection and certification may be provided by a manufacturer's representative or a licensed contractor's qualified representative.
  2. The person performing the inspection shall certify in writing that the falsework or vertical shoring system conforms to the working drawings and that the material and workmanship are satisfactory. A copy of the inspection certification must be available at the job site.
- iv. Access to forms and falsework
  1. The area under formwork is a restricted area and must be posted with perimeter warning signs.
  2. Joists (5 ½ in wide) at not more than 36 in. on-center may be used as walkways while forms are placed.
  3. A plank (12 in. wide) may be used as a walkway while joists are placed.
- v. Fall protection
  1. Periphery rails are required as soon as supporting members are in place.

**XXVII. Concrete Construction** (Cal/OSHA Standards 1712, 1715, 1720, 1722)

- a. UCSF project managers shall ensure that all contractors comply with the requirements for concrete construction described in this section.
- b. All contractors shall comply with the following requirements when involved with concrete construction at UCSF:
  - i. Appropriate Personal Protective Equipment must be used to protect against the following hazards
    1. Concrete burns from exposure to wet concrete.
    2. Silicosis from exposure to concrete dust during such operations as concrete cutting, drilling, grinding, or sandblasting.
  - ii. Masonry construction
    1. All masonry walls more than 8 ft. high must be braced to prevent overturning and collapse unless the wall is adequately supported through its design or construction

method. The bracing shall remain in place until permanent supporting elements of the structure are in place.

2. A limited access zone (LAZ) shall be established whenever a masonry wall is being constructed and must conform to the following:

- a. The LAZ shall be established before the start of construction.
- b. The LAZ shall be established on the unscaffolded side.
- c. The width of the LAZ shall be equal to the height of the wall to be constructed plus 4 ft. and shall run the entire length of the wall.
- d. The LAZ shall be entered only by employees actively engaged in constructing the wall. No other employee shall be permitted entry.
- e. The LAZ shall remain in place until the wall is adequately supported to prevent collapse. If the height of the wall is more than 8 ft.; the LAZ shall remain in place until permanent supporting elements of the structure are in place.

**iii.** Precast, prefabricated concrete construction, tilt-up, panels.

1. An erection plan, addenda, and procedure shall be prepared by or under the direction of an engineer (CA/PE).
2. The erection plan, addenda, and procedure shall be available at the job site.
3. Job site inspections shall be made by the responsible engineer (or representative) during the course of erection.
4. Proposed field modifications shall be approved by the responsible engineer.

**iv.** Rebar and other impalement hazards

1. Employees working at grade or at the same surface level as exposed protruding rebar or similar projections shall be protected against impalement by guarding exposed ends that extend up to 6 ft. above grade or other work surface, with approved protective covers or troughs as outlined by [Title 8, CCR §1712](#), Impalement Protection. Specifications and Testing Criteria.
2. Employees who work above grade or above any surface and who are exposed to protruding rebar or similar projections shall be protected from impalement by one or more of the following:
  - a. Guardrails
  - b. Approved fall protection systems
  - c. Approved troughs and covers

3. Personal fall protection must be used while employees place or tie rebar in walls, columns, piers, and other structures more than 6 ft. high.
  4. Guying and supporting of all rebar for walls, piers, columns, and similar vertical structures are required.
  5. Wire mesh rolls will be secured to prevent dangerous recoiling action.
- v. Concrete finishing
1. Powered finishing tools must be equipped with a dead-man-type control.
  2. Bull float handles must be constructed of a nonconductive material if they could come into contact with energized electrical conductors.

**XXVIII. Trenching and Shoring (Cal/OSHA Standards 1540-1541)**

- a. UCSF project managers shall ensure all contractors comply with the requirements described below when trenching and shoring.
- b. All contractors shall:
  - i. Notify all regional notification centers and all underground utility owners who are not members of the notification centers two working days before starting the work.
  - ii. Ensure that while excavations are open the underground utilities must be protected, supported, or removed as necessary.
  - iii. Conduct inspections of the excavations, adjacent areas and protective systems before the start of work; as needed throughout the shift, and daily for potential cave-ins, failures, hazardous atmospheres or other hazards.
  - iv. Take prompt corrective action or remove employees from excavation if a hazard is identified.
  - v. Employ standard shoring, sloping and benching must be used.
  - vi. Ensure that protective systems for excavations deeper than 20 ft. are designed by a registered engineer.
  - vii. Use additional bracing when vibration or surcharge loads are a hazard.
  - viii. Inspect excavations as needed after every rainstorm, earthquake or other hazard.
  - ix. Protect employees from falling materials by scaling, barriers or other methods.
  - x. Provide ladders or other safe means of access within 25 ft. of a work area in trenches that are 4 ft. or deeper.
  - xi. Refrain from excavating beneath the level of adjacent foundations, retaining walls or other structures unless the requirements outlined in [§1541\(i\)](#) have been met.
  - xii. Ensure that uprights are extended to the top of the trench and its lower end not more than 2 ft. from the bottom of the trench.
  - xiii. Protect employees from excavated or other material by keeping such material 2 ft. from the excavation edge or by using barrier devices.

- xiv.** Verify that shored, braced or underpinned structures are inspected daily when stability is in danger.
- xv.** Ensure that walkways or bridges with standard guardrails are be installed when employees or equipment are required or permitted to cross over excavations that are at least 6 ft. deep and wider than 30 in.
- xvi.** Erect barriers around excavations in remote locations. All wells, pits, shafts and caissons must be covered or barricaded, or if temporary, backfilled when work is completed.
- xvii.** Provide adequate protection from hazards associated with water accumulation
- xviii.** Protect each employee in an excavation from cave-ins by an adequate protective system designed in accordance with Cal-OSHA Title 8 regulations.
- xix.** Ensure that the ground in excavations is less than 5 ft. in depth and presents no indication of a potential cave-in hazard. If a cave-in hazard exists, protective systems are required.
- xx.** When excavations are deeper than 5 ft., a permit must be obtained from the DOSH and the sides shall be provided with a protective system (shored, braced or sloped sufficiently) to protect against hazardous ground movement.
- xxi.** When heavy equipment will be operated nearby, the shoring or bracing shall be able to withstand this extra load regardless of the depth of the excavation. For any excavation that a person will enter, all dirt, debris and excavation material shall be effectively stored or retained at least 2 ft. from the edge of the excavation.
- xxii.** Barricades at least 3 to 5 ft. high shall be spaced no further than 10 ft. apart and yellow and black “Caution, Do Not Enter” construction tape shall be stretched securely between the barricades.
- xxiii.** A registered professional engineer shall design excavations more than 20 ft. deep.
- xxiv.** Excavations should be covered and not left. open overnight, whenever possible.

**XXIX. Flaggers (Cal/OSHA Standard 1599)**

- a. UCSF project managers shall ensure that contractors employ flaggers as required below.
- b. All contractors shall use flaggers at locations on a construction site as soon as barricades and warning signs cannot effectively control moving traffic. The contractor must ensure the following:
  - i.** Flaggers must be placed in locations so as to give effective warning.
  - ii.** Warning signs must be placed according to the “California Manual on Uniform Traffic Control Devices for Streets and Highways, September 26, 2006”, published by the State Department of Transportation.
  - iii.** Flaggers must wear orange or strong yellow-green warning garments, such as vests, jackets, shirts, or rainwear.

- iv. Flaggers' stations must be illuminated, and flaggers must wear reflectorized garments that are visible at a minimum of 1,000 ft.. during hours of darkness.
- v. Flaggers must be trained and the training must be documented in accordance with the contractor's Injury and Illness Prevention Program requirements.

**XXX. Forklifts** (Cal/OSHA Standards 3649-3669)

- a. UCSF project managers shall ensure contractors comply with the requirements described below when using forklift's during UCSF construction projects.
- b. All contractors shall comply with the following requirements for forklift. operation at UCSF:
  - i. The rated lifting capacity of the forklift. must be posted in a location readily visible to the operator.
  - ii. Elevating employees requires the following:
    - 1. The forklift. must be equipped with a platform not less than 24" x 24" in. size.
    - 2. The platform must be properly secured to the forks or the mast.
    - 3. The platform must be equipped with guardrails, toe boards, and a back guard.
    - 4. It must have no spaces or holes larger than 1 in.
    - 5. It must have a slip-resistant platform surface.
    - 6. The operator must be at the controls while the employees are elevated.
    - 7. The operator must be instructed in the operating rules for elevating employees.
    - 8. Employees shall not sit, climb, or stand on platform guardrails or use planks, ladders, or other devices to gain elevation. When guardrails are not possible, fall protection in accordance with this document is required.
  - iii. All forklifts must have parking brakes.
  - iv. All forklifts must have an operable horn.
  - v. When the operator is exposed to the possibility of falling objects, the forklift. must be equipped with overhead protection (canopy).
  - vi. The contractor must post and enforce a set of operating rules that include the following:
    - 1. Only trained and authorized drivers may operate forklifts.
    - 2. Stunt driving and horseplay are prohibited.
    - 3. Employees must not ride on the forks.
    - 4. Employees must never be permitted under the forks (unless the forks are blocked).
    - 5. The driver must inspect the vehicle once during a shift..

6. The operator must look in the direction of travel and must not move the vehicle until all persons are clear of the vehicle.
  7. Forks must be carried as low as possible.
  8. The operator must lower the forks, shut off the engine, and set the brakes (or block the wheels) before leaving the forklift. unattended (that is, when the operator is out of sight of the vehicle or 25 ft.. away from it).
  9. Trucks must be blocked and brakes must be set before a forklift. is driven onto the truck bed.
  10. Extreme care must be taken when tilting elevated loads.
  11. The forklift. must have operable brakes capable of stopping it safely when it is fully loaded.
  12. The forklift. must have operable brakes capable of stopping it safely when it is fully loaded.
- vii.** An employee must be properly trained (as certified by the employer) before operating a forklift.. The following requirements apply to training:
1. An evaluation of the operator's performance must be conducted at least once every three years
  2. Refresher training in relevant topics must be provided to the operator when:
    - a. The operator is observed operating the vehicle in an unsafe manner.
    - b. The operator has been involved in an accident or near-miss incident.
    - c. The operator's evaluation reveals that he or she is not operating the truck safely.
    - d. The operator is assigned to drive a different type of truck.
    - e. Changes in workplace conditions could affect safe operation of the truck.

**XXXI. Heavy Construction Equipment (Cal/OSHA Standards 1590-1596)**

- a. UCSF project managers shall ensure contractors using heavy construction equipment at UCSF comply with the requirements shown below.
- b. All contractors shall comply with the following requirements when using heavy construction equipment at UCSF:
  - i.** Safety requirements for heavy construction equipment:
    1. General repairs must not be made to powered equipment until workers are protected from movement of the equipment or its parts.
    2. Before repairs are made workers must comply with lock-out/block-out requirements if applicable.

3. Wherever mobile equipment operation encroaches on a public thoroughfare, a system of traffic controls must be used.
4. Flaggers are required at all locations where barricades and warning signs cannot control the moving traffic.
5. Job-site vehicles must be equipped with the following:
  - a. Operable service, emergency, and parking brakes
  - b. Two operable headlights and taillights for night operation
  - c. Windshield wipers and defogging equipment as required
  - d. Seat belts if the vehicle has rollover protection structures
  - e. Fenders or mud flaps
6. Rollover protection structures and seat belts must be installed and used for the following equipment with a brake horsepower rating above 20:
  - a. Crawler tractor
  - b. Bulldozer
  - c. Front-end loader
  - d. Motor grader
  - e. Scraper
  - f. Tractor (except side boom pipe laying)
  - g. Water wagon prime mover
  - h. Sheeps' foot-type rollers and compactors
  - i. Rollers and compactors (weighing more than 5,950 lb)
7. Haulage and earth moving equipment safety requirements:
  - a. Every vehicle having a body capacity of 2.5 cubic yards or more must be equipped with an automatic backup alarm that sounds immediately on backing.
  - b. All other vehicles operating when rear vision is blocked must be equipped with an automatic backup alarm or its equivalent.
  - c. All vehicles must be equipped with a manually operated warning device.
  - d. Haulage vehicles in operation must be under operator control and must be kept in gear when descending grades.
  - e. Service brake systems for self-propelled, rubber-tired, off-highway equipment manufactured before January 1, 1972 (for scrapers January 1, 1971) shall meet minimum performance criteria for service brake systems as set forth in the Society of Automotive Engineers Recommended Practices listed below. Service, emergency and parking brake

systems for self-propelled, rubber-tired, off-highway equipment manufactured after January 1, 1972 (for scrapers January 1, 1971) shall meet the applicable minimum performance criteria for each system as set forth in the same Society of

Automotive Engineers Recommended Practices:

- i. Self-Propelled Graders.....SAE J236-1971
  - ii. Trucks and Wagons.....SAE J166-1971
  - iii. Front-End Loaders & Dozers.....SAE J237-1971
  - iv. Self-Propelled Scrapers.....SAE J319b-1971
- f. The control devices on a haulage vehicle must be inspected at the beginning of each shift..
  - g. Exposed scissor points on front-end loaders must be guarded.
  - h. Engines must be stopped during refueling.
  - i. Lights are required for night operation.
  - j. Vehicles loaded by cranes, shovels, loaders, and similar devices must have an adequate cab or canopy for operator protection.
  - k. Dust control is required when dust seriously limits visibility.
  - l. Respirators are required for drivers when air contamination becomes hazardous.
  - m. Industrial tractor operator's instructions must be posted in a conspicuous place, and operators must be able to understand them.
  - n. Loads on vehicles must be secured from displacement.

**XXXII. Cranes** (Cal/OSHA Standards 4884-5049)

- a. UCSF project managers ensure contractors comply with the requirements described below when using cranes during UCSF construction projects.
- b. All contractors shall comply with the requirements as follows:
  - i. General crane requirements
    - 1. Operators of mobile and tower cranes must have a valid certificate to operate the type of crane used from a certifying entity whose certification program is accredited by the National Commission for Certifying Agencies (NCCA). The only exception is for operators of mobile cranes with a boom length less than 25 ft or a maximum rated load capacity of less than 15,000 lb.
    - 2. Each crane and accessory gear that exceeds 3-ton capacity must be certified annually by a DOSH licensed certifier.

3. All required certificates must be kept with the certified equipment or at the project site.
4. All cranes must be equipped with audible warning devices controllable by the operator.
5. A crane shall not be operated when its wheels or tracks are off the ground unless it is properly bearing on outriggers.
6. Only qualified signal people shall be provided when the point of operation is not in full and direct view of the crane operator. The sole exception is the order to stop, which can be given by any person.
7. When there is a potential for accidental contact by cranes, the employer shall ensure there is effective communication to notify crane operators and signal persons of the presence of other cranes. Provide a dedicated frequency for other operators to communicate using 2-way radios.
8. Cranes must be inspected before each shift. and daily.
9. Periodic inspections must occur at least four times a year.
10. Proof load testing must occur every four years.

**ii. Specific crane requirements**

1. Mobile hydraulic cranes
  - a. A load-rating chart must be posted at a location that is readily visible to the operator.
  - b. To be used according to certifying agent requirements.
  - c. Boom angle indicators must be clearly visible from the operator's station.
  - d. Boom length indicators must be clearly visible to the operator.
  - e. A boom hoist disconnect must be installed.
  - f. A boom is required.
2. Boom-type mobile cranes (locomotive, crawler, and motor truck cranes):
  - a. A load-rating chart must be posted at a location that is readily visible to the operator.
  - b. All mobile cranes with booms more than 200 ft.. long or with capacity exceeding 50 tons must be equipped with an approved load indicating device (or its equivalent).
  - c. Either a readily visible boom angle or a boom radius indicator is required for cranes with a boom longer than 60 ft.. or a maximum rated capacity above 15 tons.
  - d. A fire extinguisher of 10:BC rating shall be accessible to the operator's station.
  - e. An operable boom stop is required on any crane whose boom could fall over backwards.

- f. The operating station must be protected by a canopy type guard or cab roof.
  - g. Safe access (by steps and handholds) must be provided.
3. Tower cranes (climbing cranes- composed of a vertical mast supporting a boom that rotates on the mast in the horizontal plane only. Requirements:
- a. The manufacturer's specifications regarding design, erection, operation, and safety must be available at the job site.
  - b. A DOSH permit is required before a tower crane is erected, climbed, or dismantled.
  - c. A new certification by a DOSH licensed certifier is required for a fixed crane relocated to a new position on the same project or erected at a new site.
  - d. A DOSH permit to operate is required before operating a fixed or mobile tower crane.
  - e. A test load of 110%-capacity rating must be available at the job site. DOSH may require a capacity test at any time.
  - f. Booms are normally allowed to freely weathervane; however, if the boom is lashed, the lashing must be in accordance with the certifying agent's recommendations.
  - g. Damaged boom sections or components must be repaired to not less than the capacity of the original section or components.
  - h. Repairs to critically stressed members of a boom or boom extension must be in accordance with manufacturers' or certified agents recommendation and new or replacement boom or boom extensions must be tested in accordance with the requirements outlined under Cal-OSHA Title 8, section 5022 before use.

**iii. Slings and attachments**

- 1. Slings and attachments must be inspected daily for damage
- 2. A manufacturer's label with capacity listed must be attached to the sling.
- 3. Damaged or defective slings must be removed from service immediately.
- 4. Chain or wire rope slings must not be shortened by knots, bolts, or other means.
- 5. Sling legs must not be kinked or overloaded.
- 6. Slings must be padded to protect against damage from sharp loads.
- 7. Suspended loads must be kept clear of all obstructions.

8. Alloy chains must not be annealed.
9. Employers must avoid operations that expose employees to overhead loads.
10. Safety-type hooks (or their equivalent) must be used when loads must pass over workers or occupied passageways.
11. Deformed or defective sling hooks rings and chains with deformed links are prohibited.
12. The use of a crane or derrick to hoist employees on a personnel platform is prohibited, except when the erection, use, and dismantling of conventional means of reaching the worksite, such as a personnel hoist, ladder, stairway, aerial lift., elevating work platform or scaffold, would be more hazardous or is not possible because of structural design or worksite conditions.

**XXXIII. Pile Driving (Cal/OSHA Standards 1600, 1601)**

- a. UCSF project managers shall ensure that contractors comply with the requirements shown below when pile driving at UCSF.
- b. All contractors shall comply with the following requirements when pile driving during UCSF construction projects:
  - i. A supervised danger zone must be established around the operating hammer if employees are cutting, chipping, or welding.
  - ii. The hammer must be safely blocked while work is being performed below it, except for momentary spotting.
  - iii. All pressure hoses of steam or air must be secured by ¼ in. alloy steel chain (3250 pound rated capacity) or wire rope of equivalent strength.
  - iv. Work platforms must be of sufficient size so that the employee can easily avoid contact with the hammer. It shall be surrounded on all sides, except between the hammer leads, with a railing or guard line 42 to 45 in. in height. Guard lines shall be taut and at least 3/8 inch wire rope or equivalent.
  - v. Leads must be provided with ladders and rings or similar attachment points for use with an appropriate fall protection system.
  - vi. Fall protection must be provided when workers are exposed to unguarded platforms or walkways exceeding 7 ½ ft. in height.
  - vii. Walkways that are at least 20 in. wide must be provided for access to all work areas.
  - viii. Employees are prohibited from riding the hammer.
  - ix. A driving head or a bonnet is required except when driving sheet piling.
  - x. The crew must use standard hand signals, and only the loft. man may control the lowering of the hammer. The only exception is when an employee is aloft., in which case the employee aloft. will signal hammer movement.
  - xi. A hammer stop block is required.

- xii.** Two steam (or air) shutoff valves are required; one must be a quick-acting valve within reach of the hammer operator.
- xiii.** Rigs must be stabilized with guys and outriggers when needed.
- xiv.** Piles shall be unloaded in a controlled manner.

**XXXIV. Demolition** (Cal/OSHA Standards 1733-1737)

- a. UCSF project managers shall ensure that contractors undertaking demolition projects at UCSF comply with the requirements for demolition.
- b. All contractors shall comply with the following requirements when engaged in demolition projects at UCSF:
  - i.** A DOSH permit is required for demolition of structures (buildings) more than 36 ft. high.
  - ii.** A pre-demolition survey of the structure shall be conducted by a qualified person to determine the condition of the framing, floors, and walls, and the possibility of an unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked.
  - iii.** A pre-demolition survey to determine worker exposure to asbestos and lead shall be conducted.
  - iv.** Utilities to the structure being demolished must be turned off or protected from damage.
  - v.** Entrances to multi-story buildings must be protected by a sidewalk shed or a canopy.
  - vi.** The demolition work on floors and exterior walls must progress from top to bottom. The only exception is demolition with explosives and for cutting chute holes which do not require progress from top to bottom.
  - vii.** The contractor must check continually for hazards created by weakening of the structure's members. If a hazard occurs, it must be removed before workers may continue.
  - viii.** Floor openings must have curbs and stop logs to prevent equipment from running over the edge.
  - ix.** Wall openings must be guarded except on the ground floor and the floor being demolished.
  - x.** Walkways 20 in. wide must be provided as a means of access across joists, beams, or girders.
  - xi.** Demolition debris must be kept wet to prevent dust from rising.
  - xii.** Whenever waste material is dropped to any point lying outside the exterior walls of the building, enclosed chutes shall be used unless the area is effectively protected by barricades, fences, or equivalent means. Signs shall be posted to warn employees of the hazards of falling debris.
  - xiii.** Chutes or chute sections that are at an angle of more than 45° from the horizontal must be entirely enclosed except for openings equipped with closures at or about floor level for the insertion of materials.
  - xiv.** When chutes are used to load trucks, they must be fully enclosed. Gates must be installed in each chute at or near the discharge end. A

qualified person must be assigned to control the operation of the gate and the backing and loading of trucks.

- xv. Any chute opening into which employees dump debris by hand must be protected by a guardrail.
- xvi. When debris is dropped through holes in a floor without the use of chutes, the area onto which the material is dropped shall be completely enclosed with barricades not less than 42 in. high and not less than 6 ft. back from the projected edge of the opening above. Signs that warn of the hazard of falling materials shall be posted at each level. Removal of debris shall not be permitted in the lower drop area until handling of debris ceases above.
- xvii. Crane demolition work must comply with the following requirements:
  - 1. The wrecking ball's weight must not exceed 50% of the clamshell rating or 25% of the rope-breaking strength.
  - 2. The boom should be limited to 30° left. or right.
  - 3. The wrecking ball must be attached with a swivel-type connection.
  - 4. The load line and ball must be inspected at least twice each shift..
  - 5. Outriggers are required when using a wrecking ball (truck cranes).

#### **XXXV. Emergencies (Cal/OSHA Standards 1512)**

##### **a. Hazardous chemical spills:**

Contractors bringing or using hazardous chemicals on UCSF property are required to have their own emergency response program. It is the responsibility of the contractor to contain and clean up hazardous chemical spills. See Management of Hazardous Materials on page 7 for more detailed information.

##### **b. Safety Showers and Eye Washes**

Safety showers and eye washes are located throughout the university where hazardous materials are used. Contractors working in these areas are to familiarize themselves with the locations of safety showers and eye washes before beginning work. In case of accidental exposure of eyes or skin, flush exposed areas with water for a minimum of 15 minutes.

##### **c. Other emergencies such as injuries, fires and medical emergencies:**

- i.** If calling from a campus phone call 9 + 911
- ii.** If calling from a cell phone, call the police department at 476-1414. Calls placed to 911 from a cell phone are directed to the California Highway Patrol.
- iii.** Notify the UCSF project manager after calling 9-911. The Capital Programs/Facilities Management front desk number is 476-2021.
- iv.** Contractors shall familiarize themselves with the locations of emergency exits before beginning work.

- v. In the event of a fire alarm, all contractors must stop work and vacate the building immediately using the nearest emergency exit.
- vi. Only individuals trained in the use of fire extinguishers should attempt to put out a small fire. Should a fire occur at or near the work area, there are fire extinguishers located throughout the campus.

d. First aid requirements

Contractors shall ensure the availability of a suitable number of appropriately trained persons to render first aid. All employees assigned first-aid duties must be provided with appropriate personal protective equipment to protect against exposure to bloodborne pathogens when providing first aid. The contractor must provide a first aid kit at all job sites where construction is taking place. The kit must contain the minimum number of supplies as determined by a licensed physician or as listed below:

Dressings in adequate quantities consisting of:	Type of Supply Required by Number of Employees			
	1-5	6-15	16-200	over 200
1. Adhesive dressings	X	X	X	X
2. Adhesive tape rolls, 1-inch wide	X	X	X	X
3. Eye dressing packet	X	X	X	X
4. 1-inch gauze bandage roll or compress		X	X	X
5. 2-inch gauze bandage roll or compress	X	X	X	X
6. 4-inch gauze bandage roll or compress		X	X	X
7. Sterile gauze pads, 2-inch square	X	X	X	X
8. Sterile gauze pads, 4-inch square	X	X	X	X
9. Sterile surgical pads suitable for pressure dressings			X	X
10. Triangular bandages	X	X	X	X
11. Safety pins	X	X	X	X
12. Tweezers and scissors	X	X	X	X
13. Cotton-tipped applicators			X	X
14. Forceps			X	X
15. Emesis basin			X	X
16. Flashlight			X	X
17. Magnifying glass			X	X
18. Portable oxygen and its portable breathing equipment				X
19. Tongue depressors				X
Appropriate record forms	X	X	X	X
Up-to-date first-aid textbook or manual	X	X	X	X

The contents of the first-aid kit shall be inspected regularly to ensure that the expended items are promptly replaced. The contents of the first-aid kit shall be arranged to be quickly found and remain sanitary. First-aid dressings shall be sterile in individually sealed packages for each item.