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## PURPOSE

The purpose of the *Construction Safety Program* is to assist with providing a safe work environment for all individuals working on the San Jose State campus. This handbook will help build a safety culture and engagement between all.

All guidelines and requirements given throughout the Construction Safety Program describe the **minimum standards** for safe work activities of all employees performing work on San Jose State University's (SJSU) campus.

If you have questions or concerns regarding the guidelines and matters that have been addressed in this program, please speak with our EH&S department.

The regulations that are referenced throughout this program are referenced from Cal/OSHA (California Division of Occupational Safety & Health) Title 8 and the [Cal/OSHA's Pocket Guide For The Construction Industry](#).



For a list of acronyms used throughout this program, please refer to page 38 or [click here](#).

## **General Campus Information**

### *Emergency Procedures*

**\*It is crucial that employee(s) have established emergency procedures for the building and/or working area where construction related activities are taking place. This should include identifying at least one means of egress from the work area. Egress and egress pathways should be maintained free of trip hazards and/or obstructions at all times during the course of work. Emergency information is posted near building entrances throughout campus and includes a map showing exit locations and available fire extinguishers.**

An emergency is defined as any situation that requires immediate assistance from the police, fire department or ambulance. In an emergency, dial 911 from a campus phone or use one of the blue light phones located throughout campus. If calling from a cell phone it is recommended that you call University Police at 408-924-2222 and they will be able to coordinate emergency services.

### Important Phone Numbers:

- **University Police (UPD): 408-924-2222**
- **Work Control: 408-924-1990**

In the event of an emergency, please follow up with your campus Project Manager after the emergency is completely under control.

## Construction Safety Practices and Procedures

### **Aerial Devices and Elevating Work Platforms**

All employees who operate aerial lift (AL) and/or mobile elevating work platforms (MEWP), or who must oversee persons operating AL/MEWP, must be knowledgeable of the requirements of this program.

A. Aerial devices, such as cherry pickers and boom trucks, may be vehicle-mounted or self-propelled and used to position employees.

General safety requirements are as follows:

1. Only authorized persons may operate aerial devices
2. Aerial devices must not rest on any structure.
3. Controls must be tested before use.
4. Workers must stand only on the floor of the basket. No planks, ladders, or other means are allowed to gain greater heights.
5. A fall protection system must be worn and attached to the boom or basket.
6. Brakes must be set when employees are elevated.
7. An aerial lift truck must not be moved when an employee is on the elevated boom platform except under conditions listed in 3648.

B. Elevating work platform equipment, such as vertical tower, scissor lift, and mast-climbing work platform, may be used to position employees and materials.

General safety requirements are as follows:

1. The platform deck shall be equipped with a guardrail or other structure around its upper periphery. Where the guardrail is less than 39 inches high, a personal fall protection system is required.
2. The platform shall have toeboards at sides and ends.
3. No employee shall ride, nor tools, materials, or equipment be allowed on a traveling elevated platform.
4. Units shall not be loaded in excess of the design working load.

C. The following information must be displayed on the device:

1. Manufacturer's name, model, and serial number.
2. Rated capacity at the maximum platform height and maximum platform travel height.
3. Operating instructions.
4. Cautions and restrictions.

D. Devices must be designed to applicable American National Standards Institute (ANSI) standards.

### **Airborne Contaminants and Dust**

Airborne contaminants can occur in the gaseous form (gasses and vapors) or as aerosols, which include airborne dusts, sprays, mists, smokes and fumes. Airborne contaminants are of particular

concern because they are associated with classical widespread occupational lung diseases, as well as with systemic intoxications such as lead poisoning, especially at higher levels of exposure.

**Dust control is a high priority on all projects and should include appropriate controls to reduce air entrainment and surface dust accumulation. Dust shall be confined to the work site boundary and measures must be implemented to prevent dust from leaving the work site boundary.**

Dust control methods must be maintained and inspected routinely to ensure efficacy. Employees engaged in dust generating activities should be provided appropriate respiratory protection equipment if engineering or administrative controls are not sufficient to reduce dust concentrations below permissible exposure limits.

#### Dust, Fumes, Mists, Vapors, and Gasses

Oxygen-deficient atmospheres or harmful dusts, fumes, mists, vapors, or gasses in concentrations sufficient to present a hazard to employees must be controlled when possible by removing the employee from the exposure, limiting daily exposure, or applying engineering controls.

- A. Whenever the above controls are not practical or fail to achieve full compliance, respiratory protection must be used in accordance.
- B. Ventilation must comply with Article 4 (Access, Work Space, and Work Areas) in the General Industry Safety Orders (GISOs) if it is used as an engineering control method.
- C. Common sources of the above hazards may include:
  - Blasting (CO<sub>2</sub>, NO<sub>X</sub>, asbestos, silica, dust).
  - Concrete and rock cutting (asbestos, silica, dust).
  - Fuel storage tanks (harmful vapors).
  - Lead abatement (lead particles, lead compounds).
  - Asbestos abatement (asbestos fibers).
  - Demolition (asbestos, silica, lead, dust, etc.).
  - Welding (fumes)
  - Painting and spraying (solvent, vapors, lead).
  - Sandblasting (asbestos, silica, lead, dust).
  - Engine exhaust emission (carbon monoxide, NO<sub>X</sub>, polycyclic aromatic hydrocarbons, and others).

#### **Asbestos**

Asbestos containing materials (ACM) must not be disturbed by anyone other than a licensed and trained asbestos-abatement worker. With that in mind, **DO NOT** demolish, pulverize, abrade, drill, scrape or otherwise disturb potentially asbestos containing materials.



You may encounter asbestos at a construction site in the following applications and areas:

- Excavations where asbestos-bearing rock outcroppings are at or near the surface.
- Fireproofing for steel-frame high-rise buildings.
- Pipe and boiler insulation.
- Insulators of electrical conductors.
- Plaster, cement, drywall, and taping compounds.
- Floor tile and tile adhesives.
- Acoustical ceilings (tiles and sprayed on).
- Asbestos-cement piping, shingles, and panels.

**Any materials that an employee or contractor suspects may contain asbestos *must not be disturbed without the prior review and consent of the Campus EHS staff, who will arrange for appropriate sampling and investigation of the suspect material.***

Employees must not install, or re-install, asbestos-containing materials in any building, structure, or equipment.

EH&S staff shall review critical containment barriers prior to any abatement work. Upon completion of work, EH&S staff must give clearance **BEFORE** containment area(s) are taken down. This will be done either visually or with air sampling.

EH&S staff will inform employee(s) of known locations of asbestos containing building materials or naturally occurring asbestos in soils upon request.

### **Ceiling/Roof, Wall or Floor Penetrations**

Ceiling/roof and floor penetrations must be properly covered, temporarily sealed, or barricaded to appropriately guard against objects falling to the level below, or (if open to the outdoors) to prevent entry of precipitation, insects, birds, other animals, human intruders, airborne dust, etc.

Employees must also barricade areas below uncovered ceiling/roof openings, elevated floor openings, or open ledges to protect employees from falling objects.

Elevated floor areas with open ledges must also be protected with guard rails. Toe boards must be used if there is a danger of falling objects.

Whenever an employee removes a floor tile or employees are exposed to a floor cutout, the opening must be clearly identified or covered.

Every worksite is different and the potential risk of a worksite penetration fall is just as variable. A thorough assessment of each worksite is required to identify penetration risks and to provide adequate preventative strategies.

*When assessing a site, consider the following:*

**Check for any obvious holes or weaknesses.**

- Are there any windows, skylights, chimneys or other openings in the worksite vicinity?
- Is there any damage to the floor or work surface such as water or fire damage?
- Are there any areas of structural instability?
- Have temporary covers been used to cover openings (such as a wooden board over a hole)? Have these been clearly marked and legible?

Sometimes penetration risks are created during the project work, so it's important to stay vigilant and look for risks throughout a project's duration.

**Confined Spaces**

A Confined Space means a space that:

1. Is large enough and so configured that an employee can bodily enter and perform assigned work; and
2. Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
3. Is not designed for continuous employee occupancy.

A Permit-Required Confined Space fits the definition of a confined space AND has one or more of the following characteristics

1. Contains or has a potential to contain a hazardous atmosphere (presence of toxic chemicals, lack of oxygen).
2. Contains a material that has a potential for engulfing the entrant (e.g., liquid, soil).
3. Contains inwardly converging walls or a floor that slopes downward and tapers to a smaller cross-section where an entrant could be trapped or asphyxiated.
4. Contains any other recognized serious safety or health hazard (e.g., unsafe temperature, electrical shock, corrosive chemicals).

A confined space evaluation must be performed before entry into any confined space by a competent person to determine if a permit is required. ***For any permit required confined space entry, a rescue team must be available on site. SJSU does not have rescue services available and local emergency services (i.e. fire department) are not suitable alternatives.*** Any confined space entry must be performed with a non-entry rescue device, such as a winch and tripod. Entrants to the space are required to remain attached to the rescue winch at all times.

For more information, please see SJSU's [confined space program](#).

*Revised 04/11/2023*

**Cranes**

Hazards that are associated with crane operations include electrocution from overhead power lines and equipment failures because of operator error; faulty or damaged equipment; overloading; support failure such as ground or outrigger collapse; and miscommunication.

To maintain safe and healthful working conditions, employers and employees must ensure that:

1. All requirements, including prohibitions, are met.
2. Manufacturer's instructions are followed.
3. All crane operators have a valid certificate of competency for the specific type of crane that they are operating.
4. Necessary tools, protective equipment, and training are provided.
5. Employees comply with all requirements of crane operation and perform tasks safely at all times.

A "Pick plan" is required to be submitted prior to crane use. The pick plan is a planning process that has two parts. One is the actual plan itself and one is the safety review.

- Pick Plans must be based on worst case % of capacity (i.e. gross deductions / chart capacity) for each specific crane configuration and location and activity (for example: unloading a delivery truck is a separate activity from erecting steel).
- All rigging devices must bear the name of the manufacturer and identify their capacity.
- Work that is not anticipated in the Pick Plan, but may arise due to site conditions (moving equipment, loading materials onto floors, etc) must be reviewed in advance. Changes affecting crane configuration and / or location may require the Pick Plan to be amended

**Electrical Safety**

Employers must ensure that only qualified person(s) perform electrical work. Employees must de-energize live parts before performing electrical work and must coordinate any power shut offs with SJSU point of contact.

Systems must be considered energized until tested and proven otherwise. Tests must not be considered conclusive until the test equipment has been shown to still be functioning properly after the system test is completed.

Employees can prevent shocks and injuries/electrocution from electrical hazards by:

- Understanding electric shock and electrocution
- Recognizing potential hazards around work involving electricity
- Following Cal/OSHA requirements
- Maintaining clearances around panels
- Using proper protective devices
- Eliminating access to exposed energized parts



- Using proper PPE
- Using proper lockout/tagout procedures
- Maintaining proper clearance
- Following proper procedures for confined space/enclosed space/underground electrical work
- Following manufacturer's instructions
- Following safe work practices

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### **Electrical Safety Equipment**

Employees must use appropriate protective equipment and safeguards such as approved insulated tools, rubber insulating mats, non conductive ladders, fall protection equipment, insulating work shoes and gloves when performing electrical work.

All hot or live circuits in all types of panels must be adequately protected with temporary shields during work. During energized work, contractors may remove knockouts, insert conduit into boxes, install lock nuts and bushings, and use non-metallic fish tape only when temporary protective shields are in place.

Employees must use GFCI (ground-fault circuit interrupter) circuit protection for portable electrical equipment used in construction areas. In addition, GFCI protection is required in all damp, wet, and outdoor areas.

All extension cords used must be the three-wire type for grounded tools and must be protected from damage. They must not be fastened with staples or extended across an aisle, doorway, walkway, or through a wall. Worn, frayed, or spliced cords must not be used. If the ground pin is broken, the cord must be immediately discarded or properly repaired. **Cords should not be placed in working/walking paths in such a way as to create a trip/fall hazard.**

Employees must assure that all electrical equipment used is a type appropriate to the hazard classification of the area where work is to be performed and that it complies with all applicable governmental standards and generally recognized industry standards.

### **Engine Exhaust Emission**

Extreme care must be taken when engine exhaust can build up in work spaces, such as confined spaces, excavations, trenches, and inside buildings or enclosed structures.

Various measures can help lower exposure to diesel exhaust. Workplaces may investigate the measures that work best in their situation.

Control measures may include but are not limited to:

- Eliminate by replacing diesel powered engines with electric or other types of power sources (remember to manage any risks introduced by alternative power sources).
- Use alternate fuels or cleaner sources of energy (such as propane, natural gas, low sulfur diesel, etc.) where possible.
- Use low-emission engines or fuel additives that will reduce emissions.
- Use exhaust treatment systems such as filters, catalysts and/or converters, and a corresponding maintenance program.
- Run engines outdoors (instead of indoors).
- Do not place exhaust near building fresh air intakes.
- Maintain the body of the vehicle to make sure that exhaust is not leaking into the cab or passenger area. Replace cabin air filters as required.
- Ventilate appropriately, such as providing positive pressure ventilation, exhaust extraction devices, inlet and exhaust general (dilution) ventilation, and/or local exhaust (such as tailpipe hose exhaust). Place exhaust hoses so they exhaust outdoors, and not allow the emissions to re-enter the workplace.
- Modify the layout of the work area to separate the area where people must work and areas where exhaust is generated, such as isolate the generator in a separate, ventilated space, or isolate the worker in a sealed, air conditioned cabin (air filtered) where possible.
- Use administrative controls such as:
  - Education and training to workers about the exposure to diesel exhaust and proper use of control measures.
  - Turning off engines when not in use.
  - Regularly maintaining engines, ventilation systems, and filters.
  - Reduce the hours of work exposed to exhaust through job rotation and scheduling.
  - Use of personal protective equipment, such as respirators.
  - No idling on campus for extended periods of time.

### **Erection and Construction**

The risks and hazards associated with erection and construction vary at each location, depending on the types of materials, sizes of structures, and other working conditions. Prior to any project, a comprehensive job hazard analysis is required to identify the potential risks and establish appropriate safety plans. The following safety orders address these hazards:

#### **A. Truss and beam requirements**

1. Trusses and beams must be braced laterally and progressively during construction to prevent buckling or overturning. The first member shall be plumb, connected, braced, or guyed against shifting before succeeding members are erected and secured to it.
2. An erection plan and procedure must be provided for trusses and beams more than 25 ft. long. The plan must be prepared by a California-registered Professional

Engineer, and it must be followed and kept available on the job site for inspection by Cal/OSHA staff.

#### B. Structural steel erection

1. A load shall not be released from its hoisting line until the solid web structural members are secured at each connection with at least two bolts (of the same size/strength as indicated in the erection drawings) and drawn wrench-tight.
2. Steel joists or steel joist girders shall not be placed on any support structure until the structure is stabilized.
3. When steel joist(s) are landed on a structure, they shall be secured to prevent unintentional displacement prior to installation.
4. Floors must be planked at every other story or 30 ft., whichever is less.
5. A floor must be installed within two floors below any tier of beams on which erection, riveting, bolting, welding, or painting is being done; otherwise, fall protection is required.
6. Fall protection is required when workers are connecting beams where the fall distance is greater than two stories or 30 ft., whichever is less.  
*Note: At heights over 15 ft. and up to 30 ft. Workers performing connecting operations must wear personal fall protection that gives them the ability to tie off.*
7. During work other than connecting operations, fall protection is required where the fall distance is greater than 15 ft.
8. Before any steel erection begins, the controlling contractor must provide the steel erector written notifications related to concrete strength and anchor bolt repair/replacement.
9. Prior to removal of planking or metal decking, all employees must be instructed in the proper sequence of removal and safety.
10. Requirements for the working area where floor openings are to be uncovered:
  - a. The area must be in the exclusive control of steel
  - b. The floor area adjacent to the floor opening shall be barricaded or the floor opening shall be covered when not attended by steel erection personnel.
  - c. Floor openings shall be guarded by either temporary railings and toeboards or by covers.
  - d. Covers shall:
    - (1) Be capable of safely supporting the greater of 400 pounds or twice the weight of the employees, equipment, and materials that may be imposed on any one square foot area of the cover at any time.
    - (2) Have not less than 12 inches of bearing on the surrounding structure.
    - (3) Be checked by a qualified person prior to each shift and following strong winds.
    - (4) Never be removed by walking forward where the walking surface cannot be seen.
    - (5) Bear a sign stating "OPENING—DO NOT REMOVE" in 2-inch-high, black bold letters on a yellow background.

11. Permanent Flooring-Skeleton Steel Construction in Tiered Buildings. Unless the structural integrity is maintained by the design:

- a. There shall be not more than eight stories between the erection floor and the uppermost permanent floor.
- b. There shall not be more than four floors or 48 ft., whichever is less of un

12. All columns must be anchored by a minimum of four anchor bolts.

*Exception: When columns are braced or guyed to provide the stability to support an eccentric load as specified in.*

*Note: Persons engaged in steel erection should review and be knowledgeable in all the requirements contained in section 1710.*

C. Wood/light gauge steel, residential and light commercial frame construction

1. Joists, beams, or girders of floors below the floor or level where work is being done, or about to be done, must be covered with flooring laid close together.
2. Employees shall not work from or walk on structural members until they are securely braced and supported.
3. Before manually raising framed walls that are 15 ft. or more in height, temporary restraints, such as cleats on the foundation or floor system or straps on the wall bottom plate, must be installed to prevent inadvertent horizontal sliding or uplift of the framed wall bottom plate. Anchor bolts alone shall not be used for blocking or bracing when raising framed walls 15 ft. or more in height.
4. When installing windows, wall openings shall be guarded as required by; however, the guardrail may be removed for actual window installation if necessary.
5. Scaffolds used as an edge protection platform must be fully planked, not more than 2 ft. below the top plate, and located no more than 16 inches from the structure.
6. Employees exposed to fall hazards must be trained to recognize and minimize the fall hazard.
7. Employees performing framing activities who are exposed to fall heights of 15 ft. or greater must be protected by guardrails, personal fall protection systems, or other effective means.

D. Reinforcing steel and post-tensioning in concrete construction:

1. Know and understand T8 CCR sections 1711, 1712, 1713, and 1717.
  - a. Site access and layout.
  - b. Written notifications.
  - c. Stability requirements for vertical and horizontal columns, walls, and other reinforcing assemblies.
  - d. Impalement protection and custody of protective covers.
  - e. Requirements for hoisting and rigging reinforcement assemblies
  - f. Post-tensioning operations.
  - g. Fall protection.
  - h. Formwork and falsework.
  - i. Training Requirements.
  - j. Framed panels and concrete forms.

- k. Falsework and vertical shoring.

### Fall Protection

Title 8 California Code of Regulations includes fall protection standards in various sections of the general industry safety standards, construction safety orders, tunnel safety orders, and electrical safety orders. These standards reflect the levels of the fall hazards associated with each activity.

- A. The factors affecting the level of hazard include the following:

1. Fall height
2. Level of hazard awareness and skill of the employee
3. Physical work environment (e.g., conditions affecting the stability of the employee on the work surface)
4. Duration of exposure to the fall hazard

*Note: Because factors 2, 3, and 4 listed above vary with different trades and activities, the regulatory requirements for fall protection reflect those differences. Below find definitions and selected fall protection requirements.*

- B. A personal fall protection (PFP) system prevents a worker from falling or—if the worker is falling—stops the fall. PFP systems include guardrails, safety nets, personal fall restraint systems, personal fall arrest systems, and positioning device systems.

1. Guardrails are required to guard the open sides of all work surfaces that are 7 1/2 ft. or higher or workers must be protected by other means. The railing must be made from select lumber (Doug Fir#1 or better, 1500 psi or equivalent) and must consist of a top rail 42 inches to 45 inches high, 2" x 4" (min.); a 1" x 6" mid-rail halfway between the top rail and the floor; and support posts at least 2" x 4" at 8 ft. o.c.
2. A personal fall restraint (PFR) 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.
3. 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. The system consists of an anchorage, connectors, and a body harness. It may include a lanyard, a lifeline, a deceleration device, or suitable combinations of these. A PFA system must meet the following requirements:
  - a. It must limit the maximum arresting force on an employee to 1,800 lbs.
  - b. It must be rigged so that an employee can neither free fall more than 6 ft. nor contact any lower level, and, where practicable, the anchor end of the lanyard shall be secured at a level not lower than the employee's waist.
  - c. Anchorage points must be able to support 5,000lbs per employee attached or:
    - (1) Must be designed, installed, and used as part of a complete PFA system with a safety factor of two; and
    - (2) Under the supervision of a qualified person.
  - d. 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.

Exception: During the construction of elevator shafts, two employees may be attached to a lifeline that is able to support 10,000 lbs.

(3) The lower end of the vertical lifeline must extend to within 4 ft. from the ground.

(4) A 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.

*Note: The use of a body belt as a part of a PFA system is prohibited.*

4. Body belts, harnesses, and components shall be used only for employee protection and not to hoist materials. Body belts used in conjunction with fall restraint systems or positioning devices shall limit the maximum arresting force on an employee to 900 lbs.

5. Safety nets may be used in place of all other fall protection systems if the nets are installed properly.

C. A PFP system compliant with section 1670 must be used if guardrails or safety nets are not installed for the following fall distances and work activities:

1. A fall distance of more than 6 ft. when placing or tying reinforcing steel in walls, columns, piers, etc.

*Exception: Reinforcing iron workers may travel point-to-point horizontally or vertically on reinforcing steel up to 24 ft. above the surface provided there are no impalement hazards.*

2. A fall distance of 7 1/2 ft. or greater during the following:

a. Work from the perimeter of a structure, through shaft ways and openings.

b. Work anywhere on roofs with slopes greater than 7:12.

c. Work from thrust-outs or similar locations when the worker's footing is less than 3 1/2 inches wide.

d. Work on suspended staging, floats, catwalks, walkways, or advertising sign platforms.

e. Work from slopes steeper than 40 degrees.

3. A fall distance of 15 ft. or greater during the following:

a. Work from buildings, bridges, structures on construction members, such as trusses, beams, purlins, or plates that are of at least 4-inch nominal width.

b. Ironwork other than connecting.

c. Work on structural wood framing systems and during framing activities on wood or light gauge steel frame residential/light commercial construction.

*Exception: For residential/light commercial frame construction, workers are considered protected when working on braced joists, rafters, or roof trusses spaced on 24-inch (or less) centers when they work more than 6 ft. from unprotected sides or edges.*

4. An eave height of 20 ft. or greater, during all roofing operations (see exceptions in 2a above and 6a and 6 below).

5. A fall distance of 30 ft. or greater, when ironworkers are connecting structural beams.



6. Any height during work:
  - a. On roofs sloped steeper than 7:12, the air hose for the pneumatic nailer shall be secured at roof level in such a manner as to provide ample, but not excessive, amounts of hose.
  - b. On roofs, while an operator uses a felt-laying machine or other equipment that requires the operator to walk backwards (*see prohibitions*).
  - c. From boatswain's chairs.
  - d. From float scaffolds.
  - e. From needle-beam scaffolds.
  - f. From suspended scaffolds.

D. A fall protection plan (FPP) must be implemented when a fall protection (FP) system is required but cannot be used because the system creates a greater hazard or is impractical.

The fall protection plan must:

1. Be prepared by a qualified person (QP) who is identified in the plan.
2. Be developed for a specific site or developed for essentially identical operations.
3. Be updated by the QP.
4. Document why a conventional FP system cannot be used.
5. Identify the competent person to implement and supervise the FPP.
6. Identify the controlled access zone for each location where a conventional FP system cannot be used.
7. Identify employees allowed in the controlled access zone (CAZ).
8. Be implemented and supervised by a competent person.

*Note: An up-to-date copy of the fall protection plan must be at the job site.*

E. The controlled access zone (CAZ) must be established and maintained as follows:

1. A control line or its equivalent must control access to the CAZ and must:
  - a. Consist of ropes, wires, tapes, or equivalent materials and be supported by stanchions.
  - b. Be flagged or marked at not more than 6 ft. o.c.
  - c. Be rigged not fewer than 39 inches and not more than 45 inches from the working surface.
  - d. Have a breaking strength of 200 lbs. (min.). See 1671.2 for greater detail.
2. Signs must be posted to keep out unauthorized persons.
3. A safety monitoring system is required and must include a designated safety monitor who is able to:
  - a. Monitor the safety of other employees.
  - b. Recognize fall hazards.
  - c. Warn an employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner.
  - d. Stay in sight of and in communication with the employee being monitored.
  - e. Have no other responsibilities.

*Note: Only an employee covered by a fall protection plan shall be allowed in a controlled access zone.*

F. Fall protection for production type residential roofing work:

1. For roof slopes 3:12 through 7:12, the following applies:

Employees shall be protected from falling where the eave height exceeds 15 feet above grade or level below by use of one or any combination of methods prescribed below:

- a. Personal Fall Protection.
- b. Catch Platforms.
- c. Scaffold Platforms.
- d. Eave Barriers.
- e. Standard Railings and Toeboards.
- f. Roof Jack Systems.

2. For roof slopes steeper than 7:12, the following applies:

- a. Regardless of height, employees shall be protected from falling by methods prescribed above with exception of Eave Barriers and Roof Jack Systems.

G. Section 1730 applies to all roofing work that is not on new production-type residential construction with roof slopes 3:12 or greater.

### Fire Protection and Prevention

The employer is responsible for establishing an effective fire prevention program and ensuring that it is followed throughout all phases of the construction work.

A. Fire-fighting equipment must be:

1. Freely accessible at all times.
2. Placed in a conspicuous location.
3. Well-maintained.

B. A water supply that is adequate to operate fire-fighting equipment must be made available as soon as combustible materials accumulate.

C. Fire extinguisher use must comply with the following:

1. Fire extinguishers must be kept fully charged, inspected monthly, and serviced annually.
2. At least one fire extinguisher rated not less than 2A must be provided at each floor.
3. At least one fire extinguisher rated not less than 2A must be provided adjacent to the stairway at each floor level.
4. Fire extinguishers rated not less than 2A must be provided for each 3,000 sq. ft. of floor area or a fraction thereof.
5. Fire extinguishers must be kept within 75 ft. of the protected area.  
*Exception: Fire extinguishers must be kept within 50 ft. of wherever more than 5 gal. of flammable or combustible liquid or 5 lbs. of flammable gas is being used.*
6. Training in the use of fire extinguishers must be provided annually.

*Note: See specific SOs and manufacturing specifications for appropriate use of fire extinguishers.*

When sprinklers are provided, they shall be installed in an approved manner as per the California Fire Code, CCR, Title 24, section 903.3. 1933, 6170.

**First Aid**

Regulations concerning first aid include the following:

- A. A first aid kit must be provided by each employer on all job sites and must contain the minimum of supplies as determined by an authorized licensed physician or as listed.
- B. Trained personnel in possession of a current Red Cross First Aid certificate or its equivalent must be immediately available at the job site to provide first aid treatment.
- C. Each employer shall inform all of its employees of the procedure to follow in case of injury or illness.
- D. Emergency medical services, including a written plan, must be provided.
- E. Exposure to bloodborne pathogens is considered a job related hazard for construction workers who are assigned first aid duties in addition to construction work. Although construction employers are specifically exempted from GISO 5193 requirements, they are required to provide appropriate protection for employees who may be exposed to bloodborne pathogens when providing first aid.

**FOR SJSU EMPLOYEES ONLY:**

If you are injured at work, you must take the proper steps immediately. [Please click here for more information.](#)

**Flammable and Combustible Liquids**

Flammable and combustible liquids include gasoline, paint thinners, solvents, etc. Because their vapors ignite and burn easily, flammable and combustible liquids have strict storage requirements. The hazard classification of a liquid determines the type and size of container in which it can be stored.

- A. These liquids must be kept in closed containers when not in use.
- B. Leakage or spillage must be disposed of promptly and safely.
- C. Flammable and combustible liquids may be used only where no open flames or sources of ignition exist (see specifics in 1935(c))
- D. All containers of flammable and combustible liquids must be plainly marked with a warning legend.

Flammable liquids must not be used

- i. To wash floors, structures, or equipment except where there is adequate ventilation

- ii. To spray for cleaning purposes unless the liquids are used in a spray booth or outdoors where there is no ignition source within 25 ft. of their use

Flammable liquids must be stored and transported in closed containers.

*Note: For specific requirements concerning indoor and outdoor storage, see 1931 and 1932. For on-site dispensing operations, see 1934.*

### **Forklifts and Other Powered Industrial Vehicles**

Gasoline-, propane-, or diesel-powered forklifts and other similarly powered industrial vehicles must not be operated inside buildings. Propane-fueling operations must be done outdoors. Only those who are authorized and trained can operate the vehicles that they are trained for.

Drivers will check the vehicle at least once per shift, and if it is found to be unsafe, the matter will be reported immediately to a supervisor, foreman or mechanic, and the vehicle will not be put in service again until it has been made safe. Attention will be given to the proper functioning of tires, horn, backup alarm, lights, battery, controller, brakes, steering mechanism, and the lift system of forklifts (forks, chains, cable, and limit switches).

Vehicles will not exceed authorized or safe speed-the campus speed limit is 5mph. The vehicle must always maintain a safe distance from other vehicles. The vehicle must remain under control of the operator at all times and shall follow all established traffic regulations.

### **Hand and Power Tools**

Hand and power tools are a common part of our everyday lives and are present in nearly every industry. These tools help us to easily perform tasks that otherwise would be difficult or impossible. However, these simple tools can be hazardous and have the potential for causing severe injuries when used or maintained improperly. Special attention toward hand and power tool safety is necessary in order to reduce or eliminate these hazards.

#### *Air Tools*

- Pneumatic power tools must be secured to the hose in such a way as to prevent accidental disconnection. Safety clips or retainers must be securely installed to prevent attachments from being inadvertently expelled.
- Never exceed the manufacturer's safe operating pressure for all fittings.
- Hoses exceeding ½ inch inside diameter must have a safety device at the source of supply or branch line to reduce pressure in the event of hose failure.

#### *Hand Tools*

- All hand tools, whether furnished by the department or employee owned, must be maintained in safe condition.
- Hand tools must be inspected before each use. Unsafe hand tools must not be used on any campus worksite.
- Hand tools must be used for the designed purpose.
- Impact tools must be free of mushroomed heads.

- Wooden handles must be free of cracks or splinters and be tight to the tool.
- Wrenches must not be used when jaws are sprung to the point that slippage occurs.
- Electric power operated tools must be double-insulated or properly grounded.
- Appropriate personal protective equipment, such as safety glasses with side shields, face shields, leather work gloves, or leather work boots must be worn when using hand tools.

### *Portable Power Tools and Equipment*

Portable power tools are designed for a wide variety of uses. Circular saws, jigsaws, drills, hammer-drills, sanders, grinders, routers and numerous other power tools, save time and effort on the job. The increased use of power tools heightens the need for awareness of the hazards they present if not operated properly. While each type of tool has its own unique hazards which must be taken into account, the following safety rules are common to all power tools.

- Do not operate power tools or equipment unless you have been authorized to do so.
- Inspect tools daily to ensure that they are in proper working order. Do not use damaged or defective tools.
- Use tools for their intended purpose and in the manner intended.
- All power tools and electrical devices must be properly grounded.
- Keep guards and protective devices in place at all times. Never use equipment or tools from which guards have been removed.
- Do not use electric power tools and equipment when standing in water.
- Only qualified persons are to repair electric tools or equipment.
- All extension cords must be the 3-pronged type and made for hard use

### *Powder-Actuated Tools*

- No employee may operate any powder-actuated tool unless properly trained in all manufacturers' instructions and authorized by their shop supervisor, manager, or foreman.
- Powder-actuated tools must not be left loaded and unattended.
- Used shots must be disposed of properly.
- Follow all manufacturers' instructions, which must be located with the tool at all times.

### **Hazard Communication**

A hazardous chemical is any chemical that is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, a hazard not otherwise classified, or is included in the List of Hazardous Substances prepared by the Director pursuant to Labor Code section 6382. These chemicals may include solvents, paints, thinners, cleaning agents, fresh concrete, and fuels. Employers whose employees may be exposed to hazardous chemicals are required to have a HAZCOM program.

A. Employers must develop, implement, and maintain at the workplace a written HAZCOM program that includes information on labels, warning, safety data sheets (SDSs), training requirements, and other relevant information as per 5194.

B. The program must include the following:

1. A list of the hazardous chemicals that are used or stored in the workplace. It must include any chemicals listed in the following:
  - a. The Hazardous Substances List.
  - b. The Code of Federal Regulations (CFR, Part 1910, Subpart Z).
  - c. Threshold Limit Values for Chemical Substances in the Work Environment (ACGIH) latest edition.
  - d. Chemicals identified and regulated under Title 8, Article 107, Dusts, Fumes, Mists, Vapors and Gases, and Article 109, Hazardous Substances and Processes.
  - e. T22 CCR 12000 (Proposition 65).
2. Labels and other forms of warning on containers of hazardous chemicals.
3. Readily accessible SDSs.
4. Procedures for safe handling, use, storage, disposal, and clean up to protect employees.

*Note: All hazardous liquids capable of physical injury on skin contact must be covered, insulated, or otherwise guarded against inadvertent contact. When the nature of the work makes covering or guarding impracticable, employers must provide personal protective equipment.*
5. Training on the hazardous chemicals that employees are or could be exposed to in the workplace.
6. The methods the employer will use to inform employees of the hazards of non-routine tasks and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
7. Clear and reasonable warnings for exposures to hazardous chemicals shall be displayed in the workplace using warning signs and labels or provided through information and training. Appendix G #12601(c)
8. For each chemical included in the HAZCOM program, the information provided on the warning signs and labels must include all of the required texts as per the T8 CCR requirements for that specific chemical.
9. A plan for managing multi-employer work-site issues including the methods used to inform other work-related employers.
10. A plan for periodically (e.g., annually) evaluating the effectiveness of the program and for updating the program.

C. The HAZCOM program must be available on request to employees, their representatives, and Cal/OSHA.

*Note: The Guide to the California Hazard Communication Regulation is available free of charge from Cal/OSHA at: [www.dir.ca.gov/dosh/dosh\\_publications/hazcom.pdf](http://www.dir.ca.gov/dosh/dosh_publications/hazcom.pdf).*

D. Employers must make sure that:

1. Each container of hazardous chemicals in the workplace is labeled, tagged, or marked. Information can be provided using labels on shipped containers or with required information such as product identifiers, pictograms, precautionary and hazard statements, first aid information, and signal words.



2. The labels on incoming containers of hazardous chemical substances are not removed or defaced.

E. Employers are required to:

1. Have an SDS for each hazardous chemical they use.
2. Use SDSs that are consistent with the Globally Harmonized System (GHS).
3. Make the SDSs readily accessible during each work shift to employees when they are in their work areas.

F. Employers must provide all required information and training as per 5194(h) to their employees. The training includes:

1. Labeling, pictograms, symbols, etc.
2. SDSs, including physical and health hazards.
3. Chemical-specific information (must always be available through labels and SDSs).
4. Location of hazardous chemicals.
5. Where the written HAZCOM program is kept.
6. Detection of presence or release of hazardous chemicals.
7. PPE and appropriate work practices.
8. Emergency and first aid procedures.

### **Hearing Conservation Program**

Hearing Protection is required when there is the potential exposure to excessive noise during an eight hour work day.

Employee(s) methods of implementation and control:

- Where possible, use engineered controls to eliminate excessive noise levels over an eight hour work shift.
- When engineered control measures are not feasible, provide personal protective equipment, i.e. hearing protective devices.

Noise exposure monitoring will be conducted to:

- determine whether hearing hazards exist;
- determine whether noise presents a safety hazard by interfering with speech communication or recognition of audible warning signs;
- identify employees for noise control efforts and establish hearing protection practices;
- identify specific noise sources that require engineering and administrative controls; and evaluate the success of noise control

### **Heat Illness Prevention Plan**

Heat illness can be one or more medical conditions including heat rash, heat cramps, fainting, heat exhaustion, and heat stroke. Heat illness may be mild initially but can become severe or fatal if the body temperature continues to rise. All employees should look continuously for signs and symptoms of heat illness in themselves and fellow workers.

*Signs and symptoms of heat illness may include:*

**Heat Rash General Symptoms:**

- Can cover large parts of the body
- Looks like a red cluster of pimples or small blisters
- Often on the neck, chest, but can be on other areas of the body as well.
- Feels uncomfortable, can disrupt sleep and work performance.

**Heat Exhaustion General Symptoms:**

- Heavy sweating, painful muscle cramps, extreme weakness and/or fatigue.
- Nausea, vomiting, dizziness, headache
- Body temperature normal or slightly high
- Fainting
- Pulse fast and weak
- Breathing fast and shallow
- Clammy, pale, cool, and/or moist skin

**Heat Stroke General Symptoms:**

- No sweating; the body cannot release heat or cool down
- Mental confusion, delirium, convulsions, dizziness
- Hot and dry skin (e.g., red, bluish, or mottled)
- Muscles may twitch uncontrollably
- Pulse can be rapid and weak
- Throbbing headache, shallow breathing, seizures/fits
- Unconsciousness and coma
- Body temperature may range from 102–104°F or higher within 10–15 minutes.

Requirements and guidance for heat illness prevention in the workplace:

A. All employers who have employees working in outdoor places of employment must have a written heat illness prevention plan and implement effective procedures for the prevention of heat illness.

B. The plan must be employer-specific and be available on site or immediately available on request of the employee or the Division.

C. Heat illness prevention plan, at a minimum, must include:

1. Procedures for providing sufficient water
2. Procedures for providing access to shade
3. High-heat procedures
4. Emergency response procedures
5. Acclimatization methods and procedures

D. The plan shall be in writing in both English and the language understood by the majority of the employees.

**E. Procedures for providing sufficient water.**

1. Sufficient amounts of fresh, pure, and suitably cool potable water shall be available at all times.
2. Provide at least one quart per employee per hour for the entire shift.
3. If individual water containers are provided, the containers must be clean, and a source of potable water must be readily available.
4. During hot weather, the water must be cooler than the ambient temperature.
5. Place water as close as practicable to where employees are working. For example, on a multi-story construction site, place water in a safely accessible location on every floor where employees are working.
6. Remind workers to drink water often and not to wait until they are thirsty to drink.
7. Provide water at no cost to the workers.

**Access to Shade**

Shade shall be provided to employee(s) during breaks and preventative measures to cool down by taking the following measures:

1. When outdoor temperature is 80°F or less:
  - a. Have shade available and provide shade or timely access to shade upon request.
  - b. It helps to have the shade erected if the weather is hot enough that the shade can help employees to cool off.
2. When outdoor temperature exceeds 80°F:
  - a. Have one or more areas with shade at all times while employees are present. If no other shade is readily available, erect shade structures immediately.

Shade structure(s) should be as close as practicable to the areas where the employees are working. Shade must be either open to the air or provided with ventilation or cooling.

**High-heat procedures:**

1. Implement high-heat procedures when the temperature equals or exceeds 95°F.
2. Train all employees to recognize the signs and symptoms of heat illness and allow them to call for emergency medical services when necessary.
3. Train all employees to stay in contact, observe each other, and immediately report any signs/symptoms of heat illness.
4. Observe and monitor employees for alertness and signs or symptoms of heat illness by implementing one or more of the following:
  - a. Supervisor or designee observation of 20 or fewer employees
  - b. Mandatory buddy system
  - c. Regular communication with sole employee using radio or cellular phone
  - d. Other effective means of observation
    - (1) Contact employees regularly.

- (2) Designate one or more employees on each worksite as authorized to call for emergency medical services.
5. Remind employees throughout the work shift to drink plenty of water.
6. Provide close supervision to new employees as they may have less or no acclimatization.
7. Conduct pre-shift meetings to review the high-heat procedures and to remind employees to drink plenty of water and take a cool-down rest when necessary.

**Emergency response procedures:**

Employers are required to implement effective emergency response procedures in the workplace. Requirements and guidance include the following:

1. Maintain effective communication by voice, observation, or electronic means.
2. Take immediate action if any signs or symptoms of heat illness in any employee(s) are observed or reported.
3. Implement emergency response procedures if the signs or symptoms indicate severe heat illness.
4. Do not leave the employee exhibiting signs or symptoms of heat illness alone or send them home without offering onsite first aid and/or providing emergency medical services.
5. Contact emergency medical services and, if necessary, transport employees to a place where they can be reached by an emergency medical provider.
6. In the event of an emergency, make sure that clear and precise directions to the worksite are provided to emergency responders.
7. If you have mobile crews, provide the emergency medical provider a map of the crew's location or detailed direction.

Have a suitable number of trained persons to render first aid. Typical first aid methods for heat exhaustion and heat stroke:

1. Give first aid for heat exhaustion, lay the person down flat in a cool environment, loosen their clothing, and give them plenty of water to drink.
2. Give first aid for heat stroke, immediately start aggressive cooling of the person and get them to a hospital right away. Cooling can include placing cool wet towels on the trunk, arms, and legs while refreshing the cooling towels every few minutes.

**Hot Work**

Hot Work is defined as cutting, welding, soldering and brazing operations for construction, demolition, maintenance, and/or repair activities that involve the use of portable gas or arc welding equipment. The use of these types of equipment for cutting and welding can introduce significant fire hazards into University buildings.

Before an employee can perform Hot Work in a non-designated hot work area, they will be required to complete an approved valid Hot Work Permit.

The duration of a Hot Work Permit depends upon the type of project and the type of the Hot Work to be performed.

- A. Before workers begin hot work, the following controls must be established:

1. No welding is permitted in an explosive environment.
2. A written “hot work” permit is recommended whenever a combustible environment may exist.
3. All combustible materials in the work area must be removed or shielded.
4. Suitable fire extinguishers that meet NFPA and ANSI Standards must be provided in the work area.
5. Welding blankets, curtains, and pads shall be approved for their intended use in accordance with section 3206.
6. Employers must instruct employees on hot work safety.
7. Welders must be required to wear:
  - a. Non-flammable gloves with gauntlets.
  - b. Appropriate foot protection.
  - c. Aprons (leather) and shirts that have sleeves and collars.
  - d. Helmets, hoods, and face shields suitable for head protection.
  - e. Suitable eye protection.
  - f. Respiratory protection (as required).
  - g. Screens must be provided to protect the eyes of non-welders from flash burns and ultraviolet light rays.

B. Gas welding is regulated as follows:

1. Fuel gas and oxygen hoses must be distinguished from each other.
2. Couplings must not disconnect by means of a straight- pull motion.
3. Oil or grease must never come into contact with oxygen equipment.
4. Oxygen from a system without a pressure regulation device must never be used.
5. Gas cylinders must be stored and used as follows:
  - a. Cylinders must be protected from all heat sources.
  - b. Cylinders containing oxygen, acetylene, or fuel gasses
  - c. Acetylene and fuel gas cylinders, including but not limited to welding and cutting fuel gas cylinders, shall be stored and used with the valve end up.
  - d. All gas cylinders in service shall be securely held in substantial fixed or portable racks, or placed so they will not fall or be knocked over.
  - e. Cylinders must be handled in suitable cradles with their valve caps installed; they must never be lifted by magnet, rope, or chain.
  - f. Cylinders must not be placed where they might form a part of any electric circuit.
  - g. Oxygen cylinders in storage shall be separated from fuel gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 ft. or by a noncombustible barrier at least 5 ft. high having a fire resistance rating of at least one-half hour.
  - h. Valve stem wrenches must be left in place while cylinders are in use.
  - i. A fire extinguisher rated at least 10 B:C must be kept near the operation.
  - j. Backflow protection is required.

C. Arc welding is regulated as follows:

1. Cables in poor condition must not be used; no cable may be spliced within 10 ft. of the electrode holder.
2. The frames of arc welding and cutting machines must be grounded.
3. Electrodes and holders that are not in use shall be protected so they cannot make electrical contact with employees or conducting objects.
4. Defective equipment must not be used.

D. Ventilation regulations for welding, cutting, and brazing operations require that workers' exposures to hazardous fumes, gasses, and vapors be reduced below PELs (permissible exposure limit).

1. Outdoor operations

Respirators are required for any operation involving beryllium, cadmium, lead, or mercury. For other operations and materials, respirators are not required when natural or mechanical ventilation is sufficient to prevent exposure to airborne contaminants in excess of the PELs noted in 5155.

2. Indoor operations

Respirators shall be used when local exhaust or mechanical ventilation is not feasible or able to prevent exposures that exceed limits specified in 5155.

E. In enclosed spaces supplied-air respirators shall be used when local exhaust ventilation is not an effective means for preventing potentially hazardous exposures.

F. Employers need to include all potentially hazardous materials involved in welding and cutting such as fluxes, coatings, coverings, and filler metals in the HAZCOM program.

Employers also must provide employee access to labels and safety data sheets, and train employees, as per 5194, 5150.

## Housekeeping

Worksite sites can present many hazards to employees when they are performing construction-related activities. Keeping a worksite relatively clean of debris can further reduce the risk of hazards. The benefits of good housekeeping far exceeds the small additional effort required to establish good housekeeping practices on a worksite.

### Employee(s) shall comply, but not limited to the following:

1. Absolutely no liquids, chemicals or contaminated construction debris may be poured down a mop sink, drain, restroom sink or toilet. Drains should be questioned in the construction area prior to use so that a capped drain is not used.
2. Personnel must maintain a high standard of housekeeping on the job at all times. Daily clean-up of work areas is required.
4. Materials shall be neatly stored when not in-use and sharp objects shall either be removed or blunted to prevent puncture.
5. A safe work area includes unimpeded access to ingress and egress locations.
6. Fix it, or ditch it. Good housekeeping is also about keeping things in good working order on site. Damaged tools or equipment must be taken out of use so that they can either be repaired or replaced.



7. Trailing leads and cables from equipment are common trip hazards, particularly when using portable equipment. Make sure you route the lead away from walkways or access routes. Route cables where they do not cause a trip hazard to you or others.
8. Contractor personnel must perform work in a manner that will minimize the production of dust and not allow migration of dust and debris to areas outside of the construction area.

Good housekeeping is the first and the most important (fundamental) level of preventing falls due to slips and trips. Keeping walkways and work areas clean and orderly will help reduce the risk of trips and slips. Spills should be immediately cleaned up. Wet floors should be identified as such using signage to warn employees of the potential hazard. Removing clutter including debris, boxes, cords, hoses, and wires from walkways and work spaces will reduce the potential for tripping.

### **Ladders**

All must comply with, but not limited to, the following:

1. A stairway or ladder must be provided for access where there is a break in elevation of 19 inches or more and no ramp, runway, sloped embankment or personnel lift is provided.
2. Portable metal or conductive ladders may not be used near energized lines or equipment.
3. Only properly designed and manufactured ladders may be used.
4. Fiberglass ladders are mandatory for electrical tasks or when working in close proximity to electrical services where accidental electrical contact is a foreseeable event.
5. Ladders must be secured to keep from shifting, slipping, being knocked or blown over.
6. Ladders must not be placed in front of doors or door openings unless the door is either monitored by an attendant or blocked open to prevent contact with the ladder. If all traffic around the ladder work area cannot be re-routed, the ladder must be secured to prevent accidental knock down. Appropriate warning signs, tape and cones must be deployed around ladder work to define exclusion zones.
7. Stepladders may not be used as straight ladders. The top or first step below the top of ordinary step ladders may not be used as a step or a stool.
8. Extension ladders must not be separated and must be tied off.
9. Each user must inspect ladders visually for defects before using.
10. Ladders used for access to an upper landing surface must have side rails that extend at least three feet above the landing surface.
11. Ladders must be maintained free of oil, grease and other slipping hazards.
12. Non-self-supporting ladders must be tied off or otherwise secured to prevent accidental displacement.
13. Non-self-supporting ladders must be used at an angle where the horizontal distance from the top support to the foot of the ladder is approximately one quarter of the working length of the ladder.

14. Ladders with structural defects must be tagged "Do Not Use," and immediately taken out of service and removed from the site.
15. Wooden ladders must not be painted.
16. Ladders must be lowered and securely stored at the end of each workday.
17. Ladders must never be tied to facility services piping, conduits, or ventilation ducting.

## Lasers

Laser levels must have a label that indicates their class.

**Common types of laser levels include (but not limited to):**

- Dot lasers, which project two, three, or five beams of light, allowing the user to establish a point from floor to ceiling, a level reference point, and a 90-degree reference.
- Line level lasers, which project a single beam of light 180 degrees horizontally and vertically, allowing the user to establish a horizontal or vertical plane.
- Rotary level lasers, which project a single beam of light 360 degrees, allowing the user to establish a horizontal or vertical plane.

The intensity of a laser beam is determined by the laser's power, which is measured in milliwatts (mW) and classified by its power as shown in the table below. Most laser levels use Class IIIA lasers.

***Class IIIb or IV lasers are not allowed to be used without additional controls and review by the campus Laser Safety Officer.***

Laser levels must have a label that indicates their class.

- Laser level safety precautions:
- Never stare into a laser beam.
- Don't try to repair or disassemble a laser level.
- Read the instruction manual before you use a laser level.
- Never point a laser level at vehicles, drivers, or other employees.
- Always turn the laser level off when you're not using it.
- Don't remove or deface any laser level labels.
- Don't operate a laser level near flammable liquids, gasses, or dust.
- Don't aim the laser beam at shiny or reflective surfaces; they're not suitable for laser use.

## Lead

Occupational exposures to lead can occur in construction activities, such as plumbing system retrofits; the spraying, removal, or heating of paint that contains lead; and the welding, cutting, and grinding of lead-containing construction materials.

Occupational lead exposures can affect workers as well as family members and friends who come in contact with the “take home” lead on the worker’s clothing, hair, hands, etc. The toxic effects of lead on the human body have been well documented and include damage to the kidneys, brain, and reproductive organs that, in turn, causes the loss of kidney function, sterility, decreased fertility, and birth defects and mental retardation in offspring.

Because of the serious, and in many cases life threatening, health effects of lead, the employer must be thoroughly knowledgeable about the regulations to protect people from lead exposure before their employees engage in any work exposing them to lead.

A. Cal/OSHA enforces the “Lead in Construction Safety Orders,” which make employers responsible for the following:

1. For each job site, the lead hazard must be assessed.
2. Where lead is present, the following is required:
  - a. Lead dust must be controlled by HEPA vacuuming, wet cleanup, or other effective methods.
  - b. The employer shall ensure that food, beverage, and tobacco products are not present or used in areas where employees are exposed to lead above the PEL. The employer shall provide hygiene facilities for changing, showering, eating, and hand washing.
  - c. Workers shall have access to labels on containers of lead and safety data sheets, and must be trained as per 5194 and 1532.1, 1532.1(I)(1)(A).
  - d. The employer shall implement a written compliance program to control hazardous lead exposures.
  - e. The employer shall provide the worker with and require the use of appropriate personal protective equipment.
  - f. The employer shall ensure that all protective clothing is removed at the completion of a work shift only in change areas provided for that purpose.

## **Lighting**

- A. Proper illumination is important in all construction activities. Construction areas, ramps, corridors, offices, shops, storage areas, etc., shall be lighted to not less than the minimum illumination intensities in the following table while work is in progress:

Foot Candles	Area of Operation
3	General construction area lighting low activity
5	Outdoor active construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas
5	Indoors: Warehouses, corridors, hallways, stairways, and exit-ways
10	General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active storerooms, barracks or living quarters, locker or dressing rooms, mess halls, indoor toilets, and workrooms)
10	Nighttime highway construction work
30	First aid stations, infirmaries, and offices

B. Nighttime highway construction work lighting shall be provided within the work zone to illuminate the task(s) in a manner that will minimize glare to work crews and not interfere with the vision of oncoming motorists.

**Lockout/Tagout**

A lockout device is a device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the unexpected energization of a machine or piece of equipment.

Lockout/Tagout is required when the unexpected energization or start up (or release of stored energy ) of machines, equipment or prime movers could injure workers during cleaning, repairing, servicing, setting-up, adjusting and un-jamming.

Devices need to be durable, standardized, substantial, and identifiable. Only one key for each lock shall be issued and the worker maintains control of said key. The device shall not be used for any other purpose and can only be removed by the employee who applied the device.

If an energy isolating device is not capable of being locked out, the employer shall utilize a tagout system and additional means. In all cases, accident prevention tags shall be placed on the controls of the equipment during cleaning/servicing and during repair. Tag shall include date, reason, and person creating tag.

Seven basic steps for any lockout tagout event including the following:

1. Proper Planning
2. Notify All Affected Personnel
3. Shutdown Equipment
4. Isolate All Energy Sources

5. Lock and Tag All Devices
6. Dissipate Residual Energy
7. Verify Isolation

A hazardous energy control procedure shall be developed and utilized by the employer. At a minimum, the procedure shall clearly and specifically outline the:

1. Scope
2. Purpose
3. Authorization
4. Rules
5. Techniques to be utilized for the control of hazardous energy and the means to enforce compliance.

### **Machine Guarding**

Any machine part, function, or process which may cause an injury must be safeguarded. Hazards must be eliminated or controlled when there is the potential for the operations of a machine or accidental contact with it that can injure the operator or other employees working on, near, or around the machine.

The following are some of the major moving machine parts that must be guarded:

- *Gears, sprockets, and chain drives.*
- *Belt and pulley drives.*
- *Belt conveyor head and tail pulleys.*
- *Screw conveyors.*
- *Exposed shafts and shaft ends.*
- *Collars and couplings.*
- *Hazardous revolving or reciprocating parts.*

### **Personal Protective Equipment**

When a hazard cannot be eliminated or controlled by engineering or administrative controls as required by Cal/OSHA regulations, workers must be protected by personal protective equipment (PPE). Employers must ensure that all required safety devices and safeguards, whether employer- or employee provided, comply with the applicable Cal/OSHA regulations and are maintained in a safe, sanitary condition. Employers must perform hazard assessments for all jobs and select the proper PPE for those hazards. Employers also must ensure that employees have an understanding of all of the PPE-related information listed in 3380(f)(4). Workers must be protected by PPE as follows:

- A. Eye and face protection is required when there is an inherent risk of eye injury from flying particles, injurious chemicals, or harmful light rays.

B. Foot protection is required for workers who are exposed to foot injury from hot, corrosive, or injurious substances; from falling objects; or from crushing or penetrating actions. Foot protection is also required for employees who work in abnormally wet locations.

C. Hand protection is required for workers who are exposed to skin absorption of harmful substances, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns, radioactive materials, and harmful temperature extremes.

D. Body protection is required for workers who are exposed to injurious materials. These workers must wear appropriate body protection and clothing appropriate for their work.

1. Loose sleeves, ties, frills, lapels, cuffs, or other loose clothing may not be worn around machinery in which it could become entangled.
2. Workers must not wear clothing saturated or impregnated with flammable liquids, corrosives, irritants, or oxidizing agents.

E. Hearing protection (HP) is required because the noise levels of many construction operations frequently exceed 90 dBA. When employees are subjected to sound levels listed in Table 3 (5096(b)), feasible administrative or engineering controls must be used. If these controls fail to reduce sound levels to an acceptable range, workers must wear hearing protection and be trained to properly use the HP devices

F. Head protection requirements include the following:

1. Head protection is required for employees who are exposed to flying or falling objects or to electric shocks and burns.
2. When required, the employer shall provide each employee with head protection that meets the requirements of 3381(b).
3. These employees must wear approved head protection. Hair must be confined if there is a risk of injury from entanglement in moving parts, combustibles, or toxic contaminants.
4. Everyone at a construction site should wear hard hats with bills in the forward position.

G. Respiratory protection is required when engineering or administrative controls are not feasible or adequate for limiting harmful exposure to airborne contaminants. In these circumstances, exposed employees must wear respirators approved by the National Institute for Occupational Safety and Health (NIOSH).

For all respirator use, a written respiratory protection program must be in place, covering employee training, respirator selection, medical evaluation, fit testing, use, cleaning, sanitizing, inspection, and maintenance.

*Notes: The following helpful resources are available from Cal/OSHA:*

*The health and safety fact sheet “Respiratory Protection”  
([www.dir.ca.gov/dosh/dosh\\_publications/respiratoryprotection-fs.pdf](http://www.dir.ca.gov/dosh/dosh_publications/respiratoryprotection-fs.pdf))*



*A guide titled “Respiratory Protection in the Workplace—A Guide for Employers”  
([www.dir.ca.gov/dosh/dosh\\_publications/respiratory.pdf](http://www.dir.ca.gov/dosh/dosh_publications/respiratory.pdf))*

Some of the safety orders require specialized personal protective equipment not mentioned here. Employers and employees should refer to the specific safety orders applicable to the type of work they perform to determine additional PPE (personal protective equipment) requirements.

Work on exposed energized parts of equipment or systems is allowed when suitable personal protective equipment and safeguards (i.e., approved insulated gloves or insulated tools) are provided and used, and other conditions as listed in 2320.2(a) are met.

### **Scaffolds**

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 inches wide. The design and construction of scaffolds must conform to applicable standards and requirements

Scaffolds shall be constructed of wood or other suitable materials such as steel or aluminum members of known strength characteristics. Where materials other than wood are used, or where scaffold designs differ from those specified in these Orders, the scaffold and its parts must provide a degree of strength, rigidity and safety equivalent to that provided by the described scaffold it replaces.

Each scaffold shall be designed and constructed using a dead load safety factor that will ensure the scaffold supports, without failure, its own weight and 4 times the maximum intended working (live) load applied or transmitted to it.

Scaffolding safety training must be done by a qualified person and includes identification of electrocution, fall, and falling objects hazards and the procedures for dealing with those hazards. Training must also include the proper use of the scaffold, how to handle materials, and the load capacities of the scaffold.

Before getting on a scaffold, employee(s) shall check to make sure that a **competent** person has inspected the scaffold before the work shift and that it is safe to use and in proper working order. Scaffolds can only be erected, dismantled, altered or moved under the direct supervision of a **competent** person by trained personnel. If you are ever unsure regarding the safety of a scaffold check with a supervisor before use.

### Toeboards

Regulations concerning toeboards include the following:

- A. Toeboards must be provided on all open sides and ends of railed scaffolds at locations where persons are required to work or to pass under the scaffold and at all interior floor, roof, and shaft openings.

B. Specifications for toeboards are as follows:

1. A toeboard must be securely fastened at a minimum of 4 inches (nominal) in height from its top edge to the level of the floor, platform, runway, or ramp. A toeboard must have not more than a 1/4 in. clearance above the floor level. It may be made of any substantial material, either solid or with openings not more than 1 inch in greatest dimension.
2. Where material is piled to such a height that a standard toeboard does not provide protection, paneling or screening from floor to intermediate rail or top rail shall be provided.

### **Silica Dust**

Construction work that involves exposure to crystalline silica containing materials can cause lung diseases. These silica containing materials include (but are not limited to):

- Sand
- Rock
- Ceramic and terracotta tiles
- Concrete and concrete block
- Manufactured stone
- Roof tiles
- Bricks and blocks
- Grouts and mortar
- Some joint compounds
- Abrasive materials

Exposure to crystalline silica can cause a variety of lung diseases, including silicosis, lung cancer, COPD (chronic obstructive pulmonary disease), decreased lung function, increased likelihood of getting tuberculosis, and immune system and kidney effects. 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.

The 8-hour permissible exposure limit (PEL) for airborne crystalline silica is established at 0.05 mg/m<sup>3</sup> with an Action Level of 0.025 mg/m<sup>3</sup> (see Table AC-1 of 5155 and section 1532.3).

Hazardous work activities include abrasive blasting with sand and loading, dumping, chipping, hammering, cutting, and drilling of rock, sand, or concrete. Generally, during work on materials, such as rock or concrete that contain a significant amount of silica, continuous exposure to a visible cloud of dust will probably result in levels of exposure that exceed the PELs. However, in some cases the PELs can be exceeded even when there is no visible cloud of dust.

For additional information on the hazards and control of silica exposures see the:  
*Hazards of Silica in Construction eTool* ([www.dir.ca.gov/dosh/etools/08-019/index.htm](http://www.dir.ca.gov/dosh/etools/08-019/index.htm))  
*Respirable Crystalline Silica Standards Update and FAQ*  
([www.dir.ca.gov/dosh/respiratory-silica-FAQ.html](http://www.dir.ca.gov/dosh/respiratory-silica-FAQ.html))

Before beginning work that could expose employees to crystalline silica, employers must comply with the following requirements:

A. Know and understand T8 CCR sections 1532.3 and 1530.1. Section 1530.1 contains certain requirements not found in 1532.3, such as:

1. Procedures to ensure that dust reduction systems maintain their effectiveness.
2. Additional training topics for employees and supervisors.

B. Methods of exposure control or compliance. 1532.3(c) or (d)(3).

C. Exposure assessments

D. Respiratory protection.

E. Housekeeping.

F. Restricted areas.

G. Written exposure control plan.

H. Medical surveillance.

I. Communication of respirable crystalline silica hazards to employees.

J. Recordkeeping.

### **Storm Drain, Process Wastewater and Sanitary Sewer Discharges**

There shall be no unauthorized discharge of construction related process water to any campus drain. Any discharge to campus drainage systems must first be approved by the University and in compliance with established discharge standards defined by the Regional Water Quality Control Board.

### **Traffic Control**

Regulations concerning traffic control are noted below:

A. Worksite traffic controls and placement of warning signs must conform to the requirements of the "California Manual on Uniform Traffic Control Devices for Streets and Highways, January 13, 2012" published by the State Department of Transportation. Additional means of traffic control, such as continuous patrol, detours, barricades, or other techniques for the safety of employees may be employed.

B. Specifications for the size and design of signs, lights, and devices used for traffic control shall be as described in the "Manual," pursuant to the provisions of California Vehicle Code section 21400, which is incorporated by this reference.

C. Employees (on foot), such as grade-checkers, surveyors, and others exposed to the hazard of vehicular traffic, shall wear high-visibility safety apparel in accordance with the requirements of 1598, 1599, and 1590. Warning garments shall be manufactured in accordance with the requirements of the ANSI/ISEA 107-2004, High Visibility Safety Apparel and Headwear.

D. Flaggers are required when the controls cited above are inadequate. Flaggers must be used at locations on a construction site as soon as barricades and warning signs cannot effectively control moving traffic.

**E. Employer shall select the proper type (class) of high visibility safety apparel for a given occupational activity**

**Utility System Shut-Down Request**

All projects and/or jobs requiring the shut-down of an essential Utility System, such as, electrical, plumbing, HVAC, Vertical Transport, Pneumatic Tube, Fire Alarm or Sprinkler System, etc. will be required to submit a Utility System Shut-Down Request. The utility system shut-down request shall be completed by SJSU point-of-contact.

**Wildfire Smoke**

Smoke from wildfires contains chemicals, gasses and fine particles that can harm health. The greatest hazard comes from breathing fine particles in the air (*PM2.5: particulate matter 2.5 micrometers or less in size*), which can reduce lung function; worsen asthma and other existing heart and lung conditions; and cause coughing, wheezing and difficulty breathing.

AirNow.gov is an official source that uses high quality air monitors to monitor air quality on a regional basis. This website provides average air quality over a 24-hour period, as well as forecasts for future air quality.

The U.S. Air Quality Index is EPA's (*Environmental Protection Agency*) tool for reporting air quality. The AQI (*air quality index*) is divided into six categories. Each category corresponds to a different level of health concern and is designated a specific color indicator. The AQI is as follows:

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0-50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51-100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for	101-150	Members of sensitive groups may experience

	Sensitive Groups		health effects. The general public is less likely to be affected.
Red	Unhealthy	151-200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201-300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	>301	Health warning of emergency conditions: everyone is more likely to be affected.

When the current AQI for PM2.5 is 151 or higher, and workers may be exposed to wildfire smoke, employers are required to protect their workers.

1. Communicate:
  - a. Inform workers about the current AQI and the measures the employer is taking to protect them.
  - b. Encourage workers to inform the employer of worsening air quality and any symptoms that might be caused by exposure to wildfire smoke.
2. Train and instruct workers on the items contained in Appendix B of 5141.1, at a minimum:
  - a. Health effects of wildfire smoke.
  - b. The right to obtain medical attention without fear of retaliation.
  - c. How to find out the AQI for PM2.5.
  - d. The requirements of title 8 section 5141.1.
  - e. The employer’s two-way communication system.
  - f. The employer’s methods to protect workers from wildfire smoke.
  - g. The importance, limitations, and benefits of using a respirator when exposed to wildfire smoke.
  - h. How to properly put on and use the respirators
  - i. Make N95 masks available for voluntary use at no cost to the employee.

## **LIST OF ACRONYMS**

ACCM: Asbestos-Containing Construction Material  
ACM: Asbestos-Containing Material  
AL: Aerial Lift  
ANSI: American National Standards Institute  
AQI: Air Quality Index  
Cal/OSHA: California Occupational Safety and Health Administration  
CAZ: Controlled Access Zone  
CCR: California Code of Regulations  
COPD: Chronic Obstructive Pulmonary Disease  
CSOs: Construction Safety Orders  
EPA: Environmental Protection Agency  
FP: Fall Protection  
FPP: Fall Protection Plan  
GFCI: Ground-Fault Circuit Interrupter  
GISOs: General Industry Safety Orders  
MEWP: Mobile Elevating Work Platforms  
NIOSH: National Institute for Occupational Safety and Health  
PEL - Permissible exposure limit  
PFP: Personal fall protection  
PFR: Personal Fall Restraint  
PM2.5: Particulate Matter 2.5 micrometers or less in size  
PPE: Personal Protective Equipment  
SDS: Safety Data Sheet  
SJSU: San Jose State University  
SO: Safety Order  
TSOs: Tunnel Safety Orders  
TWA: Time-Weighted Average