GENERAL SAFETY RULES

The safety rules in this section are general in nature and by no means are an exhaustive list of the requirements by federal, state or local regulations or codes. Employees and subcontractors are responsible for abiding by these rules and all other regulations, codes, or safe practices that may apply to their work.

A) GENERAL JOB SITE RULES AND HOUSEKEEPING

1) Job Site Rules:

a) All accidents and injuries, no matter how slight, are to be reported immediately to your supervisor and TRAMMELL CROW project supervision.

b) No horseplay or practical jokes are permitted. Running within the job site is strictly prohibited, except in the case of an emergency situation.

c) All workers must be at least 18 years of age and have legal working status.

d) Intoxicants of any kind are not permitted on site. Workers under the influence of intoxicants will be immediately removed from the site.

e) Weapons of any type will not be permitted on the job site property.

f) All site-specific rules will be adhered to, including the Emergency Action Plan.

g) Radios, tape players, or other music-playing devices, including those with headphones, are not allowed on site.

2) Housekeeping: A basic concept in any effective prevention endeavor is good housekeeping. No one item has a greater impact on the overall success of a safety program on a construction site. The importance of good housekeeping must be planned for at the beginning and followed through to the final clean-up.

a) Daily clean-up of each work are is required. All scrap material, including form lumber, rolling stock, and insulation, must be kept clear from work areas and passageways in and around the building.

b) All aisles, stairways, emergency exits, and fire extinguishers will be kept clear of material storage and debris.

c) All refuse and waste materials will be placed in the recognized waste containers for disposal.

d) Containers used for oily rags, flammables, or hazardous wastes must have covers.

e) Scrap or reusable lumber, formwork, and cribbing shall be stored in an orderly fashion and have protrusions (For example nails and screws) removed or bent over prior to stacking.

f) All stacks or piles of material shall be stable, with proper supports as necessary.

g) Rolling stock will be chalked or effectively secured from displacement.

h) Workers are not to drop or throw materials from one level to another without controlling the material with a chute, rope, or barricading the landing area.

i) Extension cords, air hoses, welding leads, and similar equipment shall not be allowed to create a tripping hazard.

j) Spills that present a slip hazard shall be cleaned up immediately.

k) Spills that contain hazardous material shall be contained immediately and reported to the Safety Director. Hazardous material spills shall be cleaned up and disposed of in accordance with local, state, and federal regulations.

l) The areas in front and surrounding electrical installations such as switch gear, temporary and permanent power panels, and transformers shall be kept clear. A minimum of three (3) feet of space is required in front of these units.

m) All construction areas in which workers are performing work must be lighted to a minimum of 10 foot-candles.

B) PERSONAL PROTECTIVE EQUIPMENT

Engineering and administrative controls shall be the primary methods used to eliminate or minimize hazard exposure in the workplace. When such controls are not practical or applicable, personal protective equipment (PPE) shall be employed to reduce or eliminate personnel exposure to hazards. PPE will be provided, used, and maintained when it has been determined that its use is required and that such use will lessen the likelihood of occupational injuries and/or illnesses.

1) Hazard Assessment: Hazard analysis procedures shall be used to assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of PPE. If such hazards are present, or likely to be present, the following actions will be taken:

a) Select the proper PPE to protect the worker from the hazard.

b) Select PPE that properly fits each affected worker.

c) Communicate selection decisions to each affected worker and train the worker in the proper use, care, sanitation, and storage of the PPE.

d) Ensure each affected worker uses the selected PPE.

PPE, whether supplied by the worker or the employer, shall be regularly inspected for damage. Defective or damaged PPE shall not be used. Employers are responsible for assuring that employee-owned PPE is adequate and properly maintained.

2) Training: All workers who are required to use PPE shall be trained to know at least the following:

a) When and what PPE is necessary.

b) How to properly don, remove, adjust, and wear the PPE.

c) The limitations of the PPE.

d) The proper care, maintenance, useful life, and disposal of the PPE.

PPE training should be documented. Re-training may be necessary when the workplace changes, making earlier training obsolete; the PPE changes; or when the worker demonstrates lack of use, improper use, or insufficient skill or understanding.

3) Clothing:

a) Appropriate work attire shall be worn on all job sites. Shorts, sweat pants, and cut-offs are not appropriate attire.

b) A shirt with a 4” sleeve must be worn at all times.

c) Loose clothing, dangling sleeves, and drawstrings can be hazards when working around rotating machinery, and are therefore inappropriate attire when operating such equipment.

d) Reflective vests must be worn when workers are exposed to public traffic areas. All TRAMMELL CROW employees should wear safety vests at all times while on the project.

4) Head Protection:

a) Head protection (ANSI Z89.1) will be required for all workers on TRAMMELL CROW projects. Head protection will also be required to be worn by engineers, inspectors, and visitors.

b) Head protection shall be worn until all overhead hazards have been eliminated and the project has reached completion to the point that the public has access.

c) Bump caps or skull guards are constructed of lightweight materials and are designed to provide minimal protection against hazards, and are therefore not an appropriate means for head protection.

d) Workers exposed to high voltage are required to wear at minimum a Type 1 Class E hard hat, rated for up to 20,000 volts.

5) Eye and Face Protection*:*

a) Approved eye and face protection (ANSI Z-87.1) shall be worn when there is a reasonable possibility of exposure to flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

b) Eye protection that provides side protection is required when there is a hazard of flying objects. Detachable side protectors are acceptable.

c) Workers that wear prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses without disturbing the proper position of the prescription lenses or the protective lenses.

d) Full face shields are required when the operation presents hazards where the entire face needs protection. Such operations may include, but are not limited to, grinding, cutting, chipping, or handling of hazardous chemicals.

e) Workers shall use eye protection with filter lenses that have a shade number appropriate for the work being performed for protection from injurious light radiation.

6) Foot Protection:

a) TRAMMELL CROW requires all workers to wear a sturdy work boot with a hard sole. Sandals, tennis shoes, or any other soft cloth shoe shall not be worn.

b) Where deemed necessary, steel toe shoes and/or metatarsal guards shall be worn to provide additional impact and compression protection. This type of protection may be required when carrying or handling excessively heavy materials or performing activities such as jack-hammering.

7) Hand Protection:

a) Hand protection is required when a worker's 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.

b) Selection shall be based on an evaluation of the performance characteristics of the hand protection relative to the task(s) performed, conditions present, duration of use, and the hazards and potential hazards identified.

8) Hearing Protection:

a) Hearing protection is required when sound levels exceed those listed in the table below:

Duration Per Day, Hours	Sound Level dBA Slow Response
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

b) Such protective devices may include earplugs, ear muffs, or a combination of the two. Cotton balls and other unapproved hearing devices shall not be used.

9) Fall Protection:

a) When workers are at a height of six (6) feet or greater from any location to a surface below when not protected by guardrails, covers or safety nets, they shall be protected by personal fall arrest equipment.

b) Body belts shall not be used for personal fall arrest protection. Body belts may only be used for positioning.

c) All safety harnesses, lanyards, lifelines, and anchorage points shall be inspected before each use for wear, damage, and other deterioration. Defective components shall be removed from service and tagged out.

d) Safety harnesses, lanyards, lifelines, and other personal fall arrest equipment shall be used only for safeguarding workers and shall not be used for hoisting materials.

e) Personal fall arrest equipment that has been subject to in-service loading shall be removed from service and shall not be used again without inspection and approval by a Qualified Person.

f) All PPE hardware shall be drop forged, pressed or formed steel, or made of equivalent material.

g) For further information regarding fall protection requirements, see *Fall Protection* Section II, Part F of this manual.

10) Respiratory Protection:

a) Workers are required to wear respirators when working in hazardous atmospheres that exceed OSHA Permissible Exposure Limits.

b) The respirator used must be sufficient for the atmosphere that is present and must reduce workers' exposure below the Permissible Exposure Limits.

c) All workers using respirators must have a medical evaluation and be fit-tested for their respirator.

d) All workers using respirators must be trained in their proper use.

e) For further information regarding the use of respirators, see *Respirators* Section II, Part V of this manual.

11) Working Over or Near Water:

a) Workers working over or near water where the danger of drowning exists shall wear U.S. Coast Guard approved life vests.

b) Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations and shall be spaced every 200 feet.

c) At least one lifesaving skiff shall be immediately available where workers are working over or adjacent to water.

C) TOOLS

The use of tools makes many tasks easier. However, the same tools that assist us, if improperly used or maintained, can create significant hazards in our work areas. Workers who use tools must be properly trained to use, adjust, store, and maintain tools properly.

1) General Requirements for Tools:

a) All hand and power tools and similar equipment, whether supplied by the employer or the worker, shall be maintained in a safe condition. The employer is ultimately responsible for ensuring tools are in safe working condition to use on the project.

b) Tools shall only be used for their intended purpose and design.

c) Tools shall be inspected for defects, and damaged tools shall be removed from service and tagged out until repairs are made.

d) Always use the appropriate PPE including, but not limited to, eye protection, face protection, hearing protection, respiratory protection, and gloves.

e) The wearing of loose clothing or jewelry should be avoided as they can become caught in moving parts.

2) Woodworking Tools:

a) Wooden handles shall be tight and free from cracks or splinters.

b) Impact tools shall not have mushroomed heads.

3) Electric / Fuel / Pneumatic Tools:

a) When power-operated tools are designed to accommodate guards, they shall be equipped with such guards.

b) Clamps and vises should be used to secure work, freeing both hands to operate the tool.

c) Tools should be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.

d) Tools must either have a three-wire cord with ground and be grounded or be double insulated.

e) The use of electrical cords or air hoses for hoisting or lowering tools shall not be permitted.

f) All fuel-powered tools shall be stopped while being refueled, serviced, or maintained.

g) When using pneumatic tools, hoses and tools shall be securely fastened by using a safety clip or short wire at all connections.

h) Nailers, staplers, and similar air-driven equipment, operating over 100 psi., must have a device to prevent operations unless it is in contact with the surface.

i) Compressed air must not be used for cleaning if the pressure is over 30 psi.

j) The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded when using hydraulic tools.

k) All hoses exceeding ½ inch inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure.

4) Powder-Actuated Tools:

a) Powder-actuated tools must be operated only by trained personnel. Trained workers must carry their training certification with them so they can confirm training when requested.

b) Powder-actuated tools shall be tested daily to ensure all safety devices are in proper working order.

c) Powder-actuated tools shall not be loaded until just prior to the intended firing time. Loaded powder-actuated tools shall not be left unattended.

d) All mis-fired loads from powder-actuated tools must be disposed of properly.

D) ELECTRICAL

Acting as a source of power for our tools, equipment and lighting, electricity is an integral part of our daily lives. However, its misuse and the disregard for safety measures can lead to fatal consequences. The following electrical requirements must be followed at all times.

1) Electrical Equipment and Components:

a) All electrical equipment and components shall be listed, labeled, and approved by a nationally recognized testing laboratory. All equipment shall be used according to manufacturer's recommendations and shall be inspected periodically for damage. All repairs made to electrical equipment shall be done by a Qualified Person.

b) The non-current carrying metal parts of portable and/or plug connected equipment shall be grounded. Portable tools and appliances protected by an approved system of double insulation need not be grounded. All double-insulated tools shall be distinctively marked.

2) Ground Fault Circuit Interrupters and Assured Equipment Grounding: A ground fault circuit interrupter (GFCI) is a fast-acting circuit breaker which senses small imbalances in the circuit caused by current leakage to ground, and in a fraction of a second, shuts off the electricity. It is much more effective than a standard circuit breaker or fuse, which are really designed to protect wiring and equipment, not people.

a) TRAMMELL CROW requires GFCI protection on all temporary outlets, including generators and extension cords connected to permanent power.

b) TRAMMELL CROW does not require Assured Equipment Grounding Program on all projects. If the project has been designated to use an Assured Equipment Grounding Program or if such program is required by the owner, the following inspections and test must be conducted:

i) Daily inspection of each cord set, attachment cap, plug, and receptacle of cord for external defects such as deformed or missing pins or insulation damage and for indications of possible internal damage.
ii) Test for continuity of the ground:
   (a) Before first use;
   (b) After any repairs or incidents involving the cord set; and
   (c) At intervals not to exceed three (3) months (quarterly).
iii) Equipment found damaged or defective shall not be used until repaired.
iv) The frequency of testing and inspection of the electrical tools and cord sets shall be indicated by attaching color-coded tape or color-coded tie wraps. The color codes and their corresponding scheduled inspection dates are:

MONTH	COLOR CODE	
	Quarterly	Monthly
January	White	White
February	White	White/Yellow
March	White	White/Blue
April	Green	Green
May	Green	Green/Yellow
June	Green	Green/Blue
July	Red	Red
August	Red	Red/Yellow
September	Red	Red/Blue
October	Orange	Orange
November	Orange	Orange/Yellow
December	Orange	Orange/Blue
Repair or Incident	Brown	Brown

3) Flexible Cords and Cables:

a) All extension cords shall be of the three-wire type and shall be designed for hard or extra hard usage in accordance with the NEC code.
   i) Hard (Type S, ST, SO, STO)
   ii) Extra hard (Type SJ, SJO, SJT, SJTO)

b) Flexible cords and cables shall be protected from damage. Sharp corners and projections shall be avoided. Worn or frayed electrical cables shall not be used.

c) Flexible cords and cables greater than No. 12 may be repaired if spliced so that the splice retains the insulation, outer sheath properties, and usage characteristics of the cord being spliced. Electrical tape is not an approved method for repairing extension cords.

d) Cords should be routed so they do not present a tripping hazard in designated walkways.

e) All non-rigid cords shall be provided strain relief where necessary.

4) Electrical Boxes and Panels:

a) All electrical boxes and panels shall be securely fastened to the surface upon which they are mounted and fitted with covers to protect workers from accidental contact with live parts.

b) Branch circuits shall be located where the conductors will not be subject to physical damage, and the conductors shall be fastened at intervals not exceeding 10 feet. No branch circuit shall be laid on the floor.

c) Overcurrent protection shall be provided by fuses or circuit breakers for each feeder and branch circuit and shall be based on the current carrying capacity of the conductors supplied and power load being used.

d) Each disconnecting means for motors and appliances shall be legibly marked to indicate its purpose. Each service, feeder, and branch circuit at its disconnecting means or over current device shall be legibly marked to indicate its purpose. These markings shall be of sufficient durability to withstand the environment involved.

e) All open spaces created from missing breakers and open knockouts are to be covered with approved electrical fittings to prevent contact with live parts. Electrical tape is not approved for such protection.

f) Watertight enclosures shall be used where there is a possibility of moisture entry from work operations or weather exposure.

g) All switch boxes and panels of 220 volts and higher shall be labeled as to the voltage and should have warning signs prohibiting access by unauthorized personnel.

h) A clear approach and a three (3) foot side clearance shall be maintained for all distribution panels.

i) Electrical distribution areas will be guarded against accidental damage by locating in specifically designed rooms, use of substantial guard posts and rails, and/or other structural means.

j) Access to electrical distribution rooms should be limited only to authorized personnel.

k) Equipment, circuits, or controls that are de-energized or deactivated during the course of work on energized or de-energized equipment or circuits shall be locked and tagged out. Tags shall be placed to identify plainly the equipment or circuits being worked on. For further information regarding Lock-out / Tag-out requirements, see *Lock-Out / Tag-Out* Section II, Part U of this manual.

5) Temporary Lights:

a) Temporary lights shall be equipped with a heavy duty electric cord with the connection and insulation maintained in safe condition. Temporary lights shall not be suspended by electric cords unless cords and lights are designed for this means of suspension. Splices shall have insulation equal to that of the cable.

b) Temporary lights shall be equipped with guards to prevent accidental contact with the bulbs.

c) All sockets in the light strand must have a bulb in the socket.

d) Lights and cords shall not be placed in working spaces, walkways, or other locations where they may be exposed to damage.

e) All construction areas, including stairways in which workers are performing work, must be lighted to a minimum of 10 foot-candles.

6) Overhead Power Lines:

a) All equipment or machines (except cranes) must maintain a minimum distance from overhead power lines.
   i) For lines 50 kV or below, minimum clearance must be 10 feet.
   ii) For lines 50 kV or greater, minimum clearance must be 10 feet plus .4 inch for each 1 kV over 50kV.

b) For further information approach distances for cranes, please refer to *Cranes and Hoists* Section II, Part N of this manual.

c) If work must encroach within the minimum clearances, the power company owning the line must be contacted and the line must be de-energized or protected.

7) Training and Safe Work Practices for Unqualified Workers: An unqualified worker is defined as one who has not been trained or authorized by his/her company to conduct electrical work.

a) Training for unqualified workers is general electrical safety precautions and should provide awareness and understanding of electrical hazards. Elements of basic electrical training will include:
   i) Hazard awareness.
   ii) Ground fault protection.
   iii) Inspection of equipment.
   iv) Proper measures for removing equipment from service.
   v) Safe work practices.

b) At no time should an unqualified worker operate equipment if they suspect an electrical problem.

c) Turn off and unplug electrical equipment before attempting to replace a part, clear a jam, adjust, or troubleshoot

d) Only use dry hands and tools and stand on a dry surface when using electrical equipment.

e) Always pick up and carry portable equipment by the handle and/or base. Never carry equipment or tools by the cord.

f) Never remove the grounding pin from a three-prong plug.

g) Head all warning signs, barricades, and/or guards that are posted when equipment or wiring is being repaired or installed or if electrical components are exposed.

h) Unqualified workers must not attempt to make any repairs to electrical equipment. All deficiencies should be immediately reported to their supervisor.

8) Training and Safe Work Practices for Qualified Workers: A qualified worker is defined as one who has skills and knowledge related to the construction and operation of electrical equipment installation and has training on the hazards involved. He or she must be authorized to conduct electrical work by his or her employer.

a) Training for qualified workers should be sufficient enough to familiarize the worker with the proper use of special precautionary techniques, PPE, arc flash, insulating and shielding materials, insulated tools, wiring methods, testing techniques, grounding theory, grounding application, inspection techniques, basic electrical theory, and test equipment. A person can be considered qualified with respect to certain equipment methods, but still be unqualified for others. At minimum, the training shall include:
   i) The skills and techniques to distinguish exposed live parts.
   ii) The skills and techniques to determine nominal voltage.
   iii) The proper clearance distances and the corresponding voltages to which he/she may be exposed.

b) Only qualified workers may perform work, repairs, or tests on electrical cords, tools or equipment.

c) All qualified workers will follow established electrical safety procedures and precautions.

d) Areas under new installation or repair must be sufficiently guarded with non-conductive physical barriers and warning signs to prevent unauthorized entry. Where barricades and warning signs do not provide adequate protection, an Attendant shall be stationed to warn and protect other workers.

e) It is TRAMMELL CROW's policy that all equipment be de-energized before performing any work. Therefore, it is the responsibility of the employer to determine before operations start if there are any energized circuits with which his/her employees may come in contact, and to provide protection and warning against all hazards.

f) In the case that it creates a greater hazard to de-energize or in the case of emergency, workers working on energized parts must follow the guidelines for Energized Work Procedures as laid out in this manual and the requirements of NFPA 70E.

g) A lock and tag shall be placed on each disconnecting means used to de-energize circuits and equipment on which work is to be performed. All electrical circuits should be treated as "live" until they have been tagged, locked out, and tested in accordance with the Lock-out / Tag-out Policy. For more on Lock-out / Tag-out procedures, see *Lock-out / Tag-out* Section II, Part U of this manual.

h) Any worker working on electrical equipment on a crane or other elevated equipment must take necessary precautions to prevent a fall from reaction to electrical shock or other causes.

i) Portable ladders shall have non-conductive side rails, if they are used where the worker or the ladder could contact exposed energized parts.

j) Conductive items of jewelry and clothing shall not be worn unless they are rendered non-conductive by covering, wrapping, or other insulating means.

k) Ropes and other hand lines used near exposed energized equipment shall be non-conductive.

l) When working in confined or enclosed workspaces where electrical hazards may exist, barriers or insulating materials must be provided.

m) After a protective circuit is disconnected or opened, it may not be connected or closed until it has been determined that the equipment and circuit can be safely re-energized.

9) Energized Work Procedure: If it is determined that it creates a greater hazard to de-energize electrical equipment, or in the case of emergency, the following procedures and the requirements set forth in NFPA 70E shall be followed to protect workers. All energized work must be approved by TRAMMELL CROW's Safety Director.

a) Before any work may begin on energized equipment, an Energized Work Permit must be completed. A copy of this permit may be obtained through TRAMMELL CROW's Safety Department. The purpose of this permit is to:
   i) Demonstrate that de-energizing is infeasible or creates additional hazards;
   ii) Assess exposure risk; and
   iii) Control exposure risks by determining the approach boundaries and PPE required in accordance with NFPA 70E.

b) Only Qualified and Authorized workers shall work on energized electrical equipment.

c) Workers shall wear PPE sufficiently rated to protect them from electrical shock and arc blast. This may include electrically rated insulated gloves, aprons, rubber soled shoes, and insulated shields.

d) PPE shall be visually inspected and/or tested before use. Any damaged PPE shall be removed from service.

e) In cases where the insulation capabilities of the PPE may be damaged during the work, a protective outer cover such as leather must be used.

f) All protective insulating equipment shall be inspected in accordance with the table below.

Type of Equipment	Frequency of Testing
Rubber insulating gloves	Before first use and every 6 months
Rubber insulating sleeves	Before first use and every 6 months
Rubber insulating blankets	Before first use and every 6 months
Rubber insulating cover	Upon indication that insulating value is suspect
Rubber insulating line hose	Upon indication that insulating value is suspect

g) Qualified workers shall use insulated tools and testing equipment suitable for the voltage present and the working environment.

h) Tools and testing equipment shall be visually inspected before each use, and damaged equipment must be removed from service.

i) Workers shall not reach blindly or enter spaces containing exposed energized parts without proper illumination. Illumination must be provided that enables the workers to perform the work safely.

j) Portable ladders must have non-conductive side rails.

k) All conductive articles such as jewelry and clothing must be completely removed.

l) Doors or other hinged panels shall be constructed and secured to prevent them from swinging into a worker and causing contact with exposed energized parts.

m) Housekeeping in areas of exposed energized parts may not be completed unless adequate safeguards (insulations equipment or barriers) are present. Conductive cleaning materials such as steel wool, silicon carbide, or liquids may not be used.

n) A person certified in first aid and CPR must be on standby at all times while work on energized equipment is being performed.

E) STAIRWAYS AND LADDERS

Whenever there is a change in elevation of 19 inches or greater, workers must use a ladder, stairway, runway, or personnel hoist to gain access. Two or more separate points of access must be provided when there are 25 or more workers in an area.

1) General Requirements for Stairways:

a) Stairways that will not be a permanent part of the building or structure, on which construction work is being performed, shall have landings of not less than 30 inches in the direction of travel and extend at least 22 inches in width at every 12 feet or less of vertical rise.

b) Temporary stairs shall be installed between 30^{o} and 50^{o} from horizontal.

c) Riser height and tread depth shall be uniform within ¼ inch.

d) Where doors or gates open directly on a stairway, a platform shall be provided and the platform shall extend a minimum of 20 inches past the swing of the door in the direction of travel.

e) Slippery conditions on stairways are to be eliminated before workers are allowed to use them for access.

f) Stairways that have open metal pan treads and landings are not to be used until they have been completely filled with wood, concrete, or other suitable materials.

g) Stairways having four or more risers or rising more than 30 inches, whichever is less, shall be equipped with a stair rail system along each unprotected side or edge. All stairways meeting the requirements of having a stair rail must also be equipped with at least one handrail.

h) Handrails shall have a minimum of three (3) inches of clearance between the handrail and the wall or any other obstruction to allow adequate handhold for workers.

i) Unprotected sides and edges of stairway landings shall have guardrail systems that meet or exceed the criteria established in *Fall Protection* Section II, Part F of this manual.

2) Portable Ladder Design:

a) Job built ladders must be built in accordance to ANSI A14.4.

b) Each portable ladder will be capable of supporting four times the intended load without failing.

c) Rungs, cleats, and steps of portable ladders shall be uniformly spaced and shall not be less than 10 inches apart and no more than 14 inches apart as measured between the centerline of the rungs, cleats, and steps.

d) The minimum clear distance between side rails of portable ladders shall be 11 ½ inches.

e) The rungs and steps of portable ladders shall be corrugated, knurled, coated with skid resistant material, or otherwise treated to minimize slipping.

f) Ladder components shall be surfaced so as to prevent injury to workers from punctures, lacerations, and to prevent snagging of clothing.

g) Only ladders with non-conductive side rails shall be used while working near energized electrical parts.

h) Wooden ladders shall not be painted or covered with any material that would hinder the inspection of the ladder.

i) Ladders should be periodically inspected and should be immediately inspected after any occurrence that could affect their safe use. All defective ladders shall be removed from service and tagged out.

3) Portable Ladder Use:

a) All workers using or constructing ladders shall be trained to recognize hazards related to ladders and to use proper procedures to minimize these hazards.

b) All ladders shall be placed on solid footing and secured to prevent displacement.

c) Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced when the ladder is in position for use.

d) Ladders may only be used for the purpose for which they were designed.

e) When two or more ladders are used to gain access to an elevated work area, the ladders shall be offset with a platform or landing between the ladders.

f) Step ladders must be fully extended with the spreader in the locked position before use.

g) The top and top step of step ladders shall not be used to sit or stand on.

h) Workers must face the ladder at all times.

i) Workers must maintain three points of contact when ascending and descending all ladders.

j) When ladders are used to gain access to an upper landing, the side rails of the ladder must extend three (3) feet above the landing surface; when such extension is not possible, due to ladder length, a grasping device, such as a grab rail or post, shall be provided to assist workers in getting on and off the ladder.

k) Straight or extension ladders should be positioned so that the horizontal distance between the foot of the ladder and the support against which it is placed is equal to one-fourth the height of the ladder at the top of support.

l) Ladders shall be kept free of oil, grease, and dirt. Ladders shall not be used on slippery surfaces unless secured to prevent displacement.

m) The areas at the top and bottom of ladders shall be kept clear of debris and other hazardous materials.

4) Fixed Ladders: Fixed ladders that are a permanent part of the building or structure shall not be used unless they have been fully installed in accordance with the specifications and drawings.

F) FALL PROTECTION

Falls continue to be the number one killer among construction workers. For this reason, it is imperative that all fall hazards be eliminated where possible, and all workers exposed to falls are protected by a fall arrest system.

1) Conditions Requiring Fall Protection: The following are examples of situations where fall protection would be needed. This listing is by no means complete, and there are many other situations where a fall of six (6) feet or more is possible. It should be noted that steel erection, ladders, and scaffolding are not included in this list because they are covered by other OSHA standards and other requirements of this safety manual.

a) **Unprotected Sides and Edges:** Workers who are working on walking or working surfaces with unprotected sides or edges which are six (6) feet or more above a lower level must be protected from falling.

b) **Wall Openings:** Workers at, above, or near a wall opening (including those with chutes attached) where the outside bottom edge of the wall opening is six (6) feet or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches above the walking working surface, must be protected from falling.

c) **Holes:** By OSHA's definition, a "hole" is any gap or void two (2) inches or more in its least dimension in a floor, roof, or other walking or working surface. All "holes", regardless of depth, must be covered or barricaded to prevent workers from tripping into or through.

d) **Excavations:** Each worker at the edge of an excavation six (6) feet or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers when the excavations are not readily visible because of plant growth or other visual barrier. Where walkways are provided to permit workers to cross over excavations, guardrails are required on the walkway if fall exposure is greater than six (6) feet.

e) **Hoist Areas:** Each worker in a hoist area shall be protected from falling six (6) feet or more by guardrail systems or personal fall arrest systems. If the guardrail or portions thereof must be removed to facilitate hoisting operations, as during the landing of materials, workers receiving the material must be protected by a personal fall arrest system.

f) **Ramps, Runways, and Other Walkways:** Each worker using ramps, runways, and other walkways shall be protected from falling six (6) feet or more by guardrail systems.

g) **Low-slope Roofs (less than or equal to 4 in 12):** Each worker engaged in roofing activities on low-slope roofs with unprotected sides and edges six (6) feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of a warning line system and guardrail system, warning line system and safety net system, warning line system and personal fall arrest system, or warning line system and safety monitoring system.

h) **Steep Roofs (greater than 4 in 12):** Each worker on a steep roof with unprotected sides and edges six (6) feet or more above lower levels shall be protected by guardrail systems, safety net systems, or personal fall arrest systems.

2) Fall Protection Systems: When there is a potential fall of six (6) feet or more, contractors will provide protection from fall hazards by the use of a guardrails system, personal fall arrest system, positioning device, warning lines, controlled access zone, safety monitors, and/or hole covers.

a) **Guardrail System:**
   i) Guardrail systems must be capable of supporting a minimum of 200 pounds.
   ii) The top edge height of the guardrails system must be 42 inches, plus or minus three (3) inches, above the walking or working surface.
   iii) Midrails must be installed at a height midway between the top edge of the guardrail system and the walking or working level.
   iv) Guardrails must be made in such a way that will prevent punctures, lacerations, and snags.
   v) Steel and plastic banding must not be used for top rails or midrails.
   vi) Top rails and midrails must be at least ¼ inch diameter thickness.

b) **Personal Fall Arrest:**
   i) Personal fall arrest systems must limit maximum arresting force on a worker to 1,800 pounds.
   ii) When used with a body harness, workers must be rigged so that he/she can neither free fall more than six (6) feet nor contact any lower level and bring the worker to a complete stop and limit maximum deceleration distance a worker travels to 3.5 feet.
   iii) All personal fall arrest systems must have sufficient strength to withstand twice the potential impact energy of a worker free falling a distance of six (6) feet or the free fall distance permitted by the system, whichever is less.
   iv) All PPE hardware shall be drop forged, pressed or formed steel, or made of equivalent material and shall be ANSI or ASTM approved.
   v) The use of body belts for fall arrest is prohibited, and a full body harness is required. Body belts may only be used for positioning.
   vi) Personal fall arrest equipment that has been subject to in-service loading shall be removed from service and shall not be used again for worker safeguarding until inspected by a Qualified Person.

c) **Positioning Device:**
   i) Positioning systems are to be set up so that workers can free fall no farther than two (2) feet.
   ii) A body belt may be used as a positioning device, providing it limits the maximum arresting force on the worker to 900 pounds.
   iii) Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of a worker's fall or 3,000 pounds, whichever is greater.

d) **Warning Line System:**
   i) Warning line systems may consist of ropes, wires, or chains and supporting stanchions.

ii) Warning lines shall be rigged and supported so that the lowest point including sag is no less than 34 inches from the walking or working surface and its highest point is no more than 39 inches from the walking or working surface.
iii) Stanchions, after being rigged with warning lines, shall be capable of resisting, without tipping over, a force of at least 16 pounds applied horizontally against the stanchion.
iv) The rope, wire, or chain shall have a minimum tensile strength of 500 pounds, and after being attached to the stanchions, must support without breaking the load applied to the stanchions as prescribed above.
v) Warning lines shall be attached to each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in the adjacent section before the stanchion tips over.

e) **Controlled Access Zone**
i) A controlled access zone is a work area designated and clearly marked in which certain types of work (such as leading edge work or roof work) may take place without the use of conventional fall protective systems.
ii) Controlled access zones, when created to limit entrance to areas where leading edge work and other operations are taking place, must be defined by a control line or by any other means that restrict access.
iii) Control lines shall consist of ropes, wires, tapes, or equivalent materials and supporting stanchions.

f) **Safety Monitoring**
i) Safety monitoring shall only be used in connection with “low-sloped” roofs or leading edge work.
ii) The safety monitor must be on the same walking or working surface and within visual sight distance of the worker(s) being monitored.
iii) The safety monitor shall have no other responsibilities which could take the monitor’s attention from the monitoring function.
iv) The safety monitor shall be plainly identified with a reflective vest.

g) **Covers**
i) Hole covers located in roadways and vehicular aisles must be able to support at least twice the maximum axle load of the largest vehicle to which the cover might be subjected.
ii) All other covers must be able to support at least twice the weight of workers, equipment, and materials that may be imposed on the cover at any one time.
iii) To prevent accidental displacement resulting from wind, equipment, or workers’ activities, all covers must be secured.
iv) All covers shall bear the markings "HOLE" or "COVER”.

3) Falling Object Protection:

a) Where open sided floors, holes, or other areas create a hazard of falling objects to workers below, toeboards, screens, or barricades must be used to protect workers from falling objects.

b) Toeboards shall be a minimum of four (4) inches and capable of withstanding a force of 50 pounds.

c) Where tools and equipment are piled higher than the toeboards, screening shall be used from the walking or working surface to the guardrail system.

4) Inspections: Equipment used for fall protection must be inspected by personnel prior to each use. If upon inspection a piece of equipment shows any signs of wear it must be immediately removed from service and tagged out. Such signs shall include cut or frayed edges, cracks, mildew or mold, undue stretching, chemical burns, dryness, corrosion, broken stitches and loosened or distorted rivets

5) Rescue: A job-specific rescue procedure should be developed when workers are utilizing personal fall protection. The rescue procedure may include self rescue, assisted rescue by a fellow co-worker, or professional rescue service from a local fire department. The rescue procedure should be a part of the worker's fall protection training.

6) Training: Each worker who may be exposed to fall hazards will be trained to recognize the hazards and the procedures to follow to minimize the hazards. A Competent Person will provide the training.

a) The Competent Person must train workers in the following areas:
   i) Fall hazards in the work area;
   ii) Correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems used;
   iii) Use and operation of the fall protection systems used;
   iv) Role of each worker in fall protection plans;
   v) What rescue procedures to follow in case of a fall; and
   vi) Overview of the OSHA fall protection standards.

b) A training record will be maintained for each worker. The record will contain the name of the workers trained, date of training, and the signature of the person who conducted the training. Re-training should be done if there is a change in the fall protection system being used or if a worker's actions demonstrate that the worker has not retained the understanding or skills important to fall protection.

G) SCAFFOLDS

Scaffolding provides a large stable work platform where workers can stack materials and set up their tools when working from heights. However, each year, more than sixty workers are killed from scaffold failure or falls. Most hazards from scaffolds are usually from poor planning and assembly.

1) Competent Person:

a) A Competent Person should be assigned to each scaffold project to ensure proper assembly, use, and disassembly. Before each use, the Competent Person should inspect the platform condition, framework, the base and supports, access ladders, scaffold connections, and the overall stability. If, at any time, the scaffold is not fully completed or is found to be non-compliant, the Competent Person shall tag the scaffold out of service.

b) The Competent Person must have specific training in and be knowledgeable about the type of scaffold in use and must have extensive knowledge of OSHA Subpart L standards. In addition, the Competent Person must have the authority to take immediate action if a hazard exists.

2) Capacity:

a) Manufacturer's specification must be followed at all times.

b) All scaffolds and their components will be capable of supporting without failure at least four times the maximum intended load. All suspension ropes and hardware shall be capable of supporting at least six times the maximum intended load.

3) Platform Construction:

a) All platforms will be entirely planked and decked with scaffold grade planks.

b) Gaps shall not be more than one inch wide in between planks and no more than 9½ inches between the last plank and the upright.

c) All platforms will be at least 18 inches wide and shall not deflect more than 1/60 of the span when loaded.

d) The front edge of any working platform shall not be more 14 inches from the face of the work.

e) Scaffold planks 10 feet or less in length, unless cleated or secured with hooks, will extend at least six (6) inches past the support but not more than 12 inches. Scaffold planks greater than 10 feet will extend no more than 18 inches past the support.

f) Where platforms are overlapped to create a long platform, the overlap shall occur only over supports and shall not be less than 12 inches unless secured to prevent movement.

g) Brackets used to support cantilevered loads must only be used to support personnel, unless the scaffold has been designed for other loads by a qualified engineer.

h) All platforms will be kept clear of debris or other obstructions that may hinder the working clearance on the platform.

4) Supported Scaffolds:

a) The footing or anchorage for scaffolds will be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects will not be used to support scaffolds or planks. Mud sills will be used when required.

b) The poles legs, or uprights, will be plumb, and securely and rigidly braced to prevent swaying and displacement.

c) All supported scaffold with a height to base ratio greater than 4:1 shall be restrained from tipping by the use of ties, guys, or equivalent.

d) Mixing scaffold components from one manufacturer to another may not be done unless the integrity of each component can be maintained and is approved by the Competent Person.

e) Fork trucks and similar pieces of equipment shall not be used to support scaffold platforms unless they have been specifically designed by the manufacturer for such use. If so designed, the platform shall be securely fastened to the forks and shall not extend 10 inches beyond the wheel base of the equipment.

5) Mobile Scaffolds:

a) Scaffolds shall be braced by cross, horizontal, or diagonal braces, or a combination thereof, to prevent collapse.

b) Scaffold casters shall be locked to prevent movement of the scaffold while occupied.

c) Manual force used to move the scaffold shall be applied as close to the base a practical but not more than five (5) feet above the supporting surface.

d) Platforms shall not extend outward past the base unless outriggers are provided.

e) Caster stems and wheel stems shall be pinned or otherwise secured in the scaffold legs or adjustment screws.

f) Workers shall not be allowed to ride on scaffolds unless the surface on which the scaffolds is being moved is within 3° level and is free of pits, holes, and other obstructions; the height to base ratio is 2:1 or less; and the scaffold is moved at a speed of one (1) foot or less per second.

6) Access:

a) A safe access must be provided to each scaffold platform greater than 24 inches above the supporting surface. Acceptable means of accesses which are permitted include: hook-on ladders, portable ladders, stairways, stair towers, ramps, or integral pre-fabricated frames.

b) Cross braces shall not be climbed or used as a means of access.

7) Scaffold Inspection and Tagging:

a) Inspection and tagging of the scaffold are to be performed by a competent worker experienced in the erection of scaffold.

b) All scaffold identification tags will be of a solid green, yellow, or red color with black lettering and must include:
   i) Date Erected / Tagged
   ii) Inspected By: Name (print and signature)

c) **Green -** tags will be hung on scaffolds that have been inspected and are safe for use. A green "SAFE FOR USE" tag(s) should be attached to the scaffold at each access point after the initial inspection is complete.

d) **Yellow -** "CAUTION" tag(s) will replace all green "SAFE FOR USE" tag(s) whenever the scaffold has been modified to meet work requirements, and as a result could present a hazard to the user. This tag indicates special requirements for safe use. As a minimum requirement, the tag will have the unusual or potential hazard symbol marked on the reverse.
   i) The yellow tag should not to be removed until the scaffold has been returned to a safe condition and an inspection by a "Competent Person" has been completed. Based on the results of that inspection, the appropriate tag (red or green) will be hung on the scaffold and the yellow tag removed.
   ii) NOTE: Use of the "yellow tag" status is not intended to override the green tag system. All efforts should be made to return the scaffold to a "Green Tag" status as soon as possible.

e) **Red -** "DANGER – UNSAFE FOR USE" tag(s) will be used during erection or dismantling when the scaffold is left unattended and replace all green "SAFE FOR USE" tag(s) or yellow "CAUTION" tag(s) in the event a scaffold has been deemed unfit for use.

8) Fall Protection and Falling Object Protection:

a) All scaffolds over 10 feet must be equipped with a guardrail system including a top rail, midrail, and toeboard in accordance with the Fall Protection requirements of this manual.

b) Toeboards shall extend a minimum of four (4) inches above the work platform. When it is anticipated that material will be stacked higher than four (4) inches, screens must be provided from the work platform to the top rail to prevent material from falling from the scaffold.

c) When feasible, all erectors and dismantlers of scaffolds shall be protected from falling by the use of a personal fall arrest system. The Competent Person will determine feasibility of such protection.

9) Use:

a) All scaffold users must comply with the tagging system as described above.

b) Scaffolds shall never be loaded to exceed their capacity.

c) Scaffolds shall not be erected within three (3) feet from insulated power lines carrying less than 300 volts and not within 10 feet from power lines carrying 300 volts or more. For each kilovolt over 50kv, add four (4) inches.

d) Scaffolds shall not be moved while occupied by workers, unless designed for such purpose.

e) Workers will not work on scaffolds which are covered with ice or snow. All ice or snow must be removed to prevent slipping.

f) No worker will work on scaffolds during storms or high winds.

g) The use of shore scaffolds and lean-to scaffolds is strictly prohibited.

10) Training: All workers who perform work on a scaffold shall be trained annually to recognize the hazards associated with the type of scaffold being used and the procedures to control or minimize those hazards. This training shall include:

a) The nature of electrical hazards, fall hazards, and falling object hazards in the work area;

b) Proper use of scaffolds and tagging system;

c) Proper handling of materials on scaffolds;

d) Proper erecting, maintaining, and disassembling of fall protections systems;

e) Proper construction, use, placement, and care in handling of scaffolds; and

f) Maximum intended load and load carrying capacities of scaffolds used.

Note: This policy is not intended to be inclusive of every scaffold type. Suspension scaffolds and other specific types of scaffolds must be designed, constructed, and used in accordance to Subpart L 1926.450-1926.454.

H) AERIAL LIFTS

The leading cause of construction fatalities is falls. For this reason, many contractors often seek the use of aerial lifts to provide easier and safer access to elevated work areas. However, aerial lifts may pose their own hazards if not used appropriately. TRAMMELL CROW requires that all operators be trained in the safe operations of the lift, perform a pre-lift inspection, and follow the general safe operating guidelines for the lift in use.

There are generally two types of aerial lifts:

Articulating Boom Lifts: These lifts are used for reaching up and over machinery, equipment, and other obstacles mounted on floors, and for reaching other elevated positions not easily approached by a straight (telescopic) boom lift. The machine's turntable may be rotated 360^{o} in either direction. The boom can be raised or lowered from vertical to below horizontal and extended (telescoped) while the work platform remains horizontal and stable.

Scissor or Vertical Lifts: These lifts are used where less reach and height but more workspace and lifting capacity are required. They are designed to provide larger platform work areas and generally to allow for heavier loads than boom lifts. Scissor lifts may be maneuvered in a manner similar to boom lifts, but the platform may be raised only vertically, except for an available option that extends the deck horizontally.

1) Fall Protection:

a) Unless required by the owner or by the project-specific safety plan**,** TRAMMELL CROW does not require fall protection in scissor or vertical lifts. However, a full body harnesses and lanyard shall be used for worker fall protection and restraint when using an articulating boom lift.

b) The lanyard shall be attached to an approved anchorage point as designated by the manufacturer of the lift, and at no time shall a worker attach off to an adjacent structure or equipment.

c) The operator shall not stand, sit, or climb on the edges of the basket, nor shall a worker use a ladder, plank, or other device to increase his working position.

2) Inspections:

a) Lift equipment and controls shall be inspected upon delivery to the job site and daily prior to use.

b) All aerial lift devices shall conform to ANSI standards applicable to the type of equipment being used.

c) Any lift that is found to be damaged or is not functioning properly shall be tagged-out and removed from service until repairs are made.

d) Permanent labeling must be conspicuously posted to indicate lifting capacity and travel height.

e) Aerial lift devices shall only be used for the purpose(s) intended by the manufacturer. Modifications shall not be made to any aerial lift device without the express written authorization from the manufacturer.

3) General Requirements for Safe Use:

a) All manufacturer warnings regarding operation, capacity, and safety precautions shall be strictly followed.

b) Before extending or raising the boom or platform, outriggers (if so equipped) shall be positioned properly and the lift will be level.

c) Outriggers shall be placed on mud mats or other solid surface. If the lift is on unlevel ground, the wheels shall be chocked and the parking brake set.

d) Sufficient clearance shall be checked before raising the lift.

e) Workers shall keep both feet on the floor of the bucket or platform at all times.

f) When the lift has to be moved, it shall only be moved in accordance with the manufacturer's recommendations. Some manufacturers require the lift to be moved only when the bucket or platform is at the lowered position. For scissor and vertical lifts, this is lowered all the way down. For articulating boom lifts, this is lowered to the lowest point that the operator can safely see to drive the vehicle.

g) Lifts with obstructed views to the rear shall be equipped with a working back-up alarm being louder than the surrounding noise levels or utilize a spotter to signal the operator while backing up.

h) Workers shall not position any aerial lifts closer than 10 feet to a power line that carries up to 50 kilovolts. For each kilovolt over 50, add four (4) inches.

i) Tools, parts, or any materials shall not be dropped or thrown from the bucket or platform.

4) Training:

a) Aerial lift operators shall be trained and certified to use the various lifts on the job sites.

b) Training shall include the pre-lift inspection, fall protection, hands-on operation, and safe work practices.

c) Training certification for workers shall be available to TRAMMELL CROW upon request.

I) WELDING AND CUTTING

There are several hazards to consider when performing welding or cutting operations. These hazards include fires, explosions, electrocution, burns, welder's flash, oxygen depletion, and toxic fumes. To prevent these hazards from arising, the following requirements shall be met on all TRAMMELL CROW projects.

1) General Welding and Cutting Requirements:

a) Objects to be welded, cut, or heated must be moved to a designated safe location. If the object cannot be easily moved, all moveable fire hazards will be moved at least 35 feet from the work site or protected with flame-proof covers, metal guards, or curtains.

b) A fire extinguisher must be immediately available in the work area, free of obstruction, and maintained for instant use. The fire extinguisher shall be of suitable size and rating for the work being performed.

c) When conditions warrant, a fire watch person shall be provided during and for 30 minutes past the completion of the welding project.

d) When welding, cutting, or heating is performed on walls, floors and ceilings, precautions shall be taken on the opposite side to prevent possible fire.

e) No welding, cutting, or other hot work shall be performed on empty drums, barrels, tanks, or other containers until they have been cleaned thoroughly to remove any flammable materials, fumes, or vapors.

f) Portable welding screens, partitions, or curtains shall be used to protect other workers within 40 feet of the working area.

g) The work area shall be kept clear of welding rod studs and other debris.

h) When welding operations create fumes, smoke, or exhaust that could potentially create a hazardous atmosphere, mechanical ventilation shall be used with sufficient capacity and arranged to produce the number of air changes necessary to remove the hazard.

i) If material to be welded is plated, coated, or painted with material which may emit toxic fumes or vapors, the welder shall wear an appropriate respirator in addition to any local ventilation. Please refer to *Respirators* Section II, Part V of this manual for further guidance in the use of respirators.

j) All personnel engaged in welding or burning operations shall wear the appropriate PPE. This includes, but is not limited to, eye and face protection against harmful radiation and flying particles, flame retardant clothing, and leather gauntlet-type gloves.

k) Visual inspections of welding equipment and compressed gas cylinders should be conducted daily. If welding equipment is found to be defective, it shall be removed from service and tagged out until properly repaired.

2) Electric Welding:

a) Ensure electrical cord, electrode holder, and cables are free from defects (No cable splices or repairs are allowed within 10 feet of the electrode holder).

b) Lug connections on electric welders must be protected by a rubber boot or other protective means to prevent electrical shock.

c) Ensure the welding unit is properly grounded.

d) If electrode holders are left unattended, the electrodes shall be removed and holders placed so they cannot make electrical contact with workers or conducting objects.

e) When the arc welder or cutter leaves his/her work, stops work for any appreciable length of time, or when the arc welding cutting machine is moved, the power supply to the equipment shall be turned off.

f) To avoid overheating, ensure proper contact of work leads and connections and remove any metal fragments from magnetic work clamps.

3) Gas Welding:

a) Inspect pressure gauges, hoses, and torches daily for defects. Ensure all fittings are tight. If cylinders, valves, regulators, plugs, or other safety devices are damaged, they must be tagged out of service and removed from the work area.

b) When parallel sections of oxygen and fuel-gas hoses are taped together, not more than four (4) inches out of each 12 inch length shall be covered by tape.

c) Hoses, cables, and other equipment shall be kept clear of walkways, ladders, and stairs.

d) Flashback arrestors shall be installed at the gauge on all oxygen and fuel gas setups if not built in the torch handle by the manufacturer.

e) Cylinder valves must be opened slightly and closed immediately before a regulator is connected to the cylinder. This is called “cracking” which clears the valve of dust and dirt. The worker must stand to the side of the outlet, not in front. Valves must be cracked away from welding work, sparks, flames, or other sources of ignition.

f) Valves must not be opened more than 1½ turns. If a wrench is required, it must stay in position in case of emergency for a quick shut off.

g) When work is complete, cylinders must be closed and the gas released from the regulator before removing the regulator.

h) Oxygen cylinders and fittings must be kept free of oil or greasy substances and may not be handled with oily hands or gloves.

i) Clogged torch tip openings must be cleaned with approved cleaning wires, drills, or other devices designed for that purpose.

j) Torches may be lit only with friction lighters or other approved devices. Matches, small butane lighters, or hot work shall not be used to ignite torches.

4) Compressed Gas Cylinders:

a) Compressed gas cylinders must be visually inspected before use for leaks, cracks, and other damage. If a cylinder is thought to be defective, it should be returned to the supplier for replacement. Under no circumstances should workers attempt to repair defective cylinders.

b) Compressed gas cylinders shall be legibly marked with either the chemical or trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable.

c) Cylinders must be kept in an upright position and secured at all times.

d) Cylinders shall be kept far enough away from actual welding or cutting operations so that sparks, hot slag, or flame will not reach them. When this is impractical, shields shall be provided.

e) Cylinders shall not be placed where they can become part of an electrical circuit.

f) Cylinders containing oxygen or other fuel gas shall not be taken into confined spaces.

g) Cylinders shall be stored in an upright position in a safe, dry, well-ventilated place prepared and reserved for the purpose.

h) Cylinders shall not be kept in unventilated enclosures such as gang boxes, lockers, or job trailers.

i) Cylinders shall not be stored in the same area as flammable substances, such as oil and volatile liquids or near sources of heat, such as radiators or furnaces.

j) Cylinders shall not be stored near elevators, gangways, stairwells, or other places where they can easily be knocked down or damaged.

k) Oxygen cylinders should not be stored within 20 feet of highly combustible materials, oil, grease, wood shavings, or cylinders containing flammable gases. If closer than 20 feet, cylinders should be separated by a five (5) foot wall with a fire-resistance rating of at least 30 minutes.

l) When acetylene cylinders are transported by powered vehicles, they must be in a vertical position.

m) Cylinders must be moved or transported in special racks or cradles to prevent them from being dropped or falling over in transit.

n) Lifting cylinders from one level to another is not permitted by means of attaching rope, cable or chain chokers, or slings. Only enclosed cages or carrying cradles designed for this purpose are to be used.

o) Workers shall not attempt to lift compressed gas cylinders, empty or full. Cylinders should be moved on cylinder carts designed for such purpose or rolled on their bottom edge.

p) Cylinder valves will be shut off and valve caps in place during transit from location to location. Cylinders shall not be hoisted by the valve or valve cap.

q) Cylinders that have been dropped during transit shall be taken out of service and returned to the supplier for inspection.

r) Cylinder manifolds shall be installed under the supervision of an experienced person and must comply with proper practices in reference to their construction and use.

5) Training:

a) Only trained and authorized personnel should be allowed to operate welding and cutting equipment.

b) Training should include:
   i) The specific job procedure related to the type of welding and/or cutting;
   ii) Review of OSHA 1926.350;
   iii) Safe use, handling, and storage of compressed gas cylinders;
   iv) The duties and requirements of a fire watch;
   v) The proper use of fire extinguishers; and
   vi) The use of Hot Work Permits (if required).

6) Hot Work Permit: When required by the owner or on projects where fire poses a significant risk of damage, a Hot Work Permit may be required by the project-specific safety plan. See *Fire Protection* Section II, Part J for permit requirements.

J) FIRE PROTECTION

Fires can often wreak havoc on a job site by causing thousands of dollars in property loss and threatening the lives of workers. Fire safety becomes every worker's responsibility and starts with a good housekeeping program.

1) General Fire Prevention Requirements:

a) No welding, flame cutting, or other operation involving the use of flame, arcs, or sparking devices will be permitted without adequate protection and shielding.

b) All flammable or combustible material shall be removed from the immediate work area. If removal is impossible, all flammable or combustible materials shall be protected with a fire blanket or suitable noncombustible shield to prevent spark, flames, or hot metal from reaching the flammable or combustible materials.

c) All oil-soaked rags, papers, and other combustible materials shall be removed from any building at the close of each day's work, or more often if necessary, and shall be placed in metal containers with self-closing lids.

d) Temporary heating devices shall be inspected regularly. Heating devices shall not be used to dry clothes or other flammable materials.

2) Storage and Usage of Flammable Liquids:

a) Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Portable fuel containers must be UL labeled safety cans that have flame arrestors, spring loaded spouts, and vents. Plastic fuel containers shall not be used on TRAMMELL CROW projects.

b) Portable containers of flammable liquids shall not exceed five (5) gallons.

c) Not more than a one-day supply of flammable liquids, such as oil, gasoline, paint or paint solvent, shall be brought into any building at any one time.

d) No more than 25 gallons of flammable or combustible liquids shall be stored in a room outside of an approved storage cabinet.

e) Not more than 60 gallons of flammable or 120 gallons of combustible liquids shall be stored in any one storage cabinet. Not more than three such cabinets may be located in any single storage area.

f) Flammable or combustible liquids shall not be stored in areas used for exits, stairways, or normally used for the safe passage of people.

g) Portable outdoor storage tanks shall be a minimum of 20 feet from any building or structure and any yard storage of building materials.

h) All tanks must be double-walled or have secondary containment of 110% capacity to prevent leaks from spilling onto the ground.

i) Tanks must be grounded and bonded when dispensing flammable liquids from one tank to another.

j) No flames, hot work activity, or smoking will be permitted in flammable or combustible liquid storage areas. Areas which constitute a fire hazard shall have conspicuously posted "No Smoking or Open Flame".

k) Maintenance and operating practices of all flammable liquid equipment shall be in accordance with established procedures, which will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly.

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3) Automatic Sprinkler Protection:

a) If the building includes automatic sprinkler protection, the installation shall closely follow the construction and be placed in service as soon as applicable laws permit following each story.

b) Clearance of at least 36 inches shall be maintained between the tip level of the stored material and the sprinkler head.

4) Fire Extinguishers:

a) A fire extinguisher rated not less than 2A shall be provided for each 3,000 square feet of the protected building area. Travel distance from any point of the protected area to the nearest fire extinguisher shall not exceed 100 feet.

b) One or more fire extinguishers rated not less than 2A shall be provided on each floor. At least one fire extinguisher shall be located adjacent to stairways.

c) A fire extinguisher rated not less than 10B shall be provided within 50 feet of wherever more than five (5) gallons of flammable or combustible liquids or five (5) pounds of flammable gas are being used on the job site.

d) At least one fire extinguisher rated not less than 20-B shall be located not less than 25 feet, no more than 75 feet, from any flammable liquid storage area outside.

e) Fire extinguishers shall be visually inspected monthly, receive an annual maintenance check, and be serviced as needed.

f) All workers, before initial assignment and annually, should be properly trained in the use of fire extinguishers. Generally, this training can be covered in a weekly safety meeting by the acronym **PASS**:
- **P**ull the pin;
- **A**im the nozzle;
- **S**queeze the handle; and
- **S**weep back and forth at the base of the fire.

5) Fire Hydrants and Fire Lanes: In the case of a large fire, it is extremely important that the local fire department has unobstructed access to the building and/or fire protection systems, such as fire hydrants. Therefore, these areas shall be marked and proper clearances shall be maintained.

6) Hot Work Permit: When required by the owner or on projects where fire poses a significant risk of damage, a Hot Work Permit may be required by the project-specific safety plan. In the case that Hot Work Permits are required, the subsequent procedures must be followed:

a) The written permit may be obtained by the contacting the Safety Department.

b) The written permit must be completed, signed by the TRAMMELL CROW supervisor, and posted at the area where the work is to take place.

c) A fully-charged and operable fire extinguisher, appropriate for the type of possible fire, must be available at the work station.

d) The worker performing the hot work activity must inspect the work area for flammable or combustible materials, liquids, or gases. All possible fire hazards must be removed from the work location or properly protected.

e) If combustible material is closer than 35 feet to the point of operation and cannot be relocated, a fire watch shall be assigned to the work location. The fire watch must remain at the work location for 30 minutes after the hot work activity has been completed.

f) Openings or cracks in walls, floors, or ducts must be tightly covered to prevent the passage of sparks to the adjacent areas.

g) Upon completion, the permit shall be removed and returned to the TRAMMELL CROW supervisor for filing.

K) EXCAVATIONS AND TRENCHING

Trenching and excavation procedures are performed thousands of times each day. Unfortunately, cave-ins are a major source of fatalities within the construction industry. Therefore, contractors must take all necessary steps to protect employees working in excavations or trenches.

1) Underground Utilities, Surface Encumbrances and Contaminated Soils:

a) All surface encumbrances that are located so as to create a hazard to workers shall be removed or supported as necessary. Surface encumbrances may include rocks, trees, or any other object that is likely to roll or fall into the excavation.

b) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure stability.

c) Support systems shall be installed and removed in a manner that protects workers from cave-ins, structural collapses, or from being struck by members of the support systems.

d) The estimated location of utility installations, such as water, sewer, telephone, electric, fuel, and all other underground installations shall be determined prior to opening an excavation. Utility companies or owners shall be contacted and asked to establish the location of the all underground installations in accordance with state and federal law. Generally this can be accomplished by using the state's one-call system or 811. If the exact location of underground utilities cannot be determined, work may proceed provided the contractor does so with caution, and provided detection equipment or other acceptable means to locate utility installations is used.

e) While excavations are open, underground installations shall be protected, supported, or removed as necessary to safeguard both the utility and workers.

f) If, during the excavation, oil and/or hazardous material (OHM) impacted soil is encountered, a Soil Management Plan shall be developed. All workers coming in contact with the OHM material must protect themselves by following the procedures and wearing the PPE outlined in the Soil Management Plan.

2) Inspections:

a) Daily inspection of excavations, the adjacent areas, and protective systems shall be made by the Competent Person for evidence of a situation that could result in a cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. All inspections shall be conducted by the Competent Person prior to the start of work and as needed throughout the shift. Inspections will be made after every rain storm or any other increasing hazard.

b) In the case where a Competent Person will be classifying soils for the purpose of protecting workers, the determination of classification must be based on at least one visual analysis and one manual analysis.

3) General Requirements:

a) All excavations greater than five (5) feet in depth shall be protected from cave-in.

b) All spoil piles or other materials or equipment that pose a hazard by falling or rolling into the excavation must be stored a minimum of two (2) feet from the sides of the excavation. These materials or equipment must not block the safe means of egress.

c) If a trench or excavation is four (4) feet deep or greater, stairways, ramps, or ladders will be used as a safe means of access and egress. For trenches, workers must not have to travel any more than 25 feet of lateral travel to reach the means of egress.

d) All walkways crossing excavations greater than six (6) feet in depth shall be protected with an adequate guardrail system. All walkways must be a minimum of 18 inches wide.

e) Structural ramps used solely by workers as a means of access shall be designed by a Competent Person. Structural ramps used for access or egress of equipment shall be designed by a Competent Person qualified in structural design.

f) No worker will perform work in an excavation where water is accumulating unless adequate measures are used to protect the workers. Water removal equipment shall be monitored by a Competent Person to ensure proper operation.

g) Excavations and trenches four (4) feet or deeper that have the potential for toxic substances or hazardous atmospheres will be tested at least daily. If the atmosphere is inadequate, the excavation or trench will be treated as a permit-required confined space. See *Confined Space Entry* Section II, Part T of this manual for confined space entry procedures.

h) When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs.

i) No worker shall be permitted underneath loads handled by lifting or digging equipment. Workers shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when vehicles are equipped with adequate cab protection.

j) If work is in or around vehicular traffic areas, workers must be supplied with and wear reflective vests. Signs and barricades must be utilized to ensure the safety of workers, vehicular traffic, and pedestrians.

k) An adequate barrier to safeguard the public, to warn vehicular traffic, and to prevent unauthorized entry shall protect excavations where needed.

l) Dust conditions should be kept at minimum level by use of water or other safe means.

4) Protective Systems: The three basic protective systems for excavations and trenches are sloping and benching systems, shoring, and shields.

a) **Sloping and Benching Systems:**

i) The maximum allowable slopes for each type of soils are as follows:

Soil or Rock Type	Maximum Allowable Slope
Stable Rock	Vertical (90º)
Type A	¾ foot : 1 foot (53º)
Type B	1 foot : 1 foot (45º)
Type C	1 ½ foot : 1 foot (34º)

ii) Sloping and benching systems for excavations greater than 20 feet must be designed and stamped by a Registered Professional Engineer.

iii) No benching is allowed in type C soils. All type C soils must be sloped.

b) **Shoring Systems and Shield Systems:**

i) Designs of support systems, shield systems, and other protective systems shall be certified by a Registered Professional Engineer or shall be based on manufactured tabulated data that has been certified by a Registered Professional Engineer. All systems shall comply with 1926.652 Appendix A,C,D, and E.

ii) Removal of supports of shoring systems shall begin at and progress from the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members.

iii) Workers shall not be allowed in shields when shields are being installed, removed, or moved vertically.

iv) Shoring and shielding systems can be two (2) feet above the bottom of an excavation if they are designed to resist loads at the full depth and if there are no indications of caving below the support of shield.

v) When shoring or shielding is used in combination with sloping, the support or shield must extend at least 18 inches above the point where proper sloping begins.

vi) The open end of all shored or shielded excavations must be protected from any exposed excavation wall.

5) Training:

a) The Competent Person must have specific training in the hazards associated with excavations and trenches, and be able to demonstrate his/her knowledge about soil analysis and the use of protective systems. In addition, the Competent Person must have the authority to take immediate action if a hazard exists. Training must be documented and available to TRAMMELL CROW upon request.

b) All other workers performing working in and around the excavation must be trained in the recognition of hazards associated with trenching and excavating.

6) Excavation / Trenching Permit: When required by the owner or on projects where trenching poses a significant risk due to soil type or other conditions, an Excavation / Trenching Permit may be required.

a) The Excavation Permit may be obtained by contacting the Safety Department. The written permit must be completed by the Competent Person and posted at the area where the work is to take place.

b) Upon completion, the permit shall be removed and returned to the TRAMMELL CROW supervisor for filing.

L) MATERIAL HANDLING AND RIGGING

Material handling is the largest single cause of lost workday injuries in construction. Workers should be properly trained in the proper use, storage, rigging, and handling of materials.

1) Safe Lifting:

a) All workers shall obtain assistance in lifting heavy objects. When possible, mechanical equipment should be used to assist in material handling.

b) When workers must lift heavy objects, they should:
- Crouch or squat with their feet close to the object to be lifted;
- Secure good footing;
- Take a firm grip;
- Keep the back vertical; and
- Lift by bending at the knees and using the leg and thigh muscles.

c) Workers shall not attempt to lift compressed gas cylinders, empty or full. Cylinders should be moved on cylinder carts designed for such purpose or rolled on their bottom edge.

d) No worker shall be allowed under a suspended load. Workers must stand clear of loads about to be lifted.

e) Tag lines shall be used when hoisting large loads, unless the use of a tag line creates an unsafe condition

2) Storage:

a) All materials stored in tiers shall be stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, rolling, or collapse.

b) Materials stored inside the building should not be placed within six (6) feet of any hoistway or inside floor opening, nor within 10 feet of an exterior wall which does not extend above the top of the material stored.

c) Materials may not be stored or leaned against a column unless they can be protected from accidental / inadvertent fall over.

d) Materials may not be stacked more than two pallets high.

e) Brick stacks shall not be more than seven (7) feet in height. When a loose brick stack reaches a height of four (4) feet, it shall be tapered back two (2) inches in every foot of height above the four (4) foot level.

f) When masonry blocks are stacked higher than six (6) feet, the stack shall be tapered back one-half block per tier above the six (6) foot level or shall be secured from tipping. No stack shall exceed 10 feet.

g) Structural steel, poles, pipe, bar stock, and other cylindrical materials must be chocked to prevent spreading.

h) Dunnage, cribbing, banding, and other materials used for transportation of materials to the site must be cleared from work areas on a regular basis. Lumber must have nails pulled or bent over before disposing.

3) Rigging Equipment:

a) Rigging equipment shall be inspected daily prior to use. Defective rigging shall be removed from service and tagged out.

b) Rigging equipment shall not be loaded in excess of its recommended safe working load.

c) Alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer.

d) Wire rope slings shall not be kinked or knotted. Slings showing signs of “bird-caging” or having heat damage should be removed from service.

e) Banding and other materials used for transportation of materials may not be used for rigging unless specifically designed for such purpose.

f) All hooks used for overhead lifting shall have a working safety latch.

g) Manila rope and other synthetic rigging material shall not be used in or near operations involving the use of corrosive substances.

h) Makeshift devices formed from bolts, rods, and reinforced steel, for example, shall not be used.

i) Spreader bars shall be tagged or stamped with their rated capacity.

4) Training: A Qualified Rigger can perform simple, repetitive rigging tasks when the load weight, center of gravity, the rigging, and rigging configuration are provided to or known by the rigger through experience or on-the-job training prior to the rigging activities.

a) All workers performing rigging tasks must be properly trained.

b) Training shall include, at the minimum:
   i) Pre-use inspection of rigging equipment;
   ii) Basic knowledge and use of hitch configurations, capacities, and basic knots;
   iii) Recognized associated hazards; and
   iv) Crane and hoist signaling.

M) TRAFFIC CONTROL, MOTORIZED VEHICLES AND FORK TRUCKS

Vehicles and equipment that are improperly operated can present a serious hazard on a work site. Operators must be trained and abide by all of the following requirements of this section.

1) Traffic Control:

a) Traffic control devices shall be installed and maintained as prescribed by OSHA and by DOT Federal Administration's Manual Uniform Traffic Control Devices (MUTCD).

b) Contractors performing work requiring traffic control devices shall ensure that all operations have routine inspections of traffic control elements for acceptable levels of operation.

c) When traffic exposures are such that signs, signals, or barricades do not provide the necessary protection on, or adjacent to, a highway or street, traffic regulators *(Signal Person)* or other appropriate traffic controls shall be provided. A Qualified Person who is responsible for the project traffic control shall determine modification of traffic controls, such as additional signs or devices, or a change in work operations.

d) Signaling directions by traffic regulators shall conform to the provisions of OSHA and DOT.

e) If signaling by a traffic regulator is necessary on a project that is within a public right-of-way, then a hand-held paddle sign shall be used. The hand-held paddle sign shall:
- Have two faces and be attached to a staff of suitable design that will allow the entire unit to be held and controlled by one traffic regulator;
- The bottom of the sign shall be a minimum of six (6) feet above the roadway surface;
- The sign shall be fastened to the staff so that no part of the legend is obscured;
- The portion of the staff within the sign face shall match the sign colors; and
- The sign shall not be less than 18" x 18" and the letters shall have a minimum height of six (6) inches.

f) In periods of darkness, appropriate lighting shall be used to illuminate the traffic regulator and the traffic regulator station. The lighting shall be as required in OSHA and DOT standards. Appropriate lighting means lighting that illuminates the traffic regulator so that he/she is visible to oncoming traffic and does not impair either the traffic regulator's or motorists' visibility due to blinding or shadowing.

g) The traffic regulator must be properly trained in the use of the traffic control devices.

h) The traffic regulator must wear at all times a high visibility shirt or vest with reflective material.

2) General Requirements for Motorized Vehicles:

a) All vehicles and equipment should be inspected at the beginning of each shift.

b) All equipment left unattended at night, adjacent to a highway in normal use, or adjacent to construction areas in progress, shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors to identify the location of the equipment.

c) Parked equipment must not block emergency equipment such as fire equipment, fire lanes, or fire hydrants.

d) All cab glass shall be safety glass or equivalent that introduces no visible distortion affecting the safe operation of the machine or equipment.

e) All vehicles shall be equipped with an adequate audible warning device at the operator's station and in an operable condition.

f) All vehicles with an obstructed view to the rear must have a reverse signal alarm audible above the surrounding noise level.

g) All equipment should be shut off before the operator leaves the operating station.

h) Vehicles used to transport workers shall have seats firmly secured and adequate for the number of workers to be carried.

i) With the exception of vehicles without rollover protection, seat belts shall be installed and worn on all motor vehicles, including fork trucks.

j) When discharging from a slope, a ready-mix truck's wheels shall be blocked and the brakes set to prevent movement.

k) Recreational ATV's shall not be used on TRAMMELL CROW projects unless approved by the Safety Director. When such use is approved, the manufacturer's operating instructions must be followed, including the use of a helmet.

l) The speed limit on a TRAMMELL CROW project is 10 mph, unless otherwise posted.

3) Fork Trucks:

a) No worker shall operate a fork truck without successfully completing fork truck training. An experienced and Qualified Person shall conduct all training. Training shall be documented in writing and the operator should carry his/her card to verify training.

b) Lift capacity will be clearly marked on all fork trucks. The operator will ensure that loads do not exceed rated weight limits.

c) The forks or mast of a fork- ruck shall not be used for "free rigging". Only approved attachments may be used for such operations.

d) Fork trucks and similar pieces of equipment shall not be used to support scaffold platforms unless they have been specifically designed by the manufacturer for such use.

e) No modifications or additions which affect the capacity or safe operation of the equipment shall be made without the manufacturer's written approval.

N) CRANES AND HOISTS

Many types of cranes, hoists, and rigging devices are used on TRAMMELL CROW projects for lifting and moving of materials. TRAMMELL CROW's policy is to maintain a safe workplace for its employees and subcontractors. Therefore, it cannot be overemphasized that only qualified and licensed individuals shall operate these devices. The safety rules and guidance in this policy apply to all operations on TRAMMELL CROW projects that involve the use of cranes and hoists.

1) General Requirements:

a) Hoisting equipment such as cranes shall not be used unless ground conditions are firm, drained, and graded to a sufficient extent necessary to maintain manufacturer's recommendations in regards to adequate support and degree of level of the equipment being used.

b) All underground hazards within the setup area must be located, including voids, tanks, and utilities. Site drawings, as-builts, and soil reports may be used to identify such hazards.

c) An Assembly/Disassembly (A/D) director must be on site and direct the assembly and disassembly of all cranes. The A/D director must be both competent and qualified to direct such operations.

d) Lifts that exceed 75% of the crane capacity or lifts that involve the use of more than one crane must have a written lift plan. The plan must be developed by a Qualified Person and submitted to TRAMMELL CROW before proceeding with the lift.

2) Power Line Safety:

a) All power lines shall be presumed energized unless the utility owner/operator has confirmed that the power line is de-energized and is visibly grounded at the work site.

b) Cranes, hoists, or loads shall not be assembled, disassembled, or operated closer than 20 feet to a power line that carries up to 350 kilovolts and 50 feet to a power line that carries up to 1,000 kilovolts. Cranes that must encroach closer to a power line must de-energize and ground the power line or follow the approach distances in the following table:

Minimum Clear Distances	
Voltage (Nominal, KV, AC)	**Minimum Clear Distance (Feet)**
Up to 50	10
Over 50 to 200	15
Over 200 to 350	20
Over 350 to 500	25
Over 500 to 750	35
Over 750 to 1,000	45
Over 1,000	Established by utility owner/operator or Registered Professional Engineer

c) If the table above is used or if the equipment's maximum working radius is closer than 20 feet, the responsible contractor must:
   i) Meet with the operator and other workers to review the location of the power line and the steps that will be implemented to prevent further encroachment and electrocution;
   ii) Use non-conductive taglines;
   iii) Use an elevated warning line or barricade in view of the operator at the minimum clear distance requirement; and
   iv) Provide a proximity alarm, spotter, a range limiting device, or an insulating link.

d) Operations that involve any part of a crane or hoist to be closer than the clear minimum distances in the table above to an energized power line are not permitted unless approved by TRAMMELL CROW's Safety Director. Such operations must follow the requirements of 1926.1410.

Minimum Clear Distances While Traveling (No Load)	
Voltage (nominal, KV, AC)	**Minimum clear distance (feet)**
Up to 0.75	4
Over .75 to 50	6
Over 50 to 345	10
Over 345 to 750	16
Over 750 to 1000	20
Over 1,000	Established by Utility owner/operator or registered professional engineer

e) When equipment must be moved under power lines, the following clear minimum distances must be maintained.
   i) The boom, mast, and support system shall be sufficiently lowered to maintain minimum clear distances.
   ii) The effects of speed and terrain on equipment movement shall be considered, and a spotter must be used to effectively communicate with the operator and assist in maintaining clear distance requirements.

3) Inspections:

a) A Qualified Person must inspect each crane and hoist as follows:
   i) After any repair or adjustments that relates to the safe operation of such equipment.
   ii) Upon completion of assembly or on any piece of equipment that has been idle for more than three (3) months.
   iii) Annually (documented).

b) A Competent Person must inspect each crane and hoist as follows:
   i) Before each shift.
   ii) Monthly (documented).

c) The annual inspection and monthly inspections must include the items checked, the results of the inspection, and the name and signature of the person who conducted the inspection. Inspections must be on site and available upon request.

d) More frequent inspections may be required if the severity of use or conditions of the equipment are such that there is a reasonable probability of damage or excessive wear.

e) Any crane or control that is found to be damaged or is not functioning properly and creates a safety hazard shall be tagged out and removed from service until repairs are made.

4) Wire Rope:

a) A Competent Person must inspect each wire rope in use as follows:
   i) During the course of each shift.
   ii) Monthly (documented).

b) A Qualified Person must inspect each wire rope annually and document this inspection.

c) All deficiencies that create a safety hazard must be immediately corrected before returning to use, or the wire rope must be removed and tagged out of service.

d) Wire rope must be designed to have, in relation to the equipment's rated capacity, a sufficient breaking force and design factor to prevent sudden rope failure.

5) Safety Devices and Operational Aids:

a) The following safety devices are required on all cranes:
   i) Crane level indicator.
   ii) Boom stops and jib stops (except derricks and hydraulic booms).
   iii) Locks for all equipment with foot pedal brakes.
   iv) Integral holding device or check valve for all hydraulic outrigger or stabilizer jacks.
   v) Horn.
   vi) Fire extinguisher rated not less than 5 BC.

b) The following operational aids are required on all cranes:
   i) Boom hoist limiting device.
   ii) Luffing jib limiting device.
   iii) Anti two-blocking device.
   iv) Boom angle or boom radius indicator.
   v) Load weighing device.

6) Operations:

a) All operations involving cranes must comply with the manufacturer's specifications and limitations. Where manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a qualified engineer competent in this field, and such determinations will be appropriately documented and recorded with the project files.

b) There shall be no modifications or additions that affect the capacity or safe operation of the equipment made without the written approval from the manufacturer.

c) Attachments used with cranes shall not exceed the capacity, rating, or scope recommended by the manufacturer.

d) Operating procedures, including rated capacities (load charts), recommended operating speeds, special hazard warnings, and instruction and operation manuals must be available in the cab at all times to the operator.

e) Cranes must not be operated in excess of their rated capacities.

f) Crane operators must not engage in any activity that diverts his/her attention while operating the equipment. This includes the use of cellular phones except when used for signal communications.

g) The operator must not leave the controls while the load is suspended unless the area is barricaded and no workers are exposed to the suspended load, and the Competent Person has determined that it is safe to do and implements measures necessary to restrain the boom hoist and telescoping, load, swing, and outrigger or stabilizer functions.

h) Cranes shall not be operated in severe weather. Crane operating capacities should take into consideration the effects of wind, ice, and snow.

i) The weight of all loads must be known before lifting.

j) The boom or other parts of the equipment must not contact any obstruction.

k) Cranes shall not be used to pull or drag loads sideways.

l) Traveling with a load is prohibited, unless the crane has been specifically designed for such operation.

m) The crane operator has the authority to stop and refuse to handle loads until a Qualified Person has determined that safety has been assured.

n) Hand signals to operators shall be those prescribed by OSHA Subpart CC Appendix A for the type of crane in use. An illustration of the hand signals shall be posted on the job site. Radios may be used where hand signal are not feasible. The operator's reception of radio signals must be by a hands-free system.

o) Accessible areas within the swing radius of the rear of the rotating superstructure of the crane shall be barricaded in such a manner as to prevent a worker from being struck or crushed by the crane. Where barricades are not feasible, a combination of warning signs and training shall be used.

p) Hoisting routes should minimize the exposure of workers to falling loads. No workers should be allowed in the fall zone except:
   i) Workers engaged in hooking, unhooking, or guiding a load.
   ii) When engaged in the initial attachment of the load to a component or structure.
   iii) When operating a concrete hopper or concrete bucket.

q) Boom and load line free-fall is prohibited where workers' exposure to falling loads exist.

r) All crane and hoist hooks shall have self-closing latches.

s) All loads must be rigged by a Qualified Rigger.

t) Tag lines must be used when loads must traverse long distances or must otherwise be controlled.

7) Fall Protection:

a) For non-assembly / disassembly work, all workers who are on a walking or working surface with an unprotected side or edge more than six (6) feet above a lower lever shall be protected by personal fall arrest or fall restraint systems, except for workers on a horizontal lattice boom or for workers engaged in assembly or disassembly work where the protective fall distance is 15 feet or more.

b) A personal fall arrest system is permitted to be anchored to the crane hook as long as the setup and rated capacity of the crane exceeds 5,000 pounds, there is no load on the hook other than the equipment used for the fall arrest system, and the crane operator has been informed that the crane hook is being used for such purpose.

8) Qualifications and Training:

a) Competent and Qualified Persons: The Competent Person and Qualified Person must be able to demonstrate their qualifications by recognized degree, certificate, or professional standing.

b) Operators: Cranes shall only be operated by operators who have been certified by an accredited crane operator testing organization.
   i) Operators must be certified based on the type of equipment and capacity that will be used.
   ii) Operators must carry their certification with them at all times and show it upon request.

c) Signal Person: Each signal person must be properly trained and have a certification showing such training.

d) In addition to the training above, all workers that are subject to the following conditions must have training in these specific areas:
   i) Overhead power lines
   ii) Crush and pinch point hazards
   iii) Tag out

e) All training should be documented and provided to TRAMMELL CROW representative upon request.

9) Suspended Personnel Platforms: It is TRAMMELL CROW's policy that suspended personnel platforms are not to be used unless approved by the company Safety Director. In the case that such approval is given, the design and use of such platform shall be in strict adherence with 1926.1431.

10) Tower Cranes: Tower cranes are not common on TRAMMELL CROW job sites. However, if a tower crane is used, it must be erected, operated, inspected, and dismantled in accordance with 1926.1435.

11) Overhead and Gantry Cranes: All overhead and gantry cranes shall be plainly marked with the rated load capacity on each side and shall be clearly legible from the ground or floor from which it is being used.

12) Rigging:

a) All rigging performed during assembly and disassembly must be done by a Qualified Rigger.

b) All rigging equipment shall be inspected daily before use. Defective equipment is to be removed from service or destroyed to prevent inadvertent reuse. The load capacity limits shall be stamped or affixed to all rigging components.

c) Nylon slings with abnormal wear, torn stitching, broken or cut fibers, or deterioration shall be removed from service.

d) Wire-rope slings with kinking, crushing, bird caging, cracks, deformation, or evidence of heat damage shall also be removed from service. All wire-rope slings with six randomly broken wires or three broken wires in one strand of rope in a single lay shall be removed from service.

e) All hooks opened more than 15% at the throat or twisted sideways more than 10° from the plane of the unbent hook shall be removed from service. All crane and hoist hooks shall have safety latches.

f) Alloy steel chain slings with cracked, bent, or elongated links or components shall be removed from service.

O) CONCRETE AND MASONRY

Concrete and masonry construction is an integral part of nearly every TRAMMELL CROW job. Therefore, this policy has been developed in an effort to eliminate hazards associated with this type of work.

1) General Requirements for Concrete and Masonry Construction:

a) All reinforcing steel and form pins that present an impalement hazard must be capped with "approved" rebar caps. Mushroom caps are designed for scratch protection and are not sufficient for impalement hazards.

b) Workers are required to wear proper clothing, boots, gloves, hard hat, and safety glasses to prevent cement burns.

c) No worker shall be allowed to apply concrete through a pneumatic hose unless the worker is wearing protective head and face equipment.

d) Blades of concrete and masonry saws must be covered with a semi-circular enclosure.

e) Wire mesh rolls shall be secured at each end or turned over to prevent recoiling.

f) Powered trowels must have pressure switches that shut off when hand pressure is removed.

g) The handles of a concrete buggy shall not extend horizontally beyond the wheels on either side of the buggy.

h) A concrete bucket that is equipped with a hydraulically or pneumatically operated gate shall have a positive safety latch or similar safety device installed to prevent premature or accidental dumping.

i) Riding on concrete buckets is prohibited. No workers shall be allowed to work under concrete buckets while buckets are being elevated or lowered into position.

j) Bull float handles constructed of non-conductive material shall be used where there is a possibility of coming in contact with energized electrical conductors.

k) When discharging from a slope, a ready-mix truck's wheels shall be blocked and the brakes set to prevent movement.

l) Formwork, reinforcing steel, and vertical structures shall be designed, fabricated, erected, supported, braced, and maintained so that it will be capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.

m) All shoring equipment shall be inspected prior to erection and immediately prior to, during, and immediately after the placement of concrete. Any shoring equipment that is found to be damaged, displaced, or weakened shall be immediately reinforced or re-shored.

n) Manufacturer's recommendations, drawings, or plans for the jack layout, formwork, working decks, shoring, bracing, and scaffolds shall be available at the job site.

o) Reinforcing steel shall not be used as a scaffolding hook, stirrup, or as a load-bearing member in a lifting device.

p) Forms and shores (except those on “slab on grade” and slip forms) shall not be removed until the concrete gains sufficient strength to support its weight and superimposed loads.

q) No construction loads will be placed on a concrete structure or portion of a concrete structure unless, based on information received from a Qualified Person, that the structure or portion of the structure is capable of supporting the loads.

2) Masonry Construction Requirements:

a) A Limited Access Zone (LAZ) shall be established whenever a masonry wall is being constructed. The LAZ must:
- Be established on the unscaffolded side of the wall;
- Be equal to the height of the wall plus four (4) feet;
- Shall run the entire length of the wall;
- Restrain access to only those workers engaged in constructing the wall; and
- Remain in place until the wall is adequately braced or supported.

b) Unless specifically designed otherwise, masonry walls greater than eight (8) feet in height shall be adequately braced.

c) Masonry wall bracing shall be designed by a Registered Professional Engineer or shall be in accordance with the designs established by the Masonry Institute of America.

3) Tilt-Wall Construction Requirements:

a) Lifting inserts which are embedded or attached to tilt-up panels shall be capable of supporting at least two times the maximum intended load.

b) Lifting hardware shall be capable of supporting at least five (5) times the maximum intended load.

c) Precast concrete wall units and tilt-up panels shall be adequately braced until permanent connections are completed. Bracing designs shall be approved by a Registered Professional Engineer.

d) No worker shall be allowed under precast concrete members being lifted or tilted into position, except those workers required for the erection of those members.

P) STEEL ERECTION

Steel erection continues to be a high hazard occupation. However, planning and forethought can provide workers with a safer working environment that will allow contractors to maximize productivity and minimize costs due to lost time accidents.

1) Site Layout:

a) The steel erector shall not proceed with steel erection until he/she has received written notification indicating that 75% of the designed strength of all concrete and masonry footings, piers, and walls has been achieved.

b) All repairs, replacements, and modifications to anchor bolts shall be approved by a Structural Engineer. Written notification of repairs will be provided to the steel erector.

c) An adequate road for the movement of equipment shall be provided.

d) An adequate "laydown" area that is firm, properly graded, drained, and readily accessible to the work must be provided for the storage of steel and other materials.

2) Hoisting and Rigging:

a) Cranes being used in steel erection must be visually inspected daily.

b) A Qualified Rigger shall inspect rigging before each shift.

c) The headache ball, hook, or load shall not be used to transport personnel.

d) Bundle packaging and strapping shall not be used for hoisting, unless specifically designed for such use.

e) Hooks shall have safety latches that are operable at all times.

f) Loads shall not be hoisted over workers, with the exception of connectors who are engaged in the initial connection of the steel, or workers who are necessary to hook or unhook the load.

g) Multiple lift rigging is permitted provided the crane manufacturer's specification or limitations does not prohibit such loads.

h) No more than five members shall be hoisted during multiple lift rigging. Each member shall be a minimum of seven (7) feet apart.

i) The forks or mast of a fork truck shall not be used for "free rigging". Only approved attachments may be used for such operations.

3) Structural Steel Assembly:

a) The permanent floors shall be installed as the erection of structural members progress. A fully-planked or decked floor shall be maintained within two stories or 30 feet, whichever is less.

b) At no time shall there be more than eight (8) stories between the erection floor and the uppermost permanent floor. At no time shall there be more than four (4) floors or 48 feet, whichever is less, of unfinished bolting or welding above the foundation or uppermost permanently secured floor.

c) Shear connectors shall not be installed until after the metal decking.

d) No bundles of metal decking shall be placed on the joist until all bridging has been installed and anchored and all joist bearing ends are attached.

e) Framed metal deck openings must have structural members turned down to allow for continuous deck installation. If holes and openings are cut, they must be covered immediately (preferably with metal decking). Hole covers must support twice the anticipated working load, be labeled “HOLE” or “COVER”, and shall be secured to prevent displacement.

f) Smoke, dome, or skylight fixtures are not considered hole covers unless they meet the requirement of a sufficient hole cover.

g) All columns shall be leveled and secured by a minimum of four anchor bolts prior to beam attachment. Solid web joists shall not be released from load line until members are secured with at least two bolts per connection. A Competent Person shall determine if more than two bolts are necessary to ensure stability of cantilevered members.

h) Double beam connections must allow for positive securing of the first beam by a minimum of one bolt before the second beam can be attached.

i) Open web joists shall not be placed on any structural steel framework unless such framework is safety bolted or welded. When steel joists are landed, they shall be secured to prevent unintentional displacement prior to installation.

j) The erection of steel joists, steel joist girders, and bridging shall be in accordance with 1926.757.

k) Plumbing-up equipment shall be placed and removed under the supervision of a Competent Person.

l) Purlins may only be used as a walking or working surface after all permanent bridging has been installed and fall protection is provided.

m) Bolts, nuts, washers, and pins shall not be thrown. When bolts or drift pins are being knocked out, means shall be provided to keep the bolts or drift pins from falling.

n) All materials, equipment, and tools shall be secured while aloft to prevent accidental displacement. This requirement includes metal decking that has not been secured by the end of a work shift.

o) No load bearing structural member will be materially weakened by cutting, grinding, burning, or other means except in accordance with the approval of the project structural engineer of record.

4) Fall Protection:

a) All workers engaged in steel erection must be trained in fall protection. Documentation of the erector's fall protection plan and training must be on site and available to TRAMMELL CROW upon request.

b) Special training is required for those workers involved in multiple lift rigging, connecting, and workers using the Controlled Decking Zone (CDZ).

c) With the exception of connectors and workers in a CDZ, all workers performing steel erection activities must be protected from falling at heights 15 feet or greater.

d) Connectors and workers in CDZs must be protected from falling more than two stories or 30 feet, whichever is less.

e) Unsecured decking in a CDZ shall not exceed 3,000 square feet.

f) CDZs shall be clearly marked with control lines and shall not be more than 90 feet wide and 90 feet deep.

g) Upon completion of the deck, perimeter cables shall be installed at the final interior and exterior perimeter of all multi-story structures. Perimeter cables must meet the Fall Protection requirements of this manual and shall not deflect more than three (3) inches under 200 pounds of pressure in any direction.

Q) DEMOLITION AND BLASTING

Demolition involves many of the hazards associated with construction. However demolition incurs additional hazards due to unknown factors such as changes in the structure's design, materials hidden within the structural members, and unknown strengths and weaknesses of construction materials. To counter these unknowns, all workers involved in a demolition project must be fully aware of the hazards and the safety precautions to take to control the hazards.

1) General Requirements for Demolition:

a) An engineering survey shall be made by a Competent Person of the structure to determine the condition of the framing, floors, and walls and possibility of unplanned collapse of any portion of the structure.

b) During demolition, continuing inspections by a Competent Person shall be made as the work progresses to detect hazards resulting from weakened or deteriorated floors, walls, or loosened materials.

c) Walls and floors shall be shored and braced as determined by the above survey.

d) At no time shall allowable floor loads be exceeded.

e) All utilities must be completely shut off, capped, or otherwise controlled before demolition work is started.

f) Hazardous materials such as chemicals, gases, explosives, and glass shall be removed before demolition work is started. All areas presumed to be containing asbestos or lead must abated by a certified contractor prior to demolition activities that could disturb such areas, thus creating exposure to workers.

g) Stairways, passageways, and ladders shall be periodically inspected and properly illuminated for safe access.

h) Openings cut in a floor for the disposal of materials shall be no larger in size than 25% of the aggregate of the total floor area.

i) Floor openings shall be cut the full span of the arch between supports.

j) 2 x10 planks shall be provided for workers to stand on while breaking down floor arches between beams. Planks shall not be spaced more than 16 inches apart. Walkways shall be a minimum of 18 inches in width. Planks shall be laid together over solid bearings with the ends overlapping at least one (1) foot.

k) The area onto which material is dropped shall be completely enclosed with barricades not less than six (6) feet back from the projected edge of the opening above.

l) All material chutes into which workmen dump debris shall be protected by a substantial guardrail system meeting the requirements of the Fall Protection policy of this manual.

m) Material chutes at an angle greater than 45^{o} shall be fully enclosed. Chute openings shall not be greater than 48 inches and shall be kept closed when not in use.

n) All holes or wall openings where workers are subject to a fall hazard shall be protected with hole covers or guardrails. Chute openings shall be protected with guardrails. Workers shall be protected from falling by the use of a personal fall arrest system when guardrails around a chute opening are removed for dumping debris.

o) A toeboard or bumper at least four (4) inches thick and six (6) inches in height shall be provided at chute openings where mechanical equipment or wheelbarrows are used for dumping material. Curbs or stop logs shall be used to prevent mechanical equipment from running over the edge of a floor or floor opening.

p) Worker entrances into multi-story structures being demolished shall be completely protected by sidewalk sheds or canopies. All canopies shall be at least two (2) feet wide and a minimum of eight (8) feet from the face of the building.

q) Masonry walls greater than eight (8) feet in height shall be laterally braced, unless such wall was originally designed and constructed to stand without such lateral support.

r) Structural steel framing shall be cleared of all loose material as the masonry demolition progresses downward.

s) Retaining walls supporting earth or adjoining structures shall not be removed until the earth or adjoining structures is properly braced or adjoining structures have been properly underpinned.

t) Storage areas into which material is dumped shall be blocked off, except for openings necessary for the removal of material. Such openings shall be kept closed at all times when material is not being removed.

u) When balling or clamming operations are used for demolition, only those workers necessary for the performance of such operations shall be permitted in the area.

v) The weight of a demolition ball shall not exceed 50% of the crane capacity based on the angle and boom length to be used and should not exceed 25% of the nominal breaking strength of the line by which it is suspended.

w) The demolition ball shall be secured with a swivel-type connection to prevent twisting and in such a manner that the weight cannot become accidentally disconnected.

2) Blasting General Requirements:

a) Only a Qualified Person should transport, handle, or use explosives for blasting. Qualifications of Qualified Persons must be submitted to the TRAMMELL CROW Safety Director before mobilization of explosive are permitted on site.

b) Explosives not in use shall be stored in a locked magazine. Explosives shall be accounted for at all times with a written inventory. Appropriate authorities shall be notified of any loss, theft, or unauthorized entry into a magazine.

c) No explosive are to be destroyed or disposed of on site.

d) Smoking and open flames shall not be permitted within 50 feet of any explosive.

e) Warning signs shall be properly displayed around any area where blasting will take place.

f) Blasting mats, overburden, or other methods shall be used to control the throw of fragments during blasting operations.

g) Blasting operations shall only be conducted from sunup to sundown.

h) Utility owners shall be notified whenever blasting operations are in close proximity to such services.

i) A fire extinguisher should be within close proximity of any area where explosive are located including vehicles used for transporting explosives. However, no fire shall be fought where the fire is in imminent danger of contact with explosives.

j) All blasting operations shall be done in accordance with the requirements of OSHA's Subpart U (CFR 1926.900 though CFR 1926.914).

R) BARRICADE TAPE AND SIGNS

Barricade tape and signs can be effective means of warning others of potential hazards or restricting an area from entry altogether. However, the improper use and placement of these items can also create confusion and complacency. Therefore, this policy has been developed to instruct workers in the proper use of these items.

1) Barricade Tape: While there are many different types and colors of barricade tape for different purposes, this policy will focus on the two primary barricade tapes used in on construction sites.

a) **Caution Tape (Yellow/Black)** – This type of barricade tape shall serve as a "caution" to indicate to workers that a potential hazard exists. Workers may enter or pass through caution barricades upon stopping and recognizing the hazards within the barricade and using caution when passing through the barricade. Examples where caution tape may be used includes, but is not limited to:
- Excavation less than four (4) feet in depth;
- Identification of trip hazards and low hanging objects; and
- Material storage on the site.

b) **Danger Tape (Red/Black)** - This type of barricade shall indicate "danger" and that a potential serious hazard may be present. No worker, other than those who have been personally assigned to work inside the barricade, may enter without first obtaining permission from the contractor that erected the tape. Examples where danger tape may be used includes, but is not limited to:
- Overhead work;
- Scaffolding under construction; and
- Around swing radius of equipment with a rotating super structure.

2) Barricade Erection:

a) Barricade tape shall be erected at least six (6) feet on the outside of the work being performed.

b) The tape shall be suspended approximately 42 inches above the walking working surface and shall be kept taught.

c) The tape shall be suspended from metal, wood, or plastic stands or stations and should not be tied to valve handles, instrument gauges, or fire extinguishers.

d) Tape should only enclose the specific area to be protected.

e) Passageways or access ways shall not be blocked by tape unless entirely necessary. If such need arises, TRAMMELL CROW supervision shall be notified to allow coordination of access for other trades and possible changes to the emergency evacuation plan.

f) Tape shall be maintained for the duration of work requiring its usage.

g) Barricade tape must be removed upon completion of the work and the abatement of hazards.

h) Barricade tape shall not be used in lieu of a guardrail where a fall hazard exists. Such areas include perimeter protection, wall openings, holes, leading edge work, and warning lines (roof work).

3) Signs: Signs and symbols shall be visible at all times when work is being performed and shall be removed or covered promptly when the hazards no longer exist.

a) **Caution Signs** - shall be used to warn against potential hazard or caution against unsafe practices. Caution signs shall have yellow as the predominating color; black upper panel and borders; yellow lettering of "Caution" on the black panel; and the lower yellow panel for additional sign wording. Black lettering shall be used for additional wording.

b) **Danger Signs** - shall be used only where an immediate hazard exists. Danger signs shall have red as the predominating color for the upper panel; black outline on the borders; and a white lower panel for addition sign wording. Black lettering shall be used for additional wording.

c) **Exit Signs** - shall be placed at all exits used for emergency evacuation. Exit signs, when required, shall be lettered in legible red letters, not less than six (6) inches high on a white field, and the principal stroke of the letters shall be at least ¾ inch in width.

d) **Safety Instruction Signs** – shall be white with green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background.

e) **Traffic Signs and Control Devices** – shall conform to the Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways.

S) EMERGENCY ACTION PLAN

Emergency Action Plans (EAP) have been prepared so that conditions arising from emergencies and unanticipated natural events can be addressed in an organized and expedient manner. The emergency procedures and the organizational framework outlined in this program are to provide protection for lives, property, and operations through effective communication and use of on-site and local emergency services. TRAMMELL CROW recognizes the importance of an effective Emergency Action Plan and requires each job site to have a plan in writing and to effectively communicate the plan with all subcontractors.

1) EAP Program Elements:

a) TRAMMELL CROW acknowledges that all construction job sites are different by the nature of work and therefore, a single emergency action plan could never suffice for all job sites. Therefore, a specific job site EAP shall be developed by using the Emergency Action Plan form (located in the Forms Section of this manual).

b) In addition to posting this form, a job site map identifying evacuation areas shall be posted, and an air horn or other alarm system shall be identified and communicated to workers.

c) Emergency phone numbers shall be posted in each job trailer using Emergency Phone Numbers form (located in the Forms Section of this manual).

2) Reporting:

a) In the event of a fire, hazardous chemical spill, bomb threat, weather emergency, or medical emergency, divert occupants from the hazard area, and immediately report the emergency to your supervisor by providing a clear description of the location, nature, and magnitude of the emergency.

b) All emergencies shall be reported to the company Safety Director.

3) Emergency Procedures: The building emergency alarm system or a designated air horn will be the most commonly used evacuation warning system. Depending on the emergency, the following procedures should be followed:

a) **Emergency Evacuation / Shelter Procedures:**
   i) Upon receiving the alarm to evacuate or take shelter, workers should immediately cease work, secure their work area, warn others, and move in a calm orderly manner to the designated assembly / shelter area.
   ii) All subcontractor foremen will wait for their employees in the assembly / shelter areas. Foremen will ensure employees working in remote areas and in confined spaces have been alerted and have proceeded to the assembly / shelter area.
   iii) Foremen will conduct a roll call of their employees. If any workers are found to be missing, the TRAMMELL CROW Superintendent will be informed immediately of the worker's name and last known location.
   iv) Workers should not leave the assembly / shelter area until emergency personnel notify that it is safe to do so. No attempt will be made to locate missing workers until it has been determined that a search and rescue party can be reasonably protected during such search.

b) **Medical Emergencies:**
   i) In the case of severe or life threatening medical emergencies, immediately call 911.
   ii) Secure the accident site and eliminate, diffuse, or reduce potential hazards to prevent further injury.
   iii) Those trained in first aid and CPR should render treatment to those injured.
   iv) Blood and body fluids should be cleaned up using the *Blood-Borne Pathogens* Section II, Part X of this manual.

4) Training: All workers are potentially affected by workplace emergencies and should receive training in appropriate response. Each contractor is responsible for training his/her employees in the Emergency Action Plan. Training shall include the following:

a) Reporting procedures;

b) Location of emergency reporting phone numbers;

c) Emergency escape routes, assembly areas, and shelter areas;

d) The alarm system; and

e) Emergency equipment (For example fire extinguishers and man-baskets)

T) CONFINED SPACE ENTRY

This policy has been developed to protect workers from the serious hazards associated with entering and working within confined spaces such as manholes, vaults, tunnels, and tanks.

1) Definitions:

Confined Space is defined as an area that has limited means of entry or exit, is large enough for workers to enter and perform the task assigned, and is not designed for continuous worker occupancy. Examples of confined spaces may include, but are not limited to, storage tanks, pits, trenches, ventilation ducts, pits, vessels, manholes, boilers, furnaces, sewers, tunnels, attics, crawl spaces and silos.

a) **Non-Permit Confined Space:** is a confined space that does not contain, or have the potential to contain, any hazard capable of causing death or serious physical harm.

b) **Permit-Required Confined Space:** is a confined space that contains, or has the potential to contain, one or more of the following:
- An atmospheric hazard;
- An engulfment hazard;
- A configuration hazard; or
- Any other recognized serious safety or health hazard.

2) Confined Space Hazard Evaluation: Prior to entry, all confined spaces must be initially evaluated by a Competent Person to determine the extent of the hazards present. Each confined space shall be evaluated for atmospheric hazards, engulfment hazards, configuration hazards, and any other serious hazard capable of causing death or serious physical harm. If it is determined that no hazards are present, the space will be considered a non-permit confined space. When evaluating confined spaces for hazards, three different concerns should be addressed:

a) Hazards inherent to the space itself; and

b) Hazards that will be brought to the space by the job performed inside it.

c) Hazards that may exist on the outside of the space that could potenially affect the inside.

3) Permits: Before entry into a permitted space, an entry permit must be signed by the entry supervisor verifying that pre-entry preparations have been completed and that the space is safe to enter. Permits must be posted at entrances and made available to entrants before they enter a permitted space. The information gathered in completing the hazard evaluation can be used to complete the permit. A permit may not be authorized until all conditions of the permit have been met. The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit. Following completion of the permit space entry job, the supervisor must cancel the permit and send a copy to the Safety Director. A copy of our company's confined space permit may be obtained by contacting the company Safety Director.

4) Training: Before participating as a member of an entry team, each worker must be given authorization to enter the space and have received documented training. The training must provide workers with the necessary knowledge and skills needed to perform their duties safely. This training includes:

a) Identification of permit-required confined spaces;

b) Hazards associated with permit-required confined spaces;

c) Roles and responsibilities of each confined space team member;
d) Procedures and equipment of confined space entry;

e) Confined space emergency rescue; and

f) First Aid / CPR for at least one confined space team member.

5) Responsibilities of the Confined Space Entry Team:

a) **Entry Supervisor**
- i) Know the hazards that may be faced during entry;
- ii) Verify that acceptable entry conditions are present at the time of entry;
- iii) Check the permit to verify that appropriate tests have been conducted;
- iv) Verify that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;
- v) Verify that rescue services are available and that the means for summoning them are operable;
- vi) Inform all authorized entrants and attendants of the hazards that may be faced during entry and of the acceptable entry conditions;
- vii) Terminate the entry and cancel the permit when operations are completed, when prohibited conditions occurs, or at the end of the shift;
- viii) Remove any unauthorized individuals who enter or attempt to enter the confined space during entry operations; and
- ix) Ensure that the entry operations remain consistent with the terms of the entry permit.

b) **Authorized Entrant**
- i) Participate and/or review calibrated air monitoring data before entry. If not comfortable with air monitoring data, entrants are allowed to request the space be re-evaluated at any time.
- ii) Be responsible for self-monitoring, using both test equipment and a knowledge of personal physical limitations;
- iii) Be aware of any unusual physical reactions, signs, or symptoms that could be caused by the environment;
- iv) Alert the attendant to changing conditions within the space;
- v) Maintain constant communication with the attendant;
- vi) Signal the attendant and exit the space immediately if any reaction to the environment is sensed or a prohibited condition is detected;
- vii) Exit the space if ordered by the attendant or entry supervisor, a sign or symptom of exposure is observed, or an evacuation alarm is activated; and
- viii) Use all equipment properly.

c) **Attendant**
   i) Know the hazards associated with the space entered;
   ii) Be able to identify signs and symptoms of any unusual developments within the space and be able to operate air monitoring equipment;
   iii) Know who is in the space by name and count;
   iv) Maintain constant communication with the authorized entrants;
   v) Monitor activities within and around the space;
   vi) Keep unauthorized personnel away from the space;
   vii) Order authorized entrants to exit the space if conditions require;
   viii) Summon help if an emergency situation arises;
   ix) Never leave the space or attempt rescue until relieved by another attendant;
   x) Perform rescue, if necessary; and
   xi) No attendant shall be allowed to monitor more than one (1) entry operation.

6) Confined Space Entry Procedures: The following safe operating procedures shall be followed before entering any confined space.

a) Identify the hazards associated with the confined space and plan for the entry and work to be performed. If multiple trades are required to perform work activities in the same confined space, then a safety meeting shall be held between the trades working in the confined space so that employees of one employer do not endanger employees of any other employer. The safety meeting shall determine communication procedures, identifs existing and potential hazards associated with each trade's work tasks, and determine proper rescue procedures.

b) Identify the confined space team and provide the proper training.

c) Identify the equipment necessary for confined space entry. All confined spaces are different and some require more equipment than others. Some equipment often used in confined space entry includes barricades, lighting, fire extinguishers, and non-sparking tools.

d) Complete the confined space permit.

e) Post danger signs and construct barricades around the confined space to prevent unauthorized entry of other workers, pedestrians, or vehicular traffic.

   i) Perform atmospheric testing before entry and continuously while occipuied .
   ii) All testing equipment shall be calibrated as instructed by the manufacturer.
   iii) The test equipment should be tested in a known atmosphere to ensure its accuracy.
   iv) Ventilation equipment must be shut off before conducting any atmospheric tests.
   v) The atmosphere must be tested at the bottom, top, and middle of all confined spaces.
   vi) The atmosphere must be monitored continuously to determine if acceptable conditions are being maintained.
   vii) If the permit space is left for any reason, the atmosphere must be tested before re-entering the space.

f) Maintain constant communication with the entrant; communication equipment may be necessary. This may include such devices as radios, telephones, beepers, or distinctive alarms.

g) Use continuous forced-air ventilation when there is the possibility of an atmospheric hazard. The method and equipment chosen to ventilate the space should be based upon the size of the confined space openings, the gases to be exhausted, and the source of makeup air.

h) Isolate and protect against the release of energy and material into the space. This includes all mechanical, electrical, or heat-producing equipment. This process may include locking out, tagging out, blanking, blinding, blocking, or disconnecting the mechanical linkages or energy sources.

i) Identify and use necessary PPE. Proper PPE may include hard hat, safety glasses or goggles, steel toe shoes, hearing protection, work gloves, impermeable clothing, and respirator. Respirators shall be used in all hazardous atmospheres. Entrants must wear a full body harness when performing work in a confined space. A retrieval line must be attached to the entrant's back, near shoulder level or above their head. Wristlets or anklets may be used in lieu of the fully body harness if the employer can demonstrate that the use of the full body harness is infeasible or creates a greater hazard for rescue.

j) Provide an early- warning system, such as a sensors or an observer posted up stream that continuously monitors for non-isolated engulfment hazards; such as flash flooding in a storm sewer. The system must alert the entrants and attendants in sufficient time for entrants to safely exit the space.

k) Ensure emergency rescue procedures and retrieval systems are in place in the case of emergency. There are two types of rescue procedures:

   i) **Non-entry rescue:** In this type of rescue, rescue personnel remain outside the space and pull the victim out of the space with the retrieval system attached to the entrant's full body harness.

   ii) **Rescue by entry:** In this procedure, one or more rescue personnel enter the space. They remove the victim with the assistance of other rescue personnel who are stationed outside the space. This type of rescue must only be considered when supply-air respirators are available or when emergency services with this capability are in close proximity and on standby.

   iii) When relying on local emergency services for rescue services, arrangements shall be with made emergency services to give the entry team advance notice if they will be unable to respond for a period of time due to responding to another emergency or attending department-wide training.

   iv) Under no circumstances shall unauthorized personnel enter a confined space to attempt a rescue. At the present time there are no TRAMMELL CROW employees authorized to perform confined space rescues by entry into the space. In the event that rescue by entry is needed, the contractor will coordinate such services with either:
   (1) The owner (host) rescue team; or
   (2) Outside rescue team (local fire/rescue services)

   v) Entry into a confined space that has conditions Immediately Dangerous to Life and Health (IDLH) are not permitted unless rescue services are on site and prepared for entry rescue.

7) Recordkeeping: The Safety Director will retain all canceled entry permits for at least one year. Permits will be used to facilitate review of the permit system. Any problems encountered during an entry operation shall be noted on the entry permit, and the Safety Director will be notified so that appropriate revisions can be made to the written Confined Space Entry Program on an annual basis.

U) LOCK-OUT / TAG-OUT

All workers will be protected from injuries caused by unexpected energizing; start-up of machines or equipment; or release of stored energy during service, repair, maintenance, operation, and associated activities. This policy establishes minimum performance requirements for the control of such potentially hazardous conditions. This will be accomplished by locking out and tagging out energy isolating devices, and otherwise disabling machines or equipment to prevent unexpected energizing, start-up, or release of stored energy.

1) Definitions:

a) **Authorized Worker:** A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment.

b) **Affected Worker:** A person whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lock-out or tag-out, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

2) General Lock-Out / Tag-Out Procedures:

Before working on, repairing, adjusting, or replacing machinery and equipment, the following procedures will be utilized to place the machinery and equipment in a neutral or zero mechanical state.

a) Before a machine or piece of equipment is turned off, the authorized worker will have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the means to control the energy.

b) The authorized worker will notify all affected workers that the machinery, equipment, or process will be out of service.

c) The machine or equipment will be shut down using the specific procedures for that machine. An orderly shutdown will be utilized to avoid any additional or increased hazards to workers as a result of equipment de-energizing.

d) All energy control devices that are needed to control the energy to the machine or equipment will be physically located and operated in such a manner as to isolate the machine or equipment from the energy source.

e) Lock-out or tag-out devices will be affixed to energy isolating devices by authorized workers. Lock-out devices will be affixed in a manner that will hold the energy isolating devices in the "safe" or "off" position and prevent the machine or equipment from being restarted.

f) All lock-out and tag-out devices shall indicate the identity (name) of the worker applying the device.

g) Where tag-out devices are used, they will be affixed in such a manner that will clearly state that the operation or the movement of energy isolating devices from the "safe" or "off" positions is prohibited.

h) The tag-out devices will be attached to the same point a lock would be attached. If the tag cannot be affixed at that point, the tag will be located as close as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.

i) Following the application of the lock-out or tag-out devices to the energy isolating devices, all potential or residual energy will be relieved, disconnected, restrained, and otherwise rendered safe.

j) Release stored energy (capacitors, springs, elevated members, rotating fly wheels, and hydraulic/air/gas/steam systems) must be relieved or restrained by grounding, repositioning, blocking, and/or bleeding the system.

k) Where the re-accumulation of stored energy to a hazardous energy level is possible, verification of isolation will be continued until the maintenance or servicing is complete.

l) After assuring that no worker will be placed in danger, test all lock-outs and tag-outs by following the normal start-up procedures (For example depress start button). *Caution:* After the test, place controls in neutral position.

m) Should the shift change before the machinery or equipment can be restored to service, the lock and tag must remain. If the task is re-assigned to the next shift, those workers must lock-out and tag-out the equipment before the previous shift may remove their lock and tag.

3) Removal of Lock-Out / Tag-Out: Before lock-out or tag-out devices are removed and the energy restored to the machine or equipment, the following actions will be taken:

a) The work area will be thoroughly inspected to ensure that nonessential items have been removed and that machine or equipment components are operational.

b) The work area will be checked to ensure that all workers have been safely positioned or removed. Before the lock-out or tag-out devices are removed, the affected workers will be notified that the lock-out or tag-out devices are being removed.

c) Only the worker that locks out and tags out machinery, equipment, or processes may remove his/her lock and tag. However, should the worker leave the facility before removing his/her lock and tag, the TRAMMELL CROW Superintendent may remove the lock and tag. The TRAMMELL CROW Superintendent must be assured that all tools have been removed, all guards have been replaced, and all workers are free from any hazard before the lock and tag are removed and the machinery, equipment, or process are returned to service. The TRAMMELL CROW Superintendent shall attempt to notify the worker who placed the lock and tag prior to removal.

4) Group Lock-Out / Tag-Out: In situations where more than one authorized worker will be required to perform work on a system or equipment, a designated authorized worker assigned by the contractor performing the work shall physically install a group lock-out device as well as a personal lock-out device prior to the attachment of other locks/tags, and shall coordinate all activities for worker protection.

a) A scissors clip or hasp will be installed on the device to allow all authorized workers a place to lock-out/tag-out the device to protect themselves from accidental start-up or operation.

b) Each worker working on energy sources or equipment that is affected shall place a padlock and tag on the scissors clip or hasp.

c) Each authorized worker should retain his/her lock-out key until the job has been completed and is responsible for personally removing his/her lock-out/tag-out device.

d) The authorized supervisor will be the last person to remove his/her lock after verifying that all workers have been accounted for.

e) In situations where group lock-outs could extend for several shifts or days and involve numerous workers, crafts, or trades, the one lock for each person rule is deviated from, providing the following conditions are met:
   i) One authorized worker from each trade on each shift must be designated and assigned the responsibility of ensuring continuity of lock-out/tag-out procedures and verify that all energy sources are locked out.
   ii) Documentation to verify this procedure shall be performed by the assigned authorized worker.
   iii) All authorized workers must be individually accounted for prior to full or partial release of the lock-out.

5) Training: Each contractor performing lock-out/tag-out shall ensure:

a) Authorized workers will be trained in the recognition of hazardous energy sources, the type and magnitude of the energy available in the workplace, and methods and means necessary for energy isolation and control.

b) All affected workers will be trained in the purpose and use of the energy control procedure and the prohibiting of the attempt to restart or re-energize machines or equipment that are locked out or tagged out.

c) Re-training will be provided for all authorized and affected workers whenever there is a change in their job assignments, a change in equipment or processes that present a new hazard, or when there is a change in the energy control procedures. Additional re-training shall also be conducted whenever a periodic inspection reveals, or whenever there is reason to believe that there are deviations from or inadequacies in the worker's knowledge or use of the energy control procedures.

d) Training records must be available upon request by TRAMMELL CROW.

6) Inspections: An annual inspection of the energy control procedure will be performed and documented by the Safety Director. The inspection will include a review of the responsibilities and procedures of authorized workers and the worker’s knowledge of the program.

V) RESPIRATORS

TRAMMELL CROW requires that exposure to hazards in the workplace be maintained below the acceptable limits. Where practical, engineering controls such as ventilation, confinement of the process, or the substitution of a toxic substance for a safer product will be used to prevent occupational exposure to air contaminated with harmful dusts, mists, fumes, vapors, or radioactive or toxic particles. However, NIOSH certified respirators will be required when the contractor has determined that the Permissible Exposure Limit (PEL) is exceeded or it is anticipated that the limit will be exceeded.

Regardless of respirator use, it is TRAMMELL CROW's policy not to allow workers into areas that have conditions Immediate Danger to Life and Health (IDLH).

1) Respirator Selection: Respirator selection should be based on the following:

a) Nature of the hazard (chemical and physical properties of the contaminant);

b) Conditions of exposure (open or confined spaces and percent of oxygen);

c) Concentration of the contaminant;

d) The individual's physical limitations and characteristics; and

e) Limitations of the respirator.

If a worker chooses to provide their own respirator, they should report this use to their supervisor so that he/she may determine that the respirator is adequate for use.

2) Types of Respirators: A respirator is any device worn by an individual to supply air or to reduce the concentration of a hazardous material in the air. There are generally two types of respirators; Air-purifying and supplied-air.

a) **Air-purifying** respirators are divided into two types. Particulate filtering, which removes particles such as dust, mists, aerosols, and fumes; and vapor and gas filtering, which removes vapors and gases you inhale. Air-purifying respirators can be worn when the oxygen is at least 19.5% and when the contaminant identity and concentration in known. Each cartridge is designed for use against specific contaminants. Therefore, it is extremely important to know the contaminant present in the environment to make the appropriate cartridge selection.

b) **Supplied-air** respirators provide a clean source of breathable air. They are used when work environments contain contaminants in concentrations such that air-purifying respirators cannot filter them out and in oxygen-deficient atmospheres. Supplied-air respirators are also divided into two types; the Self Contained Breathing Apparatus (SCBA) where the air tank is carried by the user and the air line respirator where the air supply is some distance from the user and is supplied to the face piece by an air-line hose.

c) Dust masks are not respirators and should never be used in conditions where respirator use is necessary.

3) **Medical Examination:** Using a respirator may place a physiological burden on a worker that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the worker. Contractors should provide a medical evaluation to determine the worker's ability to use a respirator before the worker is fit tested or required to use the respirator in the workplace. This medical evaluation should be performed by an approved Occupational Health Provider. Workers should have a chance to discuss results of the medical evaluation with the Occupational Health Provider.

4) **Respirator Fit Testing:** Before a worker is required to use any respirator with a negative or positive pressure tight-fitting face piece, the worker must be fit tested with the same make, model, style, and size of respirator that will be used. The contractor shall ensure that a worker using a tight-fitting face piece respirator is fit tested prior to initial use of the respirator, whenever a different respirator face piece (size, style, model, or make) is used, and at least annually thereafter. Fit testing, including a qualitative and quantitative fit test, may only be performed by a Qualified Person or an approved Occupational Health Provider.

5) **Training:** Only authorized and trained workers may use respirators. Both personnel who are required to wear respirators and their immediate supervisor will be properly trained to ensure the safe and effective use of respirators. The training shall include:

   a) How to properly inspect, don, check the fit, and wear the respirator;

   b) How to properly maintain and store the respirator;

   c) How to recognized emergency situations;

   d) The operation, capabilities, and limitations of the respirator; and

   e) When and why respiratory protection is needed.

   Re-training shall be conducted annually, when changes in the workplace or the type of respirator render previous training obsolete, and when inadequacies in the worker's knowledge or use of the respirator indicate that the worker has not retained the required understanding or skill.

6) **Program Evaluation:** The Safety Director will be responsible for the administration of the Respiratory Program. Likewise, the Safety Director will evaluate the program annually to ensure that the provisions of the current written program are being effectively implemented and that the program continues to be effective. Program evaluation will include discussions with employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected.

7) **General Guidelines for Respirator Use:**

   a) Workers should check the respirator for a good fit before each use. Positive and negative fit checks should be conducted.

   b) All facial hair that comes between the sealing surface of the face piece and the face or that interferes with valve function shall be removed.

c) If a worker wears corrective glasses or goggles or other PPE, the worker shall ensure that such equipment is worn in a manner that does not interfere with the seal of the face piece to the face.

d) Users shall not remove respirators while in a hazardous environment for any reason, including changing or replacing cartridges, filters, or canisters.

e) Each contractor shall ensure that all filters, cartridges, and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

f) Workers should recognize indications that cartridges and canisters are at their end of service. If in doubt, change the cartridges or canisters before using the respirator.

g) **Supplied-air respirators** shall meet the following requirements:
   i) Compressed breathing air shall meet the requirements for Grade D breathing air.
   ii) Pure oxygen is not to be used in respirators. Oxygen concentrations greater than 23.5% may create explosive atmospheres.
   iii) Breathing air couplings shall be incompatible with outlets for other gas systems.
   iv) Cylinders used for respirators must be tested and maintained in accordance with DOT 49 CFR Part 173 and 178.
   v) Compressors shall be situated to prevent contaminated air from getting into the system.
   vi) Compressors shall be equipped with in-line air purifying sorbent beds and/or filters that are maintained or replaced following the manufacturer's instructions.
   vii) Compressors must be tagged with information on the most recent change date of the filter and an authorizing signature.
   viii) A carbon monoxide monitor must be in place to alarm at 10 ppm or shall be monitored often enough to ensure that carbon monoxide does not exceed 10 ppm.

8) Respirator Care, Maintenance, and Storage:

a) Respirators, when practical, should be assigned to individual workers for their exclusive use.

b) Respirators should be regularly cleaned and disinfected. Those used by more than one worker shall be thoroughly cleaned and disinfected after each use.

c) Respirators used routinely shall be inspected during cleaning. Respirators that fail an inspection or are otherwise found to be defective will be removed from service to be discarded, repaired, or adjusted in accordance with the manufacturer's specifications.

d) Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator.

e) All respirators shall be stored to protect them from damage, contamination, dust, sun light, extreme temperatures, excessive moisture, and damaging chemicals. They shall be packed or stored to prevent deformation of the face piece and exhalation valve.

9) Recordkeeping: Each contractor must retain written records regarding medical evaluations, fit testing, and the respirator program. Medical records must be retained for the duration of the worker's employment plus 30 years. These records must be available upon request.

W) HEARING CONSERVATION

From time to time, heavy equipment and other site activities may produce elevated noise levels, which may increase the potential for hearing loss. If a worker is subjected to noise levels that exceed the table below, the contractor shall institute engineering and/or administrative controls in the work area. If these controls fail to reduce worker exposure to acceptable levels, the contractor must provide and enforce the use of hearing protectors.

Permissible Noise Exposures	
Duration Per Day / Hours	**Sound Level dBA Slow Response**
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or below	115

1) **Monitoring:** Where host employer monitoring has been done, the results of that monitoring will be used, provided the current exposure situation is similar to the historical monitoring. If no monitoring data is available, monitoring must be completed to assess the potential noise exposure. The following monitoring guidelines must be followed:

   a) The sampling strategy shall be designed to identify workers for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

   b) Where circumstances such as high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, the contractor will use personal sampling to comply with the monitoring requirements, unless the contractor can show that the area sampling produces equivalent results. In any case, instruments used to measure worker noise exposure shall be calibrated to ensure measurement accuracy.

   c) All continuous, intermittent, and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measure.

   d) Monitoring shall be repeated whenever a change in production, process, equipment, or controls increases noise exposures to the extent that additional workers may be exposed at or above action levels, or when hearing protection being used by workers may be rendered inadequate to meet the requirements.

2) **Worker Notification:** The contractor shall notify each worker exposed at or above the TWA action level of the monitoring results and provide affected workers with an opportunity to observe any noise measurements conducted.

3) Automatic Testing Program: If it has been determined that the contractor has workers exposed to sound levels that exceed an eight-hour time weighted average of 85 dBA or more, the contractor shall establish and maintain an audiometric testing program. The following audiometric testing guidelines shall be followed:

a) Testing shall be made available to all workers whose exposure equals or exceeds the TWA action level of 85 dBA. The testing shall be at no cost to the worker.

b) Tests shall be performed by a licensed or certified audiologist or equivalent physician or certified technician.

c) Within six (6) months of a worker's first exposure at or above the action level, the contractor shall establish a valid baseline audiogram against which subsequent audiograms can be compared. Testing to establish a baseline audiogram shall be proceeded by at least 14 hours without exposure to workplace noise. Hearing protection may be used as a substitute for the requirement that baseline audiogram be preceded by 14 hours without exposure to workplace noise.

d) At least annually, after obtaining the baseline audiogram, the contractor shall obtain a new audiogram for exposure at or above the TWA action level.

e) Each worker's annual audiogram shall be compared to his/her baseline audiogram. If the audiogram indicates the worker has suffered a standard threshold shift, the worker may obtain a re-test within 30 days and consider the results of the re-test as the annual audiogram.

f) **Follow-up procedures** – If a comparison of the annual audiogram to the baseline indicates a standard threshold shift due to occupational noise exposure has occurred, the worker shall be informed of this in writing within 21 days of the determination. The contractor shall:
   i) Require workers not using hearing protectors be fitted with hearing protectors and trained in their use and care.
   ii) Require workers already using hearing protectors to be re-fitted and re-trained, or to be provided with different hearing protectors offering greater protection.
   iii) If additional testing is indicated, they shall refer the worker for a clinical audio logical evaluation examination as appropriate.

4) Hearing Protectors: Hearing protectors must be made available to all workers who are subjected to noise levels in excess of the permissible limits or exposed to an eight-hour TWA of 85 dBA or greater and who have experienced a standard threshold shift in hearing on an annual audiogram.

a) All testing and hearing protectors will be provided at no cost to the worker.

b) The contractor must ensure a proper initial fit, show the correct use, and replace the hearing protector in accordance with wear factors and manufacturer's recommendations.

c) Whenever worker noise exposures increase, the adequacy of the hearing protectors will be re-evaluated to ensure that the equipment can provide adequate protection.

5) Training: The contractor shall institute a training program for all workers who have been exposed to noise levels at or above the Permissible Exposure Limits. The training program shall be repeated annually for each worker included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and processes. The company shall ensure that each worker is informed of:

a) Effects of occupational noise on hearing.

b) Purpose of hearing protectors. The various types and instructions on selection, fitting, use, and care.

c) Purpose of audiometric testing and explanation of the procedures.

6) Recordkeeping: Records shall be maintained for at least two (2) years, with the exception of the audiometric test record, which shall be kept for the duration of the worker's employment. Records shall be made available to workers upon request.

X) BLOOD-BORNE PATHOGENS

The purpose of this policy is to limit occupational exposure of TRAMMELL CROW employees to blood and other potentially infectious body fluids and materials that may transmit blood-borne pathogens and lead to disease or death. It is TRAMMELL CROW's policy that all employees shall use universal precautions in an attempt to eliminate or minimize employee exposure to blood-borne pathogens.

1) Exposure Determination: TRAMMELL CROW has determined that our scope of work, whether in the field or office setting, presents minimal anticipation of occupational exposure to blood-borne pathogens by our employees. This exposure is limited to:

a) Employees that are trained in and have cause to render first aid; or

b) Employees that may have cause to conduct clean-up or decontamination of surfaces or materials that could reasonably be anticipated to contain infectious materials.

2) Procedures for Reducing Exposure Risks:

a) **Universal Precautions:**
   i) Universal precautions refer to approaches to infection control in which all blood and certain body fluids are treated as if known to be infectious for HIV, HBV, or other blood-borne pathogens. These approaches recognize that there is no practical way to determine the health status of all persons who may be sources of blood-borne pathogens. Using this assumption when dealing with infectious materials eliminates the need for decision-making to determine the extent of actual or potential disease hazards and establishes minimum standards for contamination control that will effectively control blood-borne pathogens if they are present.
   ii) Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. In situations where differentiation between body fluid types is difficult or impossible (For example poor lighting and uncontrolled or emergency situations), all body fluids shall be considered potentially infectious materials.

b) **Engineering Controls:**
   i) Engineering controls include all measures designed to reduce the potential for contact between workers and potentially infectious materials by either removing the hazard or isolating the worker from exposure. All employees that are not essential to the administrating of medical treatment or to the clean-up operation of infectious materials shall be removed from the area to eliminate exposure to blood-borne pathogens.
   ii) Only trained employees shall administer first aid when the potential for exposure to blood-borne pathogens reasonably exists.

c) **Work Practice Controls:**
   i) Work practice controls are those measures that reduce the likelihood of exposure by altering the manner in which a task is performed.
   ii) To the extent possible, employees administering first aid shall have the injured employee clean their own wounds, apply compresses, and clean up spilled body fluids.
   iii) All procedures involving direct handling of blood or other potentially infectious material should be accomplished in a manner that minimizes splashing, spraying, spattering, or aerosol production of other potentially infectious material.

iv) Hands and any other exposed skin surfaces must be washed with soap and running water, and mucous membranes should be flushed with water as soon as possible after contact with blood or other potentially infectious material. If hand washing facilities are not available, employees shall utilize hand sanitizers or antiseptic towelettes/solutions located in the first aid kit.

3) Personal Protective Equipment (PPE):

a) PPE includes any item which the employee wears or uses on his/her person to provide barrier protection of the skin or mucous membranes from contamination by blood or other potentially infectious material. Examples include gloves, face shields, masks, eye protection, resuscitation bags, pocket masks, and other ventilation devices.

b) The use of appropriate PPE is required as supplementary protection in all situations where exposure remains after institution of both engineering controls and work practice controls. TRAMMELL CROW requires the use of appropriate PPE for all employees when engaged in tasks involving contact with blood, body fluids, or any potentially infectious material for which occupational exposure is reasonably anticipated. PPE will be provided to TRAMMELL CROW employees at no cost. PPE shall be repaired or replaced as needed to maintain it effectiveness.

c) Disposable latex or vinyl gloves shall be worn where it is reasonably anticipated that employees will be in contact with potentially infectious material.

d) Employees administering mouth to mouth resuscitation shall use micro-shields with one way valves.

e) The only exception to this requirement shall be those rare and extraordinary occasions when, in the professional judgment of the employee, wearing of required PPE would have prevented delivery of health or public safety services or would have posed an increased hazard to the employee or coworkers. Such situations must be investigated and documented to determine whether such occurrences can be prevented.

4) Communication of Hazards:

a) Warning labels shall be affixed to containers and bags of regulated waste containing blood or other potentially infectious material. These labels must include the biohazard legend depicted below, have a fluorescent orange or orange-red colored background with lettering or symbols in a contrasting color, and be affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal.

b) Signs which are fluorescent orange or orange-red, with lettering or symbols in a contrasting color, and bearing the biohazard legend, shall be posted at the entrance to work areas where the clean-up or disposal of blood or other potentially infected material is taking place.

5) Training: All employees with occupational exposure to blood-borne pathogens shall participate in blood-borne pathogen awareness training upon hiring or initial assignment and annually thereafter. Training records will be maintained for a minimum of three (3) years from the date of training. The content of the training program shall contain at a minimum the following elements:

- A copy of the Blood-borne Pathogen policy;
- A general explanation of the epidemiology and symptoms of blood-borne diseases;
- An explanation of the modes of transmission of blood-borne pathogens;
- An explanation of the use and limitations of methods that will prevent or reduce exposure including appropriate engineering controls, work practices, and PPE;

- Information on the appropriate actions to take and persons to contact regarding a personal exposure involving blood or other potentially infectious materials; and
- Information on the post-exposure evaluation and follow-up that TRAMMELL CROW is required to provide for the employee following an exposure incident.

6) Clean-up and Disposal Of Blood-Borne Pathogens: If blood or other potentially infectious body fluids are encountered in the workplace, always observe Universal Precautions first and foremost. While fluids such as urine and vomit are not considered infectious by themselves, they are considered infectious if observable blood is present; Use Universal Precautions in any case. The clean-up procedure for blood and other potentially infectious fluids is as follows:

a) Apply appropriate PPE.

b) Use absorbent material to pick up the bulk of the fluid.

c) Use a straight edged scraper to gather the absorbent material for pick-up.

d) Use disposable toweling to finish wiping up remaining fluid.

e) Absorbent material and toweling should be disposed of in an appropriate bag. Red, biohazard labeled bags should be used for known infectious fluids.

f) The affected area should be washed thoroughly with a solution consisting of 5.25% sodium hypochlorite (household bleach) mixed 10:1 with water. Again, blot with disposable toweling, and discard in the same bag.

g) Dispose of waste in accordance to local, state, and federal regulations.

h) Emergency management personnel should be used to perform clean-up of large amounts of potentially infectious liquids, organs, or other human body parts.

7) Hepatitis B Vaccination: The Hepatitis B vaccine shall be made available to all employees of TRAMMELL CROW who are identified as having potential occupational exposure on a daily or near daily basis to blood-borne pathogens.

a) Vaccinations will be available to employees within 10 working days of initial assignment to jobs with occupational exposure. All vaccinations will be at no cost to the employee.

b) Any employee who initially declines the recommended vaccination shall be required to read and sign the declination form. Employees who decline the vaccination initially may elect to accept it at a later date if still employed in a position with potential occupational exposure.

8) Post Exposure Evaluation and Follow-Up: Exposure incidents are defined as any specific occupational incident involving eye, mouth, other mucous membrane, or skin contact with blood or other potentially infectious materials. Upon exposure, the following steps shall be taken:

a) Employees shall thoroughly clean the affected area.

b) A report shall be made immediately to his/her supervisor and to the company Safety Director.

c) TRAMMELL CROW will direct the exposed employee to a qualified local healthcare provider with a copy of the exposure report and Hepatitis B vaccine status.

d) TRAMMELL CROW will attempt to obtain the source individual's HBV/HCV/HIV consent for testing and provide test results to the healthcare provider.

e) The healthcare provider will evaluate the exposure report, arrange for testing of the exposed employee, notify the employee of the test results, and provide counseling and post-exposure prophylaxis if medically indicated.

f) The written opinion of the healthcare provider shall be provided to the employee, and a record of the exposure shall be filed.

9) Recordkeeping: The Safety Director shall establish and maintain records for employees with occupational exposure to blood-borne pathogens for the duration of employment and 30 years after termination of employment. Each medical record shall include the employee's name and social security number, Hepatitis B vaccination status, copies of results of all exams, tests, and follow-ups related to reported exposure incidents, and written medical opinion of post-exposure incidents. Records shall be provided to employees upon request in a timely and reasonable manner within 15 working days of request.

Y) HAZARD COMMUNICATION

This program provides detailed safety guidelines and instructions for receipt, use, and storage of chemicals at our facility and job sites by employees and subcontractors. It is a matter of company policy to provide our employees with information about hazardous chemicals on the work site through our Hazard Communication Program, which includes a chemical inventory, container labeling, Safety Data Sheets (SDS), and employee information and training. Each job site will retain a copy of the written Hazard Communication Program and an SDS binder.

1) Employee Training:

a) All new workers shall receive safety orientation training covering the elements of the HAZCOM and Right to Know and Understand Program (HazCom 2012/GHS). This training will consist of general training covering:
   i) Location and availability of the written Hazard Communication Program;
   ii) Location and availability of the List of Chemicals used in the workplace;
   iii) Methods and observation used to detect the presence or release of a hazardous chemical in the workplace;
   iv) The specific physical and health hazard of all chemicals in the workplace;
   v) Specific control measures for protection from physical or health hazards;
   vi) Explanation of the chemical labeling system;
   vii) Procedures to follow if exposed to hazardous chemeicals.
   viii) Location, use and understanding of SDS.

b) In addition to the safety orientation training, TRAMMELL CROW employees will receive on-the-job training. This training will cover the proper use, inspection, and storage of chemicals they will be using or will be working around, the location of SDS sheets and the location of emergency equipment, first aid kit and emergency phone number in the case of exposure. Upon completion of the job site orientation, each employee shall complete Training Session on Hazard Communication Form.

c) No worker will be allowed to perform non-routine work without first being oriented to the chemical hazards involved. A review of safe work procedures and use of required PPE will be conducted prior to the start of such non-routine tasks. Pipes containing hazardous chemicals will be labeled wherever possible. If they cannot be labeled, workers will be informed of their contents and associated hazards before entering the work area. All workers are required to review Safety Data Sheets before using any hazardous chemical for the first time and with every new shipment to the job site thereafter.

2) SDS Binders and Chemical Hazard Lists:

Safety Data Sheets (SDS) are written documents which are provided by manufacturers for each hazardous chemical or product that they produce, sell, or distribute. Chemical manufacturers and suppliers are mandated by law to provide the SDS along with their product to the customer or user. The SDS contains valuable information about the characteristics, safety and health hazards, protective measures, and emergency response procedures for the hazardous chemical or product.

a) Each job site must maintain an SDS for all products containing hazardous chemicals used or stored on the job site. To accomplish this task, each subcontractor must provide TRAMMELL CROW with a Hazard Communication Policy and an SDS binder for all chemicals they anticipate using on the project. These SDS binders will be kept in a central location in the TRAMMELL CROW office trailer and will be available to all workers on site to review. Each binder shall be equipped with an index listing all chemicals.

b) Maintaining an accurate SDS binder is essential to an effective Hazard Communication Program. Therefore, it is necessary that all new hazardous chemicals that are purchased or received have an SDS and is filed properly in the SDS binder. Check all deliveries of chemicals for the SDS. An SDS should accompany the first shipment of all new or re-formulated chemicals. If an SDS is not provided with the shipment, immediately contact the manufacturer and have the SDS faxed or mailed.

c) When a chemical is received with an SDS, place it in the binder and add the product name to the Chemical Inventory List. Discard any old or out of date SDS for the same or similar product that no longer exists.

3) Container Labeling:

a) It is extremely important that all containers of chemicals are properly labeled to the regulated requirements of HazCom 2012. This includes every type of container from a 5000 gallon storage tank to a spray bottle of degreaser. Incoming chemicals are to be checked for proper labeling. All chemicals will be stored in their original or approved containers with the appropriate label, including chemical name, hazard pictograms(s), signal word, hazard statement and precautionary statements.

b) All warning labels and tags must be maintained in a legible condition and not be defaced. When hazardous materials are transferred from original container to secondary containers, each secondary container must be labeled, tagged, or clearly marked to identify the container's contents, the appropriate hazard warnings, and any recommended PPE. Container labeling does not apply to chemicals transferred for the immediate use of the worker doing the transfer.

c) Labels should be of prominent size and should be firmly attached to the container in such location as to be easily read and should not obstruct other labels or create a hazardous handling situation. Labels must be maintained in legible condition, affixed to the container, and shall not be defaced or removed.

d) Stationary vessels, tanks, or pipes which contain hazardous materials should have clearly affixed labels, signs, or placards which identify the container contents and have appropriate hazard warnings.

e) "Empty" containers must not be reused for anything other than the originally contained substances unless the original labels are removed or defaced and a new label is attached to identify the new contents and associated hazard warnings.

4) General Requirements for Chemical Safety:

a) Some chemicals are explosive, corrosive, flammable, or toxic. Other chemicals are relatively safe to use and store but may become dangerous when they interact with other substances. To avoid injury and/or property damage, persons who handle chemicals must understand the hazardous properties of the chemicals. Before using a specific chemical, safe handling methods and health hazards must always be reviewed. Supervisors are responsible for ensuring that the equipment needed to work safely with chemicals is accessible and maintained for all workers on all shifts. The following general safety rules shall be observed when working with chemicals:
   i) Read and understand the Safety Data Sheets;
   ii) Keep the work area clean and orderly;
   iii) Use all necessary safety equipment and PPE;

iv) Store incompatible chemicals in separate areas;
v) Substitute less toxic materials whenever possible;
vi) Limit the volume of volatile or flammable material to the minimum needed for short operation periods;
vii) Provide means of containing the material if equipment or containers should break or spill their contents;
viii) Do not pour chemicals onto the ground;
ix) Do not dispose of chemicals through the storm drain system; and
x) Do not dispose of highly toxic chemicals down sinks or sewer drains.

Z) ASBESTOS AWARENESS

TRAMMELL CROW is committed to providing workers with an asbestos-free workplace. It is our company's policy that only asbestos abatement contractors shall be permitted to work in areas where airborne concentrations of asbestos may occur. Therefore, the purpose of this program is to establish a procedure to identify asbestos-containing areas and implement control measures to prevent workers exposure to those areas.

1) Definitions:

a) **Asbestos** - is a generic term describing a family of naturally occurring fibrous silicate minerals. As a group, the minerals are noncombustible, do not conduct heat or electricity, and are resistant to many chemicals. Although there are several other varieties that have been used commercially, the most common asbestos mineral types likely to be encountered in buildings are chrysotile (white asbestos), amosite (brown asbestos), and crocidolite (blue asbestos). Among these, white asbestos is by far the most common asbestos mineral.

b) **Asbestos Containing Material (ACM)** - is any material that contains more than 1% asbestos.

c) **Presumed Asbestos Containing Material (PACM)** - is thermal insulation and surfacing material found in buildings constructed no later than 1980, or any other material that is suspected of containing asbestos.

d) **Friable Asbestos** - Friable asbestos material means finely divided asbestos or asbestos-containing material, or any asbestos-containing material that can be crumbled, pulverized, or powdered by hand pressure. Individual fibers in friable asbestos-containing material can potentially become airborne and can then present a health hazard. Friable material commonly used in buildings include sprayed fibrous fireproofing, decorative or acoustic texture coating, and thermal insulation.

e) **Non-friable Asbestos** - Non-friable asbestos includes a range of products in which asbestos fiber is effectively bound in a solid matrix from which asbestos fiber cannot normally escape. However, cutting, braking, sanding, drilling, or similar activities can release asbestos fiber from even non-friable asbestos materials. Non-friable material commonly used in buildings include cement tiles or boards, resilient floor coverings, and asphalt roofing products.

2) **Training:** All workers working in areas where exposure to ACM or PACM exists are required to have documented asbestos awareness training. The training shall be provided prior to initial assignment and at least annually thereafter. The training should include:

a) Asbestos uses and forms;

b) Health effects of asbestos exposure;

c) Identification of ACM and/or PACM locations;

d) Recognition of damaged, deteriorated, or delaminated ACM / PACM; and

e) Procedures to follow when encountering ACM / PACM.

3) General Guidelines for Controlling ACM / PACM:

a) All ACM / PACM shall be identified, and workers should be made aware of its location in the building or project. When asbestos-contained material is discovered during the course of construction, a report shall be immediately made to the TRAMMELL CROW Superintendent or the Safety Director.

b) When the job requires work in the area of non-friable ACM, one should avoid disturbing the ACM.

c) All operations where airborne concentrations of asbestos may be exceeded shall be conducted in a regulated area.

d) The abatement contractor shall employ a Competent Person to supervise and make sure all asbestos work performed is within regulated areas.

e) The abatement contractor performing work requiring the establishment of a regulated area shall inform all other workers on the project of:
   i) The nature of the abatement work with asbestos and/or PACM,
   ii) The existence of and requirements pertaining to regulated areas; and
   iii) The measures taken to ensure that workers on the project are not exposed to asbestos.

f) The regulated area shall be demarcated in any manner that minimizes the number of persons within the area and protects workers outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area. Signs shall be provided and displayed to warn others.

g) All workers working adjacent to regulated areas established by the abatement contractor shall take steps on a daily basis to ascertain the integrity of the enclosure and/or the effectiveness of the control method relied on by the primary asbestos contractor to assure that asbestos fibers do not migrate to such adjacent areas.

h) Access to regulated areas shall be limited to authorized persons and to persons authorized by the abatement contractor.

i) All workers entering a regulated area where workers are required to wear respirators shall be supplied a respirator in accordance with *Respirators* Section II, Part V of this manual.

j) The abatement contractor shall ensure that workers do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas.

AA) LEAD AWARENESS

Exposure to lead occurs in construction related activities such as abrasive blasting, welding, cutting, torch burning, and some maintenance operations. This is not to say that all welding or soldering compounds would contain lead. Subcontractors should check material content before starting such operations. If the work to be done has lead or lead-containing materials that will become "airborne" thru dust, mist, or fumes there are specific procedures that must be followed.

1) Training: Workers exposed to lead shall receive training upon hiring or initial assignment and annually thereafter. Workers are to be informed and trained on the contents of:

a) The OSHA Lead Standard (Subpart D – 1926.62) and company policy;

b) The specific nature of work operations which could result in exposure;

c) The adverse health effects associated with excessive exposure to lead;

d) The proper selection and use of respiratory protection and other PPE;

e) The purpose of medical surveillance programs;

f) Engineering and work practice controls; and

g) Employees' rights to access medical records.

2) Accreditation / Licensing: Any subcontractor performing lead abatement work must be certified as a lead abatement firm. The subcontractor is responsible to ensure that a certified lead abatement supervisor is appointed and on site at all times that abatement work is being performed. Proof of certification must be submitted to TRAMMELL CROW Superintendent prior to mobilization on site.

3) General Guidelines for Controlling Lead Exposure:

a) Exposure assessments and monitoring shall be done to determine the airborne concentration of lead to which workers may be exposed.

b) The subcontractor shall implement engineering and work practice controls, including administrative controls, to reduce and maintain worker exposure to lead to at or below the permissible exposure limit to the extent that such controls are feasible. Wherever all feasible engineering and work practices controls that can be instituted are not sufficient to reduce employee exposure to or below the permissible exposure limit, the employer shall nonetheless use them to reduce employee exposure to the lowest feasible level and shall supplement them by the use of respiratory protection.

c) Respirators shall be used and maintained in accordance with *Respirators* Section II, Part V of this manual.

d) The subcontractor shall inform all workers and other trades by posting signs or by other appropriate means necessary to warn of the potential for lead exposure.

e) The subcontractor must document the description of each activity in which lead is emitted, equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices, if applicable.

f) A medical surveillance program shall be implemented for workers engaged in lead work or for those who are exposed at or above the permissible limit.

g) Proper hygiene facilities and practices must be implemented to control lead exposure.

h) When mechanical ventilation is used to control lead exposure, the subcontractor shall evaluate the mechanical performance of the system in controlling exposure as necessary to maintain its effectiveness.

i) If administrative controls are used as a means of reducing workers' TWA exposure to lead, the subcontractor shall establish and implement a job rotation schedule which includes:
   i) Name or identification number of each affected worker;
   ii) Duration and exposure levels at each job or work station where each affected worker is located.
   iii) Any information which may be useful in assessing the reliability of administrative controls to reduce exposure to lead.

j) The subcontractor should implement an effective housekeeping program whereby all surfaces shall be maintained as free as noticeable of accumulations of lead by using a vacuuming system. Dry or wet sweeping can be used in areas where vacuuming is not effective.

k) Protective clothing and equipment must be kept clean or disposed of properly, depending on the equipment, clothing, respirators, and gloves. All protective clothing and equipment will be provided to workers at no cost.

4) Hygiene Facilities and Work Practices: The following hygiene facilities and work practices must be implemented where it has been determined that lead exposure is at or above the Permissible Exposure Limit:

a) The contractor must provide workers with eating facilities or designated areas that are readily accessible to workers and must ensure that the eating area is free from lead contamination.

b) Workers exposed to lead must wash their hands and faces prior to eating, drinking, using tobacco products, or applying cosmetics.

c) Workers must not enter lunchroom facilities or eating areas while wearing protective work clothing or equipment unless surface lead dust has been removed from the clothing or equipment by vacuuming or another cleaning method that limits dispersion of lead dust.

d) Workers must not eat, drink, use tobacco products, or apply cosmetics in any work area where the Lead Permissible Exposure Level is exceeded and the use of respirators is in place.

e) Workers who do not shower and change into clean clothing before leaving the work site may contaminate their homes and vehicles with lead dust. Therefore:
   i) The subcontractor must provide workers with a clean change area that is equipped with storage facilities for street clothes and a separate area with facilities for the removal and storage of lead-contaminated protective work clothing and equipment.
   ii) The subcontractor must provide workers with suitable shower facilities, where feasible, so that exposed workers can remove accumulated lead dust from their skin and hair prior to leaving the worksite.

f) Where shower facilities are available, workers must shower at the end of the work shift before changing into their street clothes and leaving the work site. Showers must be equipped with hot and cold water, in accordance with OSHA standards.

g) Where showers are not provided, the subcontractor must ensure that employees wash their hands and faces at the end of the work shift.

5) Air Sampling and Monitoring:

a) Exposure assessments and monitoring shall be done to determine if the exposure level is above the Permissible Exposure Limit (PEL) of 50 micrograms 50 ug/m(3) TWA, unless there is objective data which demonstrates conclusively that no worker will be exposed to lead in excess of the action level of 30 micrograms 30 ug/m(3).

b) The contractor must inform all workers exposed to lead at or above 30 ug/m(3) of the provisions of the standard and all its appendices, the purpose and description of medical surveillance, and provisions for medical removal protection if temporary removal is required.

c) If a worker is exposed to lead and air sampling is performed, the contractor must notify the worker in writing within five (5) working days of the air monitoring results which represent the exposure.

d) If the results indicate that the worker's exposure exceeds the PEL, then the contractor/subcontractor must also notify the employee of this in writing, and provide a description of the corrective action that has been taken or will be taken to reduce the exposure.

e) Worker exposures must be re-checked by monitoring at least every six months if the exposure is at or over the action level but below the PEL.

f) The contractor may discontinue monitoring if two (2) consecutive measurements, taken at least seven (7) days apart, are at or below the action level.

g) Air monitoring must be repeated every three (3) months if a worker is exposed over the PEL.

h) The contractor is required to keep all records of exposure monitoring for airborne lead in accordance with applicable regulations. Such records are to be retained for at least 30 years.

6) Medical Surveillance:

a) The contractor is responsible and required to provide initial medical surveillance consisting of biological monitoring to include blood lead and ZPP level determination to workers exposed to lead at or above the action level on any one day as determined by exposure monitoring.

b) The contractor shall provide full medical surveillance to all workers exposed to lead above 30 ug/m(3) TWA for more than 30 days each year and whose BLL exceeds 40 ug/dl.

c) The contractor is required to notify in writing each worker whose blood lead level exceeds 40 ug/dl. In addition each such worker is to be informed that the standard requires medical removal with MRP benefits when an employee's blood lead level exceeds the above defined limit.

d) The contractor shall obtain from the physician and provide the worker with a written medical opinion containing blood lead levels, the physician's opinion as to whether the worker is at risk of material impairment to health, and any recommendations.

e) Medical examination and consultations will be made available to workers as follows:
   i) At least annually for any worker who had a blood lead level at or above 40 ug/dl.
   ii) When a worker notices signs or symptoms associated with lead intoxication.
   iii) When a worker desires medical advice on ability to have a healthy child.
   iv) When a worker demonstrates difficulty in breathing during respirator fit test.

f) Medical surveillance will be provided by the contractor at no cost to the worker and will be performed by or under the supervision of a licensed physician.

g) The contractor is required to keep all medical surveillance records in accordance with applicable regulations. Medical surveillance records must be kept for the duration of employment plus 30 years except in cases where the employment was less than one year.

h) If the duration of employment is less than one year, the contractor need not retain this record beyond the term of employment if the record is provided to the worker upon termination of employment. Medical removal records also must be maintained for the duration of employment.

BB) MEDICAL MANAGEMENT

Occupational health concerns receive high priority. It is essential that each job site be able to adequately respond to first-aid events and resolve all other occupational health problems quickly. The health and wellness of each employee is a key segment of the overall safety environment.

1) **Employee Medical Records:** Medical records are permanent records and will be filled out for any injury or illness that requires treatment beyond first aid (on the job). This may include all of the following:

   a) Visits to an occupational clinic for first aid;

   b) Visits to an occupational clinic for medical treatment;

   c) Visits to any emergency room or hospital;

   d) Visits to any personal doctor or outside physician.

2) **First Aid Kits and First Aid Training:**

   a) Each contractor on site must have a well-stocked first aid kit for employee use. The job site supervisor shall perform a weekly inspection of the first aid kit to ensure that the expended items have been replaced. These kits will be located so as to allow easy and quick access. First aid kits and required contents are to be maintained in a serviceable condition. All items which must be kept sterile must be individually wrapped and sealed. Items such as scissors, tweezers, tubes of ointments with caps, or rolls of adhesive tape need not be individually wrapped, sealed, or disposed of after a single use or application.

   b) Each contractor shall provide at least one first aid trained employee, recognized by valid certificate from the American Red Cross, American Heart Association or equivalent, to be on the project work shift while work activities are performed to render first aid to company employees.

3) **Preferred Medical Provider:** The preferred provider network is a list of physicians who have agreed to treat company employees when such injuries arise out of the performance of their job duties. This preferred provider list is available for each project based upon location and type of injury to be treated. The preferred provider will provide the necessary loss data, work restrictions, and medical records to allow TRAMMELL CROW management and the workers compensation administrator to sufficiently manage the Return to Work Program.

4) **Medical Referrals:** The Safety Director will arrange for employees to see appropriate medical care providers for injuries or illnesses other than first aid. A designated occupational medical clinic or hospital will be assigned to each job site and will be posted in a conspicuous location. The posting shall include the name of the occupational clinic or hospital, the address, the phone number, and a map.

5) **Modified Duty:** When an employee has been identified by proper medical authority as having a condition that would limit them in their normal job function, the treating physician shall initiate a *Modified Duty Assignment Sheet.* This sheet will list the limitations and advise management of the need for assignment to duties that will not exceed the limitations. Management will assign limited duties in accordance with the *Modified Duty Assignment Sheet*.

The original shall remain in a Pending & Review file, held by the Safety Director, to prompt periodic monitoring of the employees condition. Copies shall be provided to the employee and his/her supervisor.

6) **Return To Duty:** When conditions have changed, such that the employee no longer has limitations, the treating physician shall initiate a *Return To Duty Assignment Sheet*. The original form shall be filed in the employee's medical record and copies provided to the employee and his/her supervisor.

7) **Non-Compliance:** Failure to comply with a modified duty assignment, a return to duty assignment, or any other section of this policy and/or the Return to Work Program, will lead to immediate disciplinary action, up to and including termination.

CC) HEAT ILLNESS PREVENTION (CALIFORNIA)

Construction workers are generally exposed to the environmental risk factors for heat illness and have the risk of developing heat related illnesses if they do not protect themselves. The objective of this program is worker awareness regarding symptoms, prevention methods and procedures to follow if symptoms occur. Therefore, it is TRAMMELL CROW's policy that all contractors comply with the procedures of this policy

1) Training and Written Program

a) ***Worker Training:*** Each supervisor and worker must be trained in the following topics before work begins where by exposure to heat related illnesses is present:
   i) Environmental and personal risk factors for heat illness, as well as the added burden of heat load on the body caused by exertion, clothing, and PPE.
   ii) Procedures for identifying, evaluating, and controlling exposures to the environmental and personal risk factors for heat illness.
   iii) The importance of frequent consumption of water.
   iv) The importance of acclimatization.
   v) Different types of heat illness and common signs and symptoms of heat illness.
   vi) The importance of immediately reporting to the employer or designee symptoms or signs of heat illness.
   vii) Procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary.
   viii) Procedures for contacting emergency medical services, including ensuring that communicating clear and precise directions to emergency personnel and/or transporting the affected worker to a point where they can be reached by an emergency medical service provider.

b) ***Supervisor Training*****:** Each supervisor responsible for overseeing workers exposed to heat related illnesses must be trained in the following topics:
   i) Procedures the supervisor will follow to implement controls as determined by the contractor.
   ii) Procedures the supervisor will follow when a worker exhibits symptoms consistent with possible heat illness, including emergency response procedures.
   iii) How to monitor weather reports and how to respond to hot weather advisories.
   iv) How to provide clear and precise directions to the work site.

c) ***Written Procedures:*** The contractor must have on site and available to all employees the written procedures for complying with the Heat Illness Prevention Policy and specific job site emergency procedures. Training documentation must be available to TRAMMELL CROW upon request.

2) Provisions for Water:

An adequate supply of potable drinking water will be supplied by each subcontractor for his/her employees.

a) At a minimum, the contractor must supply one (1) quart per hour, per person for the entire shift. The contractor may begin the shift with smaller quantities of water if they have effective procedures for replenishment during the shift.

b) Employees will be notified of the location of potable drinking water and encouraged to drink.

c) Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Water shall not be dipped from containers.

d) The common drinking cup is prohibited. Where single service cups are supplied, both a sanitary container for the unused cups and a trash receptacle for disposing of the used cups shall be provided.

e) TRAMMELL CROW will have a bottled water service supply the potable water for their employees, and the bottled water will be located in the TRAMMELL CROW trailer.

3) Provisions for Shade: Contractors are required to provide access to shade for worker relief from the heat as follows:

a) When the temperature exceeds 85^{o} Fahrenheit.

b) When the temperature is below 85^{o} Fahrenheit but is requested by a worker.

c) The shade structures must either be open to the air or provided with ventilation or cooling.

d) The amount of shade present must be at least enough to accommodate 25% of the workers on the shift at any time so that they can sit in a normal posture without having to be in physical contact with each other.

e) The shaded area shall be as close as practicable to the areas where workers are working.

f) Where the contractor can demonstrate that it is infeasible or unsafe to have a shade structure, alternative procedures such as using a misting machine may be provided in lieu of shade if the contractor can demonstrate that these measure are at least as effective as shade in allowing workers to cool.

g) Workers should be allowed and encouraged to take a cool-down rest in the shade for a period of no less than five (5) minutes at a time when they feel the need to do so to protect them from overheating. Such access to shade shall be permitted at all times.

h) The TRAMMELL CROW trailer will be used as the shade structure for all TRAMMELL CROW employees.

4) High-Heat Procedures: When temperatures exceed 95^{o} Fahrenheit, contractors shall implement the following procedures:

a) An effective communication system shall be established by voice, observation, or electronic means so that workers may contact a supervisor when necessary. Cell phones and electronics may only be used if reception in the area is reliable.

b) A continuous monitoring of workers for signs or symptoms of heat illness.

c) A reminder to all workers that hydration with water is important to prevent heat illnesses.

d) Close supervision of a new workers by a supervisor or designee for the first 14 days of the worker's employment by the contractor, unless the worker indicates at the time of hire that he/she has been doing similar outdoor work for at least 10 of the past 30 days for four (4) or more hours per day.

	Symptoms	Treatment
Heat cramps	Muscle spasms in legs or abdomen	• Move person to a cooler location • Stretch muscles for cramps • Give cool water or electrolyte-containing fluid to drink
Heat exhaustion	Headaches Clumsiness Dizziness/Lightheadedness/Fainting Weakness/Exhaustion **Heavy sweating/Clammy/Moist skin** Irritability/Confusion Nausea/Vomiting **Paleness**	• Move person to a cooler place (**do not leave alone**) • Loosen and remove heavy clothing that restricts evaporative cooling • If conscious, provide small amounts of cool water to drink • Fan person, spray with cool water, or apply a wet cloth to skin to increase evaporative cooling • **Call 911** if not feeling better within a few minutes
Heat stroke	**Sweating may or may not be present** **Red or flushed, hot dry skin** Bizarre behavior Mental confusion or loss of consciousness Panting/Rapid breathing Rapid, weak pulse Seizures or fits	• **Call 911** • Move person to a cooler place (**do not leave alone**) • Cool worker rapidly • Loosen and remove heavy clothing that restricts evaporative cooling • Fan person, spray with cool water, or apply a wet cloth to skin to increase evaporative cooling

(**First Aid Awareness and Actions In The Event Of A Heat Related Illness)**

DD) SILICA EXPOSURE PLAN

The purpose of this policy is to provide awareness about hazards associated with respirable silica dust and outline the precautions to take to ensure employees and subcontractors who work with, or around silica are not exposed to hazardous levels of silica dust. Furthermore, this policy is to provide procedures for common silica related work duties to minimize exposure to workers in accordance with the OSHA Respirable Crystalline Silica standard (29 CFR 1926.1153).

Crystalline silica is a basic component of soil, sand, granite and many other minerals. Quartz is the most common form of crystalline silica. All materials containing silica can result in the presence of respirable silica particles when chipping, cutting, drilling or grinding takes place. Silica exposure occurs through inhalation of silica containing particles and occurs through many construction methods. Exposure to excessive silica dust over long periods of time can result in silicosis, lung cancer, other respiratory diseases, and kidney disease.

Activities that may result in severe silica exposure include:

- Abrasive blasting
  Concrete crushing
- Rock drilling
- Drilling of concrete, blocks or bricks
- Chipping of concrete, blocks or bricks
- Tuckpointing of blocks or bricks
- Moving or dumping of concrete or rocks
- Using coatings containing silica
- Jack hammering
- Hoe ramming
- Mixing of concrete, mortar or grout
- Sawing of concrete, blocks or bricks
- Demolition of concrete blocks or bricks
- Grinding or polishing of concrete
- Rock crushing
- Removing coatings containing silica

1) Definitions

a) **Action Level** means a concentration of airborne respirable crystalline silica of 25 µg/m3, calculated as an 8-hour TWA.

b) **Assigned Protection Factor (APF)** means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the [employer/subcontractor] implements a continuing, effective respiratory protection program. (For example, an APF of 10 for a respirator means that a user could expect to inhale no more than one tenth of the airborne contaminant present).

c) **Competent Person** means an individual who is capable of identifying existing and foreseeable respirable crystalline silica hazards in the workplace and who has authorization to take prompt corrective measures to eliminate or minimize them. The competent person must have the knowledge and ability to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.

d) **Employee Exposure** means the exposure to airborne respirable crystalline silica that would occur if the employee were not using a respirator.

e) **Engineering and Work Practice Controls** mean the [employer/subcontractor] shall use engineering and work practice controls to reduce and maintain employee exposure to respirable crystalline silica to or below the PEL, unless the [employer/subcontractor] can demonstrate that such controls are not feasible. (EWPC examples are wet methods, local exhaust venation, and vacuum tool system).

f) **High-Efficiency Particulate Air [HEPA] Filter** means a filter that is at least 99.97% efficient in removing mono-dispersed particles of 0.3 micrometers in diameter.

g) **Objective Data** means information, such as air monitoring data from industry-wide surveys or calculations based on the composition of a substance, demonstrating exposure to respirable crystalline silica associated with a particular product or material or a specific process, task, or activity. The data must reflect workplace conditions closely resembling or with a higher exposure potential than the processes, types of material, control methods, work practices, and environmental conditions in the [employer/subcontractor]'s current operations.

h) **Permissible Exposure Limit (PEL)** limits worker exposures to 50 µg/m^3 of respirable crystalline silica per cubic meter of air, calculated as an 8-hour TWA. This is OSHA's limit for silica dust exposure.

i) **Respirable Crystalline Silica** means quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device.

2) General Guidelines for Controlling Silica Exposure

a) For each employee engaged in a task identified on Table 1 (below), the subcontractor shall fully and properly implement the engineering controls, work practices, and respiratory protection specified for the task on the table below, unless the [employer/subcontractor] assesses and limits the exposure of the employee to respirable crystalline silica in *accordance with section (2C) of this plan.*

Table 1:

Equipment / Task	*Engineering and work practice control methods*	*Required respiratory protection and minimum assigned protection factor (APF)*	
		≤ 4 hours/shift	*> 4 hours/shift*
Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade --- Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None ---	None ---
Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions: --- - When used out doors - When used indoors or in an enclosed area	 --- None APF 10	 --- APF 10 APF10
Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency	None	None
Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions: --- - When used out doors - When used indoors or in an enclosed area	 --- None APF 10	 --- None APF 10
Drivable saws	For task performed outdoors only: Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None
Rig-mounted	Use tool equipped with integrated water deliv-	None	None

core saws or drills	ery system that supplies water to cutting surface Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
Handheld and stand-mounted drills (including impact and rotary hammer drills	Use drill equipped with commercially available shroud or cowling with dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism Use a HEPA-filtered vacuum when cleaning holes	None	None
Dowel drilling rigs for concrete	For task performed outdoors only: Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter cleaning mechanism Use a HEPA-filtered vacuum when cleaning holes	APF 10	APF 10
Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector --- Or --- Operate from within an enclosed cab and use water for dust suppression on drill bit	None --- --- None	None --- --- None
Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact: --- - When used out doors - When used indoors or in an enclosed area --- Or Use tool equipped with commercially available shroud and dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism: ---	--- None APF 10 --- --- ---	--- APF 10 APF 10 --- --- ---

	-When used outdoors -When used indoors or in an enclosed area	None APF 10	APF 10 APF 10
Handheld grinders for mortar re-moval (i.e., tuckpointing)	Use grinder equipped with commercially avail-able shroud and dust collection system -- Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism	APF 10 --------------	APF 25 ---------------
Handheld grinders for uses other than mortar removal	For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions -- Or Use grinder equipped with commercially avail-able shroud and dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism: -- - When used out doors - When used indoors or in an enclosed area	None -------------- -------------- None None	None --------------- --------------- None APF 10

Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface --- Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Or --- Use machine equipped with dust collection system recommended by the manufacturer --- Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes	None --- --- None --- --- None	None --- --- None --- --- None
Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant Operate and maintain machine to minimize dust emissions	None None	None None
Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust --- Operate and maintain machine to minimize dust emissions For cuts of four inches in depth or less on any substrate: --- Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust --- Operate and maintain machine to minimize dust emissions Or --- Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant Operate and maintain machine to minimize dust emissions	None --- --- None --- --- None	None --- --- None --- --- None
Crushing	Use equipment designed to deliver water spray	None	None

machines	or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points) Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station		
Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab --- When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions	None --- None	None --- None
Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: Demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions --- Or When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab	None --- None	None --- None

b) Where an employee performs more than one task on Table 1 during the course of a shift:
   i) And the total duration of all tasks combined is more than (> *4)* four hours the required respiratory protection for each task is the respiratory protection specified for more than (> *4)* four hours per shift.
   ii) If the total duration of all tasks on Table 1 combined is less than (≤ *4)* four hours, the required respiratory protection for each task is the respiratory protection specified for less (≤ *4)* than four hours per shift.

c) For tasks not listed in Table 1, or where the [employer/subcontractor] does not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1:
   i) The [employer/subcontractor] shall assess the exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level (25 µg/m3). This exposure assessment can be performed in several ways:
      - Air monitoring over an 8-hour TWA or Objective Data.
      - Air monitoring: for a list of different air monitoring methods and directives see OSHA 1926.1153(d).
      - Objective data: for a list of requirements on objective data see OSHA 1926.1153(j)(2).

3) Housekeeping

a) The [employer/subcontractor] shall not allow dry sweeping or dry brushing where such activity couldcontribute to employee exposure to respirable crystalline silica. Use the following:
   - Wet sweeping or wet mopping
   - HEPA filtered vacuuming

b) The [employer/subcontractor] shall not allow compressed air to be used to clean clothing or surfaces where such activity could contribute to employee exposure to respirable crystalline silica.

4) Written Exposure Control Plan

a) The [employer/subcontractor] shall establish and implement a written exposure control plan using the *Written Exposure Control Plan* (appendix) that contains at least the following elements:
   i) A description of the tasks in the workplace that involve exposure to respirable crystalline silica;
   ii) A description of the engineering controls, work practices, and respiratory protection used to limit employee exposure to respirable crystalline silica for each task;
   iii) A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica; and
   iv) A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to respirable crystalline silica and their level of exposure, including exposures generated by other [employer/subcontractor]s or sole proprietors.
   v) See sample at the end of this section.

b) The [employer/subcontractor] shall review and evaluate the effectiveness of the written exposure control plan at least annually and update it as necessary.

c) The [employer/subcontractor] shall make the written exposure control plan readily available for examination and copying, upon request, to each employee covered by this section and their designated representatives.

d) The [employer/subcontractor] shall designate a competent person to make frequent and regular inspections of job sites, materials, and equipment to implement the written exposure control plan.

5) Medical Surveillance

a) The [employer/subcontractor] shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for each employee who will be required under this plan to use a respirator for 30 or more days per year.

b) Employees exposed on an ongoing basis to silica dust or any employee working with silica develops signs / symptoms of excessive exposure, should be enrolled in the Medical Surveillance Program.

c) The medical surveillance program consists, at a minimum, of baseline examination and chest X-ray.

d) Employees enrolled in the medical surveillance program should be examined annually to track any changes as a result to exposure to silica dust.

6) Training and Recordkeeping

a) Hazard Communication on Silica and Silica Awareness Training shall be conducted initially upon hiring / affected employees prior to working with silica, and consist of:
   i) Cover respirable crystalline silica in the program
   ii) Employee has access to labels on containers of crystalline silica
   iii) Potential health effects and symptoms of exposure to respirable silica
   iv) Safety data sheets for silica, quartz, and applicable products containing silica
   v) Set up of regulated area to mark the boundaries of work areas containing silica dust
   vi) The use of engineering controls, work practices, and good housekeeping to control silica dust
   vii) Use and care of PPE
   viii) Expected exposures to silica dust
   ix) Exposure monitoring process
   x) Medical surveillance process

b) The [employer/subcontractor] is required to maintain all training, medical surveillance, and exposure monitoring results.

SAMPLE - WRITTEN EXPOSURE CONTROL PLAN

Company: ABC Construction, Inc.

Person Completing the Plan: John Doe, Owner

Description of Task:
Demolishing concrete and tile floors inside commercial buildings using a jackhammer.

Control Description:

Controls:

- Use jackhammer equipped with the appropriate, commercially available shroud and a vacuum dust collection system with the flow rate recommended by the jackhammer manufacturer, a filter that is at least 99% efficient, and a filter cleaning mechanism.
- Use a portable fan to exhaust air and prevent the buildup of dust.

Work Practices:

- Check shrouds and hoses to make sure they are not damaged before start of work.
- Make sure the hoses do not become kinked or bent while working.
- Use switch on vacuum to activate filter cleaning and the frequency recommended by the manufacturer.
- Replace vacuum bags as needed to prevent overfilling.
- Use the jackhammer and vacuum controls according to the manufacturer's instruction for reducing the release of visible dust.
- If visible dust increases, check the controls and adjust as needed.

Respiratory Protection:

- Use respirator with an Assigned Protection Factor (APF) of 10 the entire time the task is being performed.
- See the written respiratory protection program for information on selection, training and fit-testing requirements, in addition to proper use instruction for respirators (for example, being clean shaven when using a respirator that seals against the face).

Housekeeping:

- Dust containing silica on work surfaces and equipment must be cleaned up using wet methods or a HEPA-filtered vacuum.
- Do not use compressed air or dry sweeping for removing dust and debris containing silica from work surfaces.
- Dispose of used vacuum bags in a container and keep the container sealed.

Procedures Used to Restrict Access to Work Areas:

- Schedule the work so that only employees who are engaged in the task (the jackhammer operator and employees helping the operator) are in the work area.