



SAFETY STATEMENT

Since our beginning in 1986, KIER Construction has been deeply concerned about the safety and general welfare of our employees. "SAFETY IS FIRST," has been and will always be a part of our company for decades to come. To focus the attention of everyone who is a part of KIER Construction on safety, we have adopted a Safety and Health Program for all employees and subcontractors.

It is our sincere objective to eliminate all occupational accidents and incidents on our projects. To compromise this absolute objective to any degree is socially irresponsible and unacceptable to the company.

This formalized program is a part of KIER Construction's way of doing business and the standard by which each of us should be judged. We expect everyone involved with us to adopt these standards as their own.

Clint R. Costley, President



SAFETY AND HEALTH PROGRAM

It is the policy of Kier Construction to provide to the best of our ability, an incident-free work environment by eliminating recognized hazards from the workplace. Our Safety and Health Program, and specific individual programs, have been developed to assure compliance with federal, state and local regulations with particular emphasis on the Utah Occupational Safety and Health Rules and Regulations that apply to our operations.

In order to maintain the safety standards desired by Kier Construction, it is necessary to actively pursue an incident prevention program through all levels of our company, from management through all employees. Safety and health are functional responsibilities of every employee.

Compliance with this program and safety and health rules is taken very seriously. This means that failure to comply is sufficient grounds for disciplinary action, which may include termination. These policies are an integral part of the company's personnel policies.

Utah Occupational Safety and Health Act

The Utah Occupational Safety and Health Act (with amendments as of August 2003) provides that every employer engaged in business in the State of Utah shall:

- ◆ Furnish to each employee a place of employment free from recognized hazards that are causing or likely to cause death or serious physical harm.
- ◆ Comply with occupational safety and health standards rules, regulations and orders pursuant to the Act that are applicable to company business and operations.
- ◆ Comply with, and require all employees to comply with, occupational safety and health standards and regulations under the Act which are applicable to their actions and situations.
- ◆ Encourage employees to contact their immediate superior for information that will help them understand their responsibilities under the Act.



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WORKFORCE RESPONSIBILITIES

Management

Management has the overall responsibility for the construction and management of all projects. This responsibility includes oversight of the safety of all personnel on the jobsites, and monitoring to ensure personnel are indoctrinated with the safety philosophy and commitment of Kier Construction's Safety and Health Program. Management is responsible to facilitate any and all aspects of the program and ensure improvements are made when needed.

Duties include:

- ▶ Appoint, or assist in the selection of, appropriate persons to administer the safety process.
- ▶ Ensure safety is a key component of all performance evaluations and subsequent incentives.
- ▶ Support the need for project safety and ensure safety is a high priority.
- ▶ Actively participate in Superintendent's meetings and report on the company's current events quarterly.
- ▶ Communicate to the field that management fully supports the safety program and will compensate for safe work practices.
- ▶ Seek safety conscious individuals when hiring new personnel.
- ▶ Support project management's decision in suspension/termination of subcontractors for noncompliance of safety policies.
- ▶ Be open to new advances in safety technology.

Safety Director/Safety Manager

Duties include:

- ▶ Provide all levels of management the services and technical advice needed for proper administration of the Safety and Health Program
- ▶ Develop programs and technical guidance to identify and remove physical, chemical and biological hazards from facilities, operations and jobsites
- ▶ Formulate, recommend and administer approved changes to the Safety and Health Program.
- ▶ Assist management in the safety training of employee.
- ▶ Ensure all new employees receive New Hire Safety Orientation
- ▶ Conduct inspections to identify unhealthy or unsafe conditions or work practices. Prepare written reports of inspections.
- ▶ Recommend programs and activities that will develop and maintain incentives for and motivation of employees in safety.
- ▶ Recommend disciplinary procedures for violators of safety rules
- ▶ Maintain the state safety and health posters, emergency telephone numbers, OSHA forms and logs, and other notices required by UOSHA. Ensure this information is posted in places where employees can see it on each jobsite
- ▶ Develop and maintain incident investigation and reporting procedures and systems
- ▶ Report occupational fatalities and serious injuries to UOSHA within 12 hours of occurrence.

Project Managers

Project Managers are responsible for implementing the Safety and Health Program at the project level.

Duties include:

- ▶ Prior to the start-up of new projects, meet with the Safety Director and the Superintendent to develop a Site Specific Safety Plan (SSSP) by reviewing potential safety hazards and the need for specific safety equipment, testing, employee training, signage and postings
- ▶ Work with the Safety Director and Superintendent to develop a site emergency medical plan
- ▶ Administer contractual agreements and support enforcement of subcontractor safety compliance



- ▶ Attend and actively participate in site safety meetings on a monthly basis
- ▶ Attend and actively participate in pre-construction meetings with major subcontractors. Ensure all other pre-construction meetings take place
- ▶ Perform monthly project review, document and send the report to the office.
- ▶ Ensure unsafe acts are corrected immediately.
- ▶ Maintain good relations with the owners and employees to support safety compliance.

Superintendents / Foremen

Duties include:

- ▶ Responsible to implement and manage the Safety and Health Program on the jobsite.
 - Perform and document daily site inspections to identify and/or predict unsafe acts or conditions, and to implement or assign corrective measures and their related follow-ups.
 - Ensure project subcontractors are performing their required HAZCOM, OSHA / ANSI / manufacturer's tests or inspections (via inspection log audits, checklists, document copies, etc.) on tools, equipment, scaffolds, trenches, materials, etc.
 - Notify Project Manager of any subcontractor safety violations, inform Safety Director of repeat offenders and uncooperative subcontractors.
 - Incorporate the safety factor in operational planning (i.e., plans that will predict and eliminate hazards, preferably before they have an exposure), that may impact the work force in general and/or the public.
- ▶ Provide for time with new hires to reaffirm safety policies, site specific safety orientation, site safety considerations, and the hazards associated with his/her work assignment.
- ▶ Provide for personal protective equipment (PPE), machine guards, warning signs and barricades, fire extinguishers, etc., prior to need.
- ▶ Responsible for holding weekly Safety Tool Box meetings and that the meetings and attendees are properly entered in the log book. During these meetings, teaches or demonstrates safe practices. Discusses unsafe conditions found, corrections made, near misses, safety training lessons, any injuries and how to avoid reoccurrence.
- ▶ Maintain appropriate safety reference materials, first aid supplies and personal protection equipment.
- ▶ Secure prompt medical attention for any injured employee. (Treat the patient and then treat the paper work.)
- ▶ Display bulletin board in conspicuous place with OSHA, federal and state required posters. Includes area emergency phones numbers, posters and other information from the insurance carrier and corporate office. Keep board maintained and up-to-date.
- ▶ Correct, log and report all unsafe conditions, practices or near misses to the Project Manager or Safety Director. This information will be discussed in the monthly Safety meeting and weekly Tool Box meetings.
- ▶ Notify Safety Director of any safety violations.
 - Supervise and ensure prompt and proper handling of incidents.
 - Contact Safety Director by phone if incident is serious (hospitalized), questionable or non-work related.
 - Ensure injured employee is transported to an approved and authorized medical facility.
 - All incidents are thoroughly investigated the same day, or as soon as possible.
 - All incidents, including first-aid, are reported and a Supervisor's Accident/Injury Report is filled out and forwarded to the office within two (2) working day of the accident/incident along with all original paperwork from the clinic/hospital/ doctors.
 - Forward original notification of the injured employee's return to work date, restrictions, next or follow-up doctors visit to the office. A copy will be returned to the employee.
- ▶ Set up pre-construction meetings with all subcontractors and their supervisors before their scope-of-work begins.
- ▶ Provide for the protection of the public from company operations.
- ▶ Maintain jobsite orderliness and good housekeeping.
- ▶ Maintain good relations with the owners and employees to support safety compliance.
- ▶ Never allow personnel to shortcut safety for expediency. Safe working conditions will always give you better efficiencies in the long run.



- ▶ Motivate crews to do a good job safely in the minimum practical time. Plan your work ahead of time to get tools and materials when needed. Clearly instruct each worker and follow through to see your instructions are carried out.
- ▶ Take care to see all materials, tools and equipment are used properly and protected from loss or damage.
- ▶ Stop your crew to correct hazards that are an immediate danger to the public, your crew or equipment.
- ▶ Be thoroughly familiar with the “Safety and Health Regulations for Construction.” Safety Director has a copy of the CFR Standards.
- ▶ Advise subcontractors of our established company safety standards and other applicable rules that will be required for compliance with our program.

Employees

The direct responsibility of all employees is that no job can be considered competently finished unless the worker has followed every precaution and safety rule to protect himself and his fellow workers. **The philosophy of production and safety must be inseparable.**

- ▶ Read and acknowledge an understanding of Kier Construction’s ‘Safety and Health Program’ and Substance Abuse Policy by signing the acknowledgment found in the back of this handbook and turn it into the Human Resource Director. This acknowledgment will be placed in your personal file. If any questions arise about company policy, ask your Superintendent, Safety Director or Human Resource Director.
- ▶ Report for work in good mental and physical condition to safely carry out assigned duties.
- ▶ Work safely in such a manner as to ensure your own safety as well as that of coworkers and others.
- ▶ Request help when unsure about how to perform any task safely.
- ▶ Correct all unsafe conditions and practices and report them along with all near misses to the Superintendent for discussion in the weekly Safety Tool Box meeting.
- ▶ Use and maintain all personal protection equipment and safety devices provided.
- ▶ Observe all safety rules and regulations as outlined in this handbook. Work in strict conformance with federal, state and local regulations.
- ▶ Strive to make all operations safe.
- ▶ Keep all work areas clean and free of debris.
- ▶ Before leaving your work area, replace or repair safety precaution signs that have been removed or altered. Unsafe conditions shall not be left to imperil others.
- ▶ Attend all weekly Safety Tool Box meetings conducted by your Superintendent and monthly Safety meetings conducted by the Safety Director.

Subcontractors

Never sacrifice safety for anything! Safety must be considered an integral part of quality control, cost reduction and job efficiency. Every subcontractor’s supervisor will be held accountable for the safety performance demonstrated by the employees under his supervision.

- ▶ All subcontractors and their employees are required to comply with Kier Construction’s Safety and Health Program and substance abuse policy, company rules and all Occupational Safety and Health Construction Standards along with other federal, state and local safety requirements while working on Kier Construction jobsites or on company premises.
- ▶ All contracts and subcontracts require that state laws concerning health and safety will be observed by the subcontractor. The provisions of these health and safety responsibilities apply to subcontractors, and their employees working for Kier Construction. Failure to fulfill this requirement is a failure to meet the conditions of the contract.
- ▶ Notify all other contractors when their activities could affect the health or safety of other companies’ employees.
- ▶ Check in with the Kier’s jobsite Superintendent before entering the jobsite.



- ▶ Submit copies of SDSs for all hazardous materials prior to bringing those materials on the jobsite.
- ▶ Report to controlling contractor any unsafe conditions that come to your attention.

Visitors

Visitors include owners, architects, engineers, suppliers, etc.

- ▶ Inform Kier's Superintendent before entering a project.
- ▶ Observe all safety rules and regulations as outlined in this handbook, the Occupational Safety and Health Construction Standards and all other state and local safety requirements.
- ▶ Report to controlling contractor any unsafe conditions that come to your attention.

PROTECTION FOR THE GENERAL PUBLIC

Protect the general public from injury or incident by providing warning and protective devices (i.e., signs, flags, lights, barricades, etc.), and keeping pedestrian walkways from obstacles or obstructions.

Where vehicular traffic needs to be rerouted, post a flagman.

Keep spectators (especially children) away from the jobsite. Always be courteous but firm in dealing with the public.

In the event of an incident involving the public resulting in injury or property damage, the Superintendent shall make a detailed written report on the day of the incident and submit it to the Safety Director and Project Manager.

MEDICAL SERVICES AND FIRST AID

All emergency telephone numbers shall be conspicuously posted near the phone (e.g., **9-1-1**, ambulance, hospital, doctor, fire department, paramedics, etc.).

First aid supplies shall be readily available and stored where readily accessible. Remote properties may require special provision medical supplies (contact the Safety Director).

When a medical facility is not readily accessible, a person trained to render first aid shall be available at the property.

Definition of First Aid

The national First Aid Science Advisory Board defined first aid as assessments and interventions that can be performed by a bystander (or by the victim) with minimal or no medical equipment. A first aid provider is defined as someone with formal training in first aid, emergency care or medicine who provides first aid.

First Aid Applications

You are likely to encounter an emergency needing first aid several times during your life. Your quick, calm thinking and application of first aid principles may make the difference between life and death.

This section is not intended to teach you all there is to know about first aid, nor is it a certification program. Such knowledge can only be obtained by attending first aid training courses and/or by extensively reading and studying books on first aid. The purpose of this section is to acquaint you with the most basic and elementary first aid procedures that may be needed to save a life in an emergency. Local emergency numbers should be posted in a conspicuous place.



Calling for Help

The single most important information for a first aid provider is to know how to get help. Rescuers should learn how and when to access the EMS system, how to activate the on-site emergency response plan (ERP), and how to contact the Poison Control Center.

Emergency Care

Depending on the type of emergency, you will have to make a quick decision of what to do first and what not to do.

- ▶ Keep the victim lying down, head level with body until you have made some assessment of the problem.
- ▶ If the victim is in severe shock, place the victim on their back with legs slightly elevated.
 - If the victim is vomiting or bleeding from the mouth and is semi-conscious, there is danger of the victim aspirating (inhaling or swallowing) this material - place the victim on their side.
 - Shortness of breath. If the victim has a chest injury, place the victim in a sitting or semi-sitting position of comfort.
 - If there is suspicion of neck or spinal injury, do not move the victim unless necessary to prevent further harm or injury to the victim or rescuers.
- ▶ Examine the victim for hemorrhage (serious bleeding), asphyxiation (suspended breathing) and shock. All of which require immediate treatment. The primary survey covers these areas:
 - Open airway.
 - Check breathing.
 - Check circulation (pulse).
 - Stop hemorrhage.
- ▶ Do not move the victim more than is absolutely necessary. Remove clothing only enough to determine the extent of the injuries. It is preferable to rip or cut to remove clothing. (Removing clothing in a conventional manner may compound the injuries if they are severe.)
- ▶ Keep the victim reassured and as comfortable as possible until professional help arrives.
- ▶ If the victim's injuries are extensive, it is best to not let them see their injuries.
- ▶ Do not touch open wounds.
- ▶ Do not give an unconscious person any solids or liquids by mouth.
- ▶ Do not move the victim unless absolutely necessary to prevent further harm or injury. If you must move the victim, do it keeping the lengthwise axis of the body straight and holding the spine if possible.

Positioning the Victim

As a general rule, a victim should not be moved, but there are times when you should do so:

- ▶ If the area is unsafe for you or the victim, move the victim to a safe location.
- ▶ If the victim is face down and needs CPR, turn the victim face up.
- ▶ If the victim is unresponsive, has an open airway and is breathing spontaneously, turn the victim onto his/her side (recovery position) with the victim's hand in front. Be aware of the potential for nerve and vessel injury if the victim lies on one arm for a prolonged period; it may be necessary to roll the victim to the other side.
- ▶ If you suspect the victim might have a spinal injury, it is best not to move the victim. If the injured victim is unresponsive and has difficulty breathing because of copious secretions or vomiting, or if you are alone and have to leave the victim to get help, place the victim in a modified HAINES recovery position by extending one of the victim's arms above the head and rolling the body to the side so the victim's head rests on the extended arm. Bend both legs to stabilize the victim.

Keep the victim warm, but not overly hot. **Remember, by far the greater number of injuries will require a minimum of effort on your part and a maximum of judgment and self-control to prevent doing too much.**



In emergency situations, rapid, calm, efficient efforts can minimize problems; and even in prolonged emergency situations, sticking with standard first aid care may be better than risking life-threatening procedures.

Immediate Lifesaving Measures

Most injuries can be dealt with calmly and without hurry. However, in serious life threatening injuries, first steps must be taken immediately to preserve life.

- ▶ First, open the victim's airway and restore breathing and heartbeat if necessary (see Cardiopulmonary Resuscitation - CPR - below);
- ▶ Second, stop any bleeding (see Bleeding below) then dress and bandage wounds to prevent infection;
- ▶ Third, treat for poisoning; and
- ▶ Fourth, treat for shock.

Respiratory Emergencies

A person who has stopped breathing is not necessarily dead, but is in critical danger. Life is dependent upon oxygen which is breathed into the lungs and then carried by blood to every body cell. Since body cells cannot store oxygen, and since the blood can hold only a limited amount, death will surely result from continued lack of breathing (oxygen must be provided in three to six minutes or damage to the brain cells or death will occur).

The heart may continue to beat for a time after breathing has stopped and the blood may still be circulated to the body cells. Thus, for a few minutes there is a chance to save a life, by the means of **artificial respiration**. Mouth-to-mouth resuscitation is the approved method for this.

Mouth-to-Mouth Resuscitation

People may stop breathing because of electrical shock, drowning, suffocation, poisoning, a physical blow to the head, chest or abdomen or any number of other causes. If you suspect an individual is not breathing, act immediately because time is life.

Waste no time, check to see if the victim is breathing. If he appears to be unconscious, tap him firmly on the shoulder and ask in a loud voice, "Are you all right?" If you get no response then immediately do the following:

- ▶ Tilt the head back so the chin is pointing upward (this is the most important action you can take to enable a person to breathe again, and may alone, in itself, help the victim to start breathing).
- ▶ Pinch the nose closed.
- ▶ Take a big breath and steadily blow into the victim's mouth.
- ▶ Watch for the chest to expand, and listen for air to come out.
- ▶ Repeat until the victim begins to breathe on his own. The victim's chest should rise with each breath. If the air goes to his stomach (as seen by the stomach rising instead of the chest) turn the victim onto his side and press on his abdomen to push the air out. Turning the victim to the side should prevent the inhalation of any regurgitated matter into the lungs. If the victim regurgitates, quickly clean the matter out of the victim's mouth with your finger and continue giving him artificial respiration. A drowning victim will almost always vomit as air replaces water in the lungs.

If the victim is a baby or young child, place your mouth over the nose and mouth rather than pinching the nostrils. Use puffs of air on an infant or young child rather than large breaths because their lung capacity is not as great as yours.

Artificial respiration may be given mouth-to-nose if the victim's mouth is severely injured. Also, if artificial respiration is necessary for a person with a stoma (an opening in the neck to facilitate breathing), just blow into the



stoma. If the stoma is open to the mouth and nose, as some are, it may be necessary to close off the nose and mouth with a free hand while using the stoma for respiration. Do not stop giving artificial respiration until the victim can breathe for himself or until he is pronounced dead by a physician.

Check the victim's carotid pulse to see if his heart is beating by placing your index and middle fingers at the side of the Adam's apple (larynx) between the muscles of the neck and the trachea.

If no pulse is detectable, begin CPR immediately. If pulse is present, continue artificial respiration but check the carotid pulse periodically to ensure his heart continues to beat.

If you have never received training in the proper administration of mouth-to-mouth resuscitation, you should consider enrolling in a class taught by the American Red Cross or other qualified institution.

CPR - Cardiopulmonary Resuscitation

CPR is a combination of artificial respiration and artificial circulation by means of external cardiac compression. CPR is almost always used in conjunction with mouth-to-mouth resuscitation. When the victim has no pulse (check the pulse as described above), artificial circulation must also be provided by the rescuer without delay. The victim must be on a hard surface, and his legs may be elevated eight to ten inches **if this can be done without injuring the victim further or delaying the administration of CPR.**

If you are alone, kneel by the victim's side and place the heel of your hand on the center of the chest one and one-half to two inches above the notch of the victim's sternum (between the nipples). Place your other hand on top of the first hand and, with arms straight and your shoulders directly above your hands, begin compressing the victim's at the rate of about one-hundred (100) times per minute. Keep your elbows straight and your fingers off the victim's chest - press only with the heel of your hand. Stop and give two quick breaths (mouth-to-mouth). Then, do thirty (30) compressions, stop and give two quick breaths (mouth-to-mouth) to provide artificial respiration, then resume compressions in this manner.

CPR should not be interrupted for longer than five seconds. CPR is not easy, and it would be difficult to perform properly after only reading about it. Instructions here are only meant to review what has already been learned.

CPR should be learned under competent supervision with hands-on experience gained in the learning. Take a class on CPR. The life of a loved one or co-worker may depend on it.

Bleeding

Extensive bleeding can cause death if not stopped promptly. External bleeding can be stopped by direct pressure when applied at an appropriate location on the supplying artery, or by use of a tourniquet, as a drastic last effort to save a life.

- ▶ Direct pressure is the first step in controlling bleeding, and is applied by pressing a sanitary dressing directly to the wound. If there is no dressing available, use the bare hand. If blood soaks through a dressing **do not remove it**, add another dressing on top and continue the pressure. If bleeding persists, continue direct pressure and **elevate** the extremity above the heart. Gravity helps reduce blood pressure and thus slows bleeding to allow clotting.

You can use an elastic bandage firmly wrapped over the gauze to hold it in place with pressure.

- ▶ Nose bleeds can usually be treated effectively by having the victim sit upright in a comfortable position and then squeezing the nostrils together. The pressure should be applied equally to both sides of the nose and



should be hard enough to stop bleeding out of the nostrils or down the back of the throat. Continue the pressure for 10 to 15 minutes.

- ▶ A tourniquet should be used only in extreme cases when direct pressure has failed to stop the bleeding and the victim's life is in danger, or in the case of traumatic amputation. The use of a tourniquet will very likely result in the loss of the limb to which it is applied. Once a tourniquet has been applied, it should not be removed or loosened until done by a physician.

If you do not have a specially designed tourniquet, you can make one with any soft, strong, pliable material such as cloth or gauze. The band of material should be about two inches wide or wide enough so it will remain at least one inch wide after it is tightened. A stick or other rigid material is needed to tighten the tourniquet. Place the band around the limb slightly above the wound (two [2] to four [4] inches). Tie a knot in the band, leaving it loose enough to insert a stick. Insert the stick under the band and twist until sufficient pressure to stop the bleeding is applied. Secure the end of the stick to the victim so it will not come loose. Record the time the tourniquet was applied and seek medical assistance immediately. **Again, never use a tourniquet unless life is threatened!**

The effectiveness, feasibility and safety of tourniquets to control bleeding by first aid providers are unknown, but the use of tourniquets is potentially dangerous. Pressure has been found to be superior to tourniquets in controlling bleeding.

Always treat a victim of severe bleeding for shock.

Shock

In any first aid emergency treat for shock! Shock may be immediate or delayed and is a life threatening illness that can be caused by almost any traumatic injury.

Injuries involving large fluid loss such as bleeding and burns are especially prone to cause shock. Shock is a depression of the action of the nervous system and its control over body functions such as circulation and respiration and is characterized by weakness, rapid and weak pulse, paleness and cool perspiration on the victim. The pupils of the eyes may be dilated and at the extreme, the victim may also become incoherent.

Reassure and comfort the victim and have him/her lie down. Treat the causes of the shock (burn, fractures, bleeding, etc.). Maintain normal body temperature. Most shock victims begin to lose body temperature so they will need to be covered with a blanket or other warming material.

However, occasionally a shock victim's body temperature may rise, in which case you will need to lower it.

If no head injuries are present, elevate the victim's legs. Call for emergency help.

Mild fluids may be given if medical assistance is not readily available, as may be the case in an extended emergency. A saline solution made by mixing one teaspoon of salt and one-half teaspoon of baking soda in a quart of lukewarm water may be used, having the victim drink one half glass every 15 minutes. **If abdominal injuries are present, do not give fluids.** If there is any indication the victim may lose consciousness, do not give fluid because the victim may regurgitate and aspirate the vomitus.

- ▶ The symptoms of shock are:
 - Pale, cold, clammy skin.
 - Weak, rapid pulse.
 - Shallow breathing.
 - General body weakness.



- ▶ Always treat a victim for shock by:
 - Laying the victim down and elevating their feet slightly higher than the head.
 - Wrapping the victim with a blanket to avoid chilling, or cooling if the victim develops a fever.
 - Raising the head and shoulders if the victim has difficulty in breathing.
 - If medical help will not be available within 30 minutes, give a lukewarm solution of salt and baking soda every 15 minutes.
 - Never give fluids if the victim is nauseated, unconscious, has a penetrating abdominal wound or requires surgery.

Poisoning

No one wants to see someone poisoned, but it still happens over a million times a year. However, there are a large number of poisonous substances in the workplace and the home. It is important to understand the toxic nature of the chemical substances in your environment and the proper protective equipment and emergency procedures in case of toxic exposure.

Suspect a poisoning when somebody suddenly becomes sick, unconscious or behaves in an unusual manner and there is no explanation for the illness or abnormal behavior. If you take enough of anything it can be poisonous. The most critical period of time is the first hour or two after the poisoning occurs - do not delay seeking advice.

Do these things before you call for help:

- ▶ Remove poisons from contact with eyes, skin or mouth.
- ▶ Eyes: gently wash eyes with plenty of water for 10 to 15 minutes with the eyelids held open. Remove contact lenses and again wash the eyes. Do not allow victim to rub the eyes.
- ▶ Skin: wash poisons off the skin with large amounts of plain water. Then wash the skin with a detergent if possible. Remove and discard all contaminated clothing.
- ▶ Mouth: look into the victim's mouth and remove all tablets, powder, plants or any other material you find. Also examine for cuts, burns or any unusual coloring. Wipe the mouth out with a cloth and wash thoroughly with water.
- ▶ Remove the victim from contact with poisonous fumes or gases, if safe for the rescuer.
- ▶ Get the victim into fresh air. Loosen all tight-fitting clothing. If the victim is not breathing, you should start artificial respiration immediately. Do not stop until the victim is either breathing well or help arrives.
- ▶ Use oxygen if available.
- ▶ Send someone else to call for help.
- ▶ If a caustic poison has been swallowed, you should dilute it by giving one or two glassfuls of milk (or water if milk is not available).

For information about what to do next, call 9-1-1 or the Poison Control Center at 1-800-222-1222. The Poison Control Center is open 24 hours a day.

- ▶ Identify yourself and your relationship to the victim.
- ▶ Describe the victim by name, age and sex.
- ▶ Have the package of poison in your hand and identify exactly (as best you can) what the victim took and how much was taken.

Ingested Poisons

- ▶ Milk or Water – Do not administer anything by mouth unless advised to do so by a poison control center. Animal studies suggest that dilution or neutralization of a caustic agent by water or milk reduces tissue injury, but no human studies have shown a clinical benefit, and the possibility of vomiting with aspiration must be considered.



- ▶ Activated Charcoal – There is insufficient evidence to recommend for or against the use of activated charcoal as first aid for ingestions. Until more definitive evidence becomes available, do not administer activated charcoal unless you have been advised to do so by a poison control center. Many children will not take the recommended dose and there are reports of harm.
- ▶ Epecac – Do not administer syrup of ipecac for ingestions. There are several problems with ipecac. These include questions about the amount of poison removed, longer lengths of stay in the emergency department and lack of evidence that it improves outcome. Side effects include lethargy and the potential hazard of aspiration during vomiting.

Don't waste time trying other ways to make the victim vomit. Tickling the back of the throat with your fingers, a spoon or some other object is not very effective. Do not use salt water. It is potentially dangerous.

Never induce vomiting if the patient is unconscious, is having convulsions (fits) or has swallowed strong caustics or corrosives.

Induce vomiting only if you are instructed to do so by a doctor or the poison control center. Never induce vomiting until you are instructed to do so.

If you go to the hospital, take or send the poison container, poisonous plant, etc. with you. Take any vomitus you collect. Don't give substances like stimulants or drugs to the victim.

Burns

- ▶ **Degrees of burns:**
 - First degree - skin is red and tender (as in a sunburn).
 - Second degree - blisters develop, never break or open blisters.
 - Third degree - deep tissue damage.
- ▶ First Aid for first and second degree burns include:
 - Submerging in cold water (the best thing to do).
 - Applying a cold pack - not ice.
 - Covering with a thick sterile dressing leaving blisters intact. After using cold water or a cold pack, cover the burn area with a thick dry sterile dressing and bandage firmly to exclude air
- ▶ First Aid for third degree burns:
 - Apply a dry sterile dressing and bandage to keep out air - leaving blisters intact
 - If large area, wrap with clean sheet or towel.
 - Keep burned hands and feet elevated and get medical help immediately.
 - Treat the same as shock victim, giving fluids as indicated and warmth if necessary.
- ▶ First Aid for chemical burns:
 - Brush powdered chemicals off the skin with a gloved hand or piece of cloth or sash chemical away with water.
 - Remove all contaminated clothing and make sure not to contaminate yourself in the process.
 - Acid or alkali burns of the eyes - wash eye thoroughly in plain water for 10 to 15 minutes. If the victim is lying down, turn head to side. Hold the eye open and wash from inner corner outward.
 - Have the victim close the eye, place eye pad over lid, bandage and get medical help as soon as possible.
- ▶ Electrocution and Electrical Burns:

The severity of electrical injuries can vary widely, from an unpleasant tingling sensation caused by low-intensity current to thermal burns, cardiopulmonary arrest and death. Thermal burns may result from burning clothing that is in contact with the skin or from electric current traversing a portion of the body. When current transverses the body, thermal burns may be present at the points where the current entered and exited the body and internally along its pathway. Cardiopulmonary arrest is the primary cause of immediate death from



electrocution. Cardiac arrhythmias (abnormal heart rhythms), including ventricular fibrillation and ventricular tachycardia (greater than 100 beats per minute) that progresses to ventricular fibrillation, may result from exposure to low- or high-voltage current. Respiratory arrest may result from electrical injury to the respiratory center in the brain or from tetanic contractions (muscle spasms) or paralysis of respiratory muscles.

Do not place yourself in danger by touching an electrocuted victim while the power is on. Turn off the power at its source. In case of high-voltage electrocution, such as that caused by fallen power lines, immediately notify the appropriate authorities (e.g., 911, fire department, etc.). All materials will conduct electricity if the voltage is high enough, so do not enter the area around the victim or try to remove wires or other materials with any object, including wooden ones, until the power has been turned off by knowledgeable personnel.

Once the power is off, assess the victim, who may need CPR, defibrillation and treatment for shock and thermal burns. All victims of electric shock require medical assessment as soon as possible because the extent of injury may not be apparent.

▶ Thermal Burns:

Cool thermal burns with cold water as soon as possible and continue at least until pain is relieved. Cooling reduces the injury and relieves pain. There is some evidence that brief cooling of small burns with ice water may be effective, but direct application of ice to a burn may produce tissue ischemia (low oxygen level to tissue due to an obstruction), and prolonged cold exposure even of small burns can lead to further injury. Avoid cooling of burns with ice or ice water for longer than 10 minutes, especially if the burn is large.

Broken Bones

▶ Symptoms of a closed fracture:

- Pain
- Swelling
- Tenderness to touch.
- Deformity over the injured area.
- Loss of power or movement of a limb.
- Grating when the ends of the bone rub together.
- Unnatural mobility of the area.
- Discoloration.

▶ Treatment for closed fractures:

- Do not allow the victim to place weight on the injured area.
- Do not move the victim unless absolutely necessary for safety.
- Keep broken bone ends from moving.
- Keep adjacent joints from moving.
- Apply cold compresses for swelling and pain.
- Treat for shock.
- See below on splinting.

▶ Treatment for compound fractures:

- Do not move protruding bone ends.
- If bleeding, control bleeding by direct pressure on wound.
- Treat same as closed fracture after bleeding is controlled.

▶ Splinting:

- Place one hand above and one hand below fracture to support it.
- Have someone grasp end of limb and pull steadily until bone is set and splints are in place.
- Secure the splints to the limb.
- Treat for shock.



Wounds and Abrasions

Irrigate wounds and abrasions with clean running tap water for at least five (5) minutes or until there appears to be no foreign matter in the wound. If running water is unavailable, use any source of clean water. Wounds heal better and with less infection if an antibiotic ointment or cream is used; triple antibiotic ointment appears to be superior to single antibiotic ointment or cream. Apply antibiotic ointment or cream only if the victim's wound is an abrasion or is superficial.

Sprains, Strains, Contusions and Fractures

Soft-tissue injuries include joint sprains and muscle contusions. Apply cold to soft-tissue injuries. Cold application decreases hemorrhage, edema, pain and disability. Cooling is best accomplished with a plastic bag or damp cloth filled with a cooling modality that undergoes a phase change (e.g., ice). Refreezable gel packs are not as good as ice. To prevent cold injury, limit each application of cold to periods of less than 20 minutes and place a barrier, such as a thin towel, between the cold container and the skin.

There is insufficient evidence to recommend for or against the use of a compression bandage to reduce edema following a closed soft-tissue injury such as a joint sprain.

Assume any injury to an extremity includes a bone fracture. Cover open wounds with a dressing if one is available. Do not move or straighten an injured extremity. If you are far from definitive health care, you may stabilize the extremity in the position found. If an injured extremity is blue or extremely pale, activate EMS immediately because this could be a medical emergency.

Head Injuries

- ▶ Symptoms of head injuries:
 - May or may not be conscious.
 - Any changes in level of consciousness.
 - Bleeding from mouth, nose or ears.
 - Paralysis of one or more extremities.
 - Difference in size of pupils.
- ▶ First aid for head injuries:
 - No stimulants or fluids.
 - Do not raise feet, keep victim flat.
 - Observe carefully for stopped breathing or blocked airway.
 - Get medical help immediately.
 - Gently transport victim - lying flat.
 - Position head to side so secretions may flow out.
 - Loosen clothing at neck.

Spine Stabilization

There is an approximately two (2) percent risk of injury to the cervical spine after blunt trauma that is serious enough to require spinal imaging in an emergency department, and this risk is tripled in patients with craniofacial injury or a Glasgow Coma Scale (detects brain damage) score of less than eight (8). Motor vehicles cause approximately half of the injuries; the remainder are caused by falls (especially from a height or diving), sports and assaults. A victim with a spinal injury has an increased risk of permanent



Dental Injuries

Traumatic dental injuries are very common. The first aid for dental injuries:

- ▶ Handle the tooth by the crown, not the root (do not handle the part that was embedded in the gum).
- ▶ Clean bleeding wounds with saline solution or tap water.
- ▶ Stop bleeding by applying pressure with a piece of cotton for five (5) minutes.
- ▶ If there is an avulsed (torn away with nerve damage) tooth, rinse it in water (do not scrub it), place it in milk, and bring it with you and consult a dentist as quickly as possible.
- ▶ If there are other dental injuries, consult a dentist as quickly as possible.

Internal Bleeding

Treat for shock and seek medical help. There is nothing else you can do. If internal bleeding does not stop on its own, it may require surgical termination.

Seizures

The general principles of first aid management of seizures are to:

- ▶ Prevent injury,
- ▶ Ensure an open airway, and
- ▶ Ensure the airway remains open after the seizure has ended.

The victim of a seizure must be protected from injury. Protect the head with a pillow or other soft material. Do not restrain the victim during a seizure or place any object in the victim's mouth. Restraining the victim may cause musculoskeletal or soft-tissue injury. Placing an object in the victim's mouth is futile because most tongue biting occurs at the onset of seizure activity and attempts to insert an object may cause dental damage or aspiration or may injure the rescuer's fingers.

To prevent aspiration of secretions and maintain an open airway, place the victim in a recovery position after the seizure stops. (See Positioning the Victim.) It is not unusual for the victim to be unresponsive or confused for a short time after a seizure.

Anaphylaxis

Allergies are relatively common, but only a small proportion of people with allergies develop anaphylactic reactions. An anaphylactic reaction is characterized by swelling, especially of the face, breathing difficulty, shock and even death. If you become aware of a co-worker having an anaphylactic reaction, get medical attention as quickly as possible. Many people with a history of anaphylaxis carry a lifesaving epinephrine auto-injector. However, they should still seek medical attention should they have an anaphylactic reaction.

Snakebite

Do not apply suction as first aid for snakebite. Suction does remove some venom; however, the amount is very small. Suction has no clinical benefit, and it may aggravate the injury.

In case of an elapid (extremely venomous) snakebite, wrap a bandage snugly (comfortably tight but loose enough to slip or fit a finger under it) around the entire length of the bitten extremity. Immobilize the extremity and get definitive medical attention as rapidly as possible.

Wrapping the extremity slows dissemination of venom by slowing lymph flow. There is a paucity of studies evaluating whether pressure and immobilization bandage are effective in bites of non-elapid snakes.



Cold Related Emergencies

Hypothermia – Hypothermia is caused by exposure to cold. The urgency of treatment depends on the length of exposure and the victim’s body temperature. Immediately begin rewarming a victim of hypothermia. Move the victim to a warm environment, remove wet clothing and wrap all exposed body surfaces with anything at hand, including blankets, clothing, newspapers, etc. If you are far from definitive health care, you may begin active rewarming for a victim of hypothermia. For example, active rewarming may be achieved by placing the victim near a heat source and placing containers of warm, but not hot, water in contact with the skin. Active rewarming should not delay definitive care.

Frostbite – Frostbite usually affects an exposed extremity. In case of frostbite, remove wet clothing and make sure the victim does not develop hypothermia. Get the victim to a medical facility as rapidly as possible. Do not try to rewarm the frostbite if there is any chance that it might refreeze or if you are close to a medical facility. If you are in a remote area far from a medical facility, you may slowly rewarm the frostbite using warm water (100°F to 105°F).

Heat Related Illnesses

Heat related illness usually comes in stages. The signal of the first stage is heat cramps in muscles. These cramps can be very painful. If you are caring for a person who has heat cramps, have him or her stop activity and rest. If the person is fully awake and alert, have him or her drink small amounts of cool water or a commercial sports drink. Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat these steps if necessary. If the victim has no other signals of heat related illness, the person may resume activity after the cramps stop.

General care for heat emergencies:

- ▶ Cool the body.
- ▶ Give fluids.
- ▶ Minimize shock.

The signals of the next, more serious stage of a heat related illness (often called heat exhaustion) include:

- ▶ Cool, moist, pale skin (the skin may be red right after physical activity).
- ▶ Headache.
- ▶ Dizziness and weakness or exhaustion.
- ▶ Nausea.
- ▶ The skin may or may not feel hot.

For heat cramps or heat exhaustion: Get the person to a cooler place and have him/her rest in a comfortable position. If the person is fully awake and alert, give a half glass of cool water every 15 minutes. Do not let him/her drink too quickly. Do not give liquids with alcohol or caffeine in them, as they can make conditions worse. Remove or loosen tight clothing and apply cool, wet cloths such as towels and wet sheets. Call **9-1-1** if the person refuses water, vomits or loses consciousness.

The signals of the late stage of a heat related illness (often called heat stroke) include:

- ▶ Vomiting.
- ▶ Decreased alertness level or complete loss of consciousness.
- ▶ High body temperature (sometimes as high as 105°F).
- ▶ Skin may still be moist or the victim may stop sweating and the skin may be red, hot and dry.
- ▶ Rapid, weak pulse.
- ▶ Rapid, shallow breathing.



For heat stroke: Heat stroke is a life threatening situation! Help is needed fast. Call **9-1-1** immediately. Move the person to a cooler place. Quickly cool the body. Wrap wet sheets around the body and fan it. If you have ice packs or cold packs, wrap them in a cloth and place them on each of the victim's wrists and ankles, in the armpits and on the neck to cool the large blood vessels. (Do not use rubbing alcohol because it closes the skin's pores and prevents heat loss.) Watch for signals of breathing problems and make sure the airway is clear. Keep the person lying down.

Drowning

Drowning is a major cause of unintentional death. It can be prevented with isolation fencing around swimming pools, wearing personal flotation devices (life jackets) while in, around or on water, and never swimming alone.

Outcome following drowning depends on the duration of the submersion, the water temperature and how promptly CPR is started. Remove the victim rapidly and safely from the water, but do not place yourself in danger.

Psychological First Aid

Catastrophic difficulties frequently bring about severe emotional reactions in the parties involved. These are often unpredictable but are normally only temporary.

If the person is not violent, the first thing to do is treat physical injuries. If the person becomes violent, call for professional help, **9-1-1**. Stay calm. Comfort the person; do not criticize him but on the other hand do not be overly solicitous. Avoid expressions such as "snap out of it," or "get hold of yourself." Avoid joking.

Accept the person's feelings and try to reassure them. Make things as comfortable as possible. Involve the victim in meaningful but not overly taxing activity as soon as possible to help them release tensions and forget their troubles.

Be patient with the disturbed. It may take awhile, but they will probably return to normal. Do not give sedatives or tranquilizers; these will only delay adjustment to the situation.

Diarrhea

In some cases diarrhea can be a serious malady. While the diarrhea continues, pay particular attention to sanitation and hygiene to prevent spread of the disease. Diarrhea usually goes away in two (2) to three (3) days without specific medical therapy.

- ▶ The type of drink is not as important as simply replenishing lost water. But avoid milk and dairy products. They will make diarrhea worse. Diet soft drinks do not provide the calories dehydrated people may need, so regular soda or soft drinks may be selected to replace lost water. Kaopectate also helps.
- ▶ Try to eat. The food does not need to be bland, but try to avoid greasy or fatty foods. Infants and children should be encouraged to eat bananas, rice applesauce and toast – the BRAT diet – a combination used for decades to treat diarrhea. (This diet should work with adults as well.) If diarrhea is accompanied by nausea, suck on ice chips until the nausea stops. After the diarrhea stops, avoid alcoholic beverages and spicy foods for two (2) more days.
- ▶ Continue your usual activities if you are mildly ill with diarrhea but avoid strenuous exercise until you feel better because it increases the risk of dehydration.



Choking: The Heimlich Maneuver

Choking on food is the sixth leading cause of accidental death in the United States. Over 3,000, and as many as 6,000, deaths occur each year. The usual slap on the back does not help very much, but the Heimlich Maneuver is easy to administer and is quite safe if administered properly.

Choking occurs when food is sucked into the windpipe instead of being swallowed. Onlookers often mistake the symptoms for those of a heart attack and administer inappropriate treatment.

The most important thing is to make sure the victim is choking, but the choking victim cannot talk. Therefore, if the patient is still conscious, one must quickly ask questions that can be answered by shaking or nodding the head. The choking patient will soon collapse.

The maneuver utilizes air that is already in the lungs. Even when we've breathed out, we still have quite a bit of air in the lungs. The maneuver forces the diaphragm upward which forces air up through the windpipe to dislodge the obstruction. This can be done with the patient in the standing or sitting positions or with the patient lying on his back.

Standing: Stand behind the victim and make a fist. Place the thumb end of the fist against the abdomen of the victim, with the fist definitely below the rib cage, between the belly button and the rib cage, but well below the rib cage. Place the other hand over the fist and pull up and in, quickly. The amount of force should depend on being able to move enough air to remove the obstruction.

In order to prevent injury, from using more force than is necessary, one may wish to start with minimal force and increase with each attempt. It may be necessary to repeat the Maneuver four or five times. With small children, use only the fingers to apply pressure.

Sitting: When the victim is sitting, the chair can provide a good brace or support to perform the Maneuver, which is performed as above.

Lying Down: If the victim has collapsed, or if the victim is so large the person applying the treatment is unable to reach around the victim, the victim should be placed on the floor on his back. The person applying the treatment quickly straddles the hips of the victim, places one hand over the other and with the heels of the hands well below the rib cage (between the rib cage and the belly button) quickly pushes up and in. Remove the food quickly after it is expelled. Also, the patient may vomit - so quickly turn him on his side after treatment.

After all, there is very little time, death or brain damage will occur in just a few minutes. You must act fast. The victim should be examined by a physician after a choking episode and treatment.

If Alone: This can be administered to yourself by placing the hands as if standing behind a victim and then letting yourself fall over a chair or table.

A Distress Signal: Placing the hand to the throat is an almost automatic response of someone choking. This will convey the message, "**I am choking.**"



BLOODBORNE PATHOGENS

Kier Construction is committed to providing a safe and healthful work environment for our entire workforce. In pursuit of this goal, the following exposure control plan (ECP) is provided to eliminate or minimize occupational exposure to bloodborne pathogens in accordance with OSHA standard 29 CFR 1910.1030, “Occupational Exposure to Bloodborne Pathogens.”

Bloodborne Pathogens means pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Contaminated means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Decontaminated means the use of physical or chemical means to remove, inactivate or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use or disposal.

Exposure incident means a specific eye, mouth, other mucous membrane, non-intact skin or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee’s duties.

Occupational exposure means reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee’s duties.

This ECP includes:

- ▶ Determination of employee exposure.
- ▶ Implementation of various methods of exposure control, including:
 - Universal precautions.
 - Engineering and work practice controls.
 - Personal protective equipment.
 - Housekeeping.
- ▶ Hepatitis B vaccination.
- ▶ Post-exposure evaluation and follow-up.
- ▶ Communication of hazards to employees and training.
- ▶ Record keeping.
- ▶ Procedures for evaluating circumstances surrounding exposure incidents.

Program Administration

The Safety Director is responsible for implementation of the ECP. The Safety Director will maintain, review and update the ECP at least annually, and whenever necessary to include new or modified tasks and procedures.

Those employees who are determined to have occupational exposure to blood or other potentially infectious materials (OPIM) must comply with the procedures and work practices outlined in this ECP.

The Safety Director will provide and maintain all necessary personal protective equipment (PPE), engineering controls (e.g., sharps containers), labels and red bags or containers as required by the standard. The Safety Director will ensure adequate supplies of the aforementioned equipment are available in the appropriate sizes and quantities.

The Safety Director will be responsible for ensuring all medical actions required by the standard are performed and appropriate employee health and OSHA records are maintained and kept confidential.



The Safety Director will be responsible for training, documentation of training and making the written ECP available to employees, OSHA and NIOSH representatives.

Employee Exposure Determination

The following is a list of all job classifications and tasks or procedures at our establishment in which all employees may have occupational exposure:

<u>Job Title</u>	<u>Department / Location</u>	<u>Tasks / Procedure</u>
Superintendents	Field / Jobsite	Daily duties, investigations, project clean-up
Carpenters	Field / Jobsite	Daily duties, investigations, project clean-up
Laborers	Field / Jobsite	Daily duties, project clean-up
Jobsite Cleaner	Field / Jobsite	Project clean-up

Methods of Implementation and Control

Universal Precautions: All employees shall utilize universal precautions. Universal precautions refers to a system of infectious disease control that assumes every direct contact with body fluids is infectious and requires exposed personnel to be protected as though such body fluids were infected with HIV, HBV or other bloodborne pathogens.

Treat all human body fluids and items soiled with human body fluids (blood, blood products, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, concentrated HIV / HAV / HBV and saliva as if contaminated with HIV / HAV / HBV. (*Note: Feces, urine, nasal secretions, sputum, sweat, tears or vomitus need not be treated as contaminated unless they contain visible blood.*)

Exposure Control Plan: All employees are covered by the ECP and will receive a copy at the time of employment. Employees can review this plan at any time during their work shifts. Employee may call the Safety Director for copies if necessary.

Engineering Controls and Work Practices: Engineering controls and work practice controls shall be used to prevent or minimize exposure to bloodborne pathogens. All procedures involving blood or other potentially infectious agents shall be performed in a manner that will minimize splashing, spraying and aerosolization. If any infectious waste materials are found on Kier property, the Safety Director shall be notified immediately and all materials shall be disposed of in the appropriate manner and in accordance with OSHA Standard 29 CFR 1910.1030.

Personal Protective Equipment (PPE): PPE is provided to all employees at risk at no cost to the employee. Training in the use of the appropriate PPE for specific tasks or procedures is provided by the Safety Director.

The types of PPE available to employees are as follows: gloves, eye protection, face masks, and specialty clothing as required.

All employees using PPE must observe the following precautions:

- ▶ Wash hands immediately or as soon as feasible after removing gloves or other PPE.
- ▶ Remove PPE after it becomes contaminated and before leaving the work area.
- ▶ Used PPE shall be disposed of in specific containers provided.
- ▶ Wear appropriate gloves when it is reasonably anticipated there may be hand contact with blood or OPIM, and when handling or touching contaminated items or surfaces; replace gloves if torn, punctured or contaminated, or if their ability to function as a barrier is compromised.
- ▶ Utility gloves may be decontaminated for reuse if their integrity is not compromised; discard utility gloves if they show signs of cracking, peeling, tearing, puncturing or deterioration.



- ▶ **Never** wash or decontaminate disposable gloves for reuse.
- ▶ Wear appropriate face and eye protection when splashes, sprays, spatters or droplets of blood or OPIM pose a hazard to the eye, nose or mouth.
- ▶ Remove immediately or as soon as feasible any garment contaminated by blood or OPIM, in such a way as to avoid contact with the outer surface.
- ▶ While performing First Aid Functions:
 - Personal protective equipment such as gloves, eye protection, face mask and apron (if appropriate) shall be worn while performing any type of first aid function. Gloves must be made of appropriate disposable material, usually intact latex, vinyl or Nitrile.
 - All personal protective equipment shall be removed immediately upon completion of first aid functions (or exposure) and placed in appropriate container for disposal. It is advised that any employee whose cloths come in contact with human blood or body fluids, be destroyed. The reason for this is these clothing items would probably not be sanitized or disinfected in an industrial manner, thus the contamination would not be eliminated.

Housekeeping: Regulated waste shall be placed in containers which are closeable, constructed to contain all contents and prevent leakage, appropriately labeled or color-coded, and closed prior to removal to prevent spillage or protrusion of contents during handling.

Contaminated sharps, broken glass, etc., shall be discarded immediately or as soon as possible in containers that are closeable, puncture resistant, leak proof on sides and bottoms, and appropriately labeled or color-coded.

Contact the Safety Director if disposal containers are required.

Bins, pails and containers shall be cleaned and decontaminated as soon as feasible after visible contamination.

Sharps, broken glass, etc., that may be contaminated shall only be picked up by using mechanical means, such as a brush and dustpan.

Laundry: The following laundering requirements must be met:

- ▶ Handle contaminated laundry as little as possible, with minimal agitation.
- ▶ Place wet contaminated laundry in leak-proof, labeled or color-coded containers before transport. Use red bags or bags marked with the biohazard symbol for this purpose.
- ▶ Wear the following PPE when handling and/or sorting contaminated laundry: gloves, eye protection, and body suit if amount of laundry is substantial.

Laundering shall be performed by a certified company with the appropriate capabilities.

Labels: Superintendents/Foremen are responsible for ensuring warning labels are affixed or red bags are used as required if regulated waste or contaminated equipment is brought onto the property. Employees are to notify the Site Manager, who in turn shall notify the Safety Director, if they discover regulated waste containers, articles containing blood or OPIM, contaminated equipment, etc., without proper labels.

Hepatitis B Vaccination

If an employee is required to perform tasks that pose an increased exposure other than project clean-up, the hepatitis B vaccination series will be made available to the employee at no cost. The Safety Director shall provide information, training and procedures to employees on hepatitis B vaccinations, addressing safety, benefits, efficacy, methods of administration and availability.



Hepatitis B Vaccine Declination (Mandatory if testing is declined)

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Signed: _____ Date: _____

(This form can be obtained from the Safety Director.)

Post-Exposure Evaluation and Follow-Up

Should an exposure incident occur, contact the Safety Director at the following number immediately or as soon as possible: 801-621-3390. Kier shall provide for the employee to be tested for HIV / HAV / HBV by IHC licensed healthcare professional at an accredited laboratory at the company’s expense. Following the initial test at time of exposure, seronegative employees will be retested at six (6) weeks, 12 weeks and six (6) months to determine if transmission has occurred.

An immediately available confidential medical evaluation and follow-up will be conducted by an IHC WorkMed health care professional. Following initial first aid (clean the wound, flush eyes or other mucous membrane, etc.), the following activities will be performed:

- ▶ Document the routes of exposure and how the exposure occurred.
- ▶ Identify and document the source individual (unless the employer can establish that identification is infeasible or prohibited by state or local law).
- ▶ Obtain consent and make arrangements to have the source individual tested as soon as possible to determine HIV, HCV and HBV infectivity; document that the source individual’s test results were conveyed to the employee’s health care provider.
- ▶ If the source individual is already known to be HIV, HCV and/or HBV positive, new testing need not be performed.
- ▶ Assure the exposed employee is provided with the source individual’s test results and with information about applicable disclosure laws and regulations concerning the identity and infectious status of the source individual (e.g., laws protecting confidentiality).
- ▶ After obtaining consent, collect exposed employee’s blood as soon as feasible after exposure incident, and test the blood for HBV and HIV serological status.
- ▶ If the employee does not give consent for HIV serological testing during collection of blood for baseline testing, preserve the baseline blood sample for at least 90 days; if the exposed employee elects to have the baseline sample tested during this waiting period, perform testing as soon as feasible. (See Hepatitis B Vaccine Declination under Post-Exposure Evaluation and Follow-up.)
- ▶ During all phases of post exposure, the confidentiality of the affected employee and exposure source will be maintained on a “need to know basis.” The results of an HIV / HAV / HBV test conducted will be provided to the exposed and source employee(s)/ individual(s) within five (5) working days of receipt.

Administration of Post-Exposure Evaluation and Follow-Up

The Safety Director ensures that health care professional(s) responsible for employee’s hepatitis B vaccination and post-exposure evaluation and follow-up are given a copy of OSHA’s bloodborne pathogens standard.



The Safety Director ensures the health care professional evaluating an employee after an exposure incident receives the following:

- ▶ A description of the employee’s job duties relevant to the exposure incident.
- ▶ Route(s) of exposure.
- ▶ Circumstances of exposure.
- ▶ If possible, results of the source individual’s blood test.
- ▶ Relevant employee medical records, including vaccination status.

The Safety Director shall provide the employee with a copy of the evaluating health care professional’s written opinion within 15 days after completion of the evaluation.

Procedures for Evaluating the Circumstances Surrounding an Exposure Incident

The Safety Director will review the circumstances of all exposure incidents to determine:

- ▶ Engineering controls in use at the time.
- ▶ Work practices followed.
- ▶ A description of the device being used (including type and brand).
- ▶ Protective equipment or clothing used at the time of the exposure incident (gloves, eye protection, etc.).
- ▶ Location of the incident.
- ▶ Procedure being performed when the incident occurred.
- ▶ Employee’s training.

The Safety Director will record all per cutaneous injuries from contaminated sharps or materials in a Sharps Injury Log.

DISASTER AND EMERGENCY PLANNING

In areas and seasons that have historically produced violent weather (i.e., earthquake, high winds, fire, floods, etc.), the Superintendent should acquaint himself with the potential of a natural disaster or emergency and take every precaution to avoid a human or financial loss. Preventive measures, as well as planned reactions to a disaster or emergency, are important. A simple but effective plan should be formulated for each jobsite.

See Emergency Response Action Plan (ERAP) section for assistance in formulating a jobsite plan. Following are a few such disasters and emergencies that 24 hour, three (3) day and seven (7) days plans should be developed for.

- | | |
|--|--|
| Earth Quake | First Aid Injuries |
| Site Security | Critical Injuries |
| High Winds | Notification Sequence and Communication to each employee |
| Site Shutdown Procedures | Fatal Injuries |
| Fire Fighting | Main Utilities Shutdown |
| Outside help (i.e., police, fire, flood control, departments, utility companies, etc.) | Media Contacts |

Emergency Plan Elements

An emergency action plan helps reduce losses such as injury, downtime, product loss, and equipment and premises damage. The following elements should be considered when preparing an action plan for each jobsite.



- ▶ Emergency escape procedures and emergency escape route assignments.
- ▶ Types of evacuation to be used in emergency circumstances.
- ▶ Procedures to be followed by employees who remain to operate critical operations before they evacuate.
- ▶ Procedures to account for all employees, after an evacuation has been completed.
- ▶ Rescue and medical duties for employees assigned to perform them.
- ▶ Preferred means of reporting fires and other emergencies.
- ▶ Names or regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan.
- ▶ Alarm system that complies with 29 CFR 1910.165. If the employee alarm system is used for alerting fire brigade members or for other purposes a distinctive signal for each purpose is necessary.

Fire Prevention Plan Elements

- ▶ A list of major workplace fire hazards and their proper handling and storage procedures.
- ▶ A list of potential ignition sources and control procedures.
- ▶ Types of fire protection equipment or systems that can control a fire.
- ▶ Names or regular job titles of employees responsible for maintenance of equipment, and systems installed to prevent or control ignitions or fires.
- ▶ Training for all employees on the fire hazards of the materials and processes they are exposed to.
- ▶ Housekeeping procedures to control accumulations of flammable, combustible waste materials and residues so they do not contribute to a fire emergency.
- ▶ Maintenance procedures to prevent accidental ignition of combustible materials from equipment and systems installed on heat producing equipment.

SANITATION

An adequate supply of potable water shall be provided in all places of employment.

Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Water shall not be dripped from containers.

Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose.

Common drinking cups are prohibited and will not be allowed on any project.

Where single service cups are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups, shall be provided.

No employee shall be allowed to consume food or beverages in a toilet-room nor in any area exposed to a toxic material.

Non-potable water on site such as water for industrial or fire fighting purposes must be identified by signs as such.

- ▶ **Jobsite Toilets:** Toilet facilities shall be available on site in adequate numbers to meet minimum requirements of the table below. A routine cleaning schedule shall be developed to ensure continued sanitary conditions. Periodic audits of these facilities shall be performed to verify that the cleaning schedule is adequate. Adjust schedule as needed.

Number of Employees

20 or less
20 or more

Min. No. of Facilities

1
1 toilet seat and 1 urinal per 40 workers



200 or More

1 toilet seat and 1 urinal per 50 workers

Under temporary field conditions, provisions shall be made to assure not less than one toilet facility is available.

Jobsites not provided with a sanitary sewer, shall be provided with one of the following toilet facilities unless prohibited by local codes: privies (where their use will not contaminate ground or surface water); chemical toilets; recirculating toilets; combustion toilets.

▶ Disposal of Waste

- Keep oily rags and flammable trash in covered metal containers.
- Remove trash from the immediate work area as soon as possible.
- Whenever trash is dropped more than 20 feet on the exterior of a building, an enclosed chute must be used.
- If trash is dropped through holes in the floor without chutes, the area must be barricaded and appropriate signs of the hazard of falling material shall be posted at each level.
- Keep aisles, passageways, and work areas clear of unnecessary material.

▶ Washing Facilities

- All washing facilities shall be maintained in a sanitary condition.
- All washing facilities shall be provided with hot and cold running water and hand soap or cleansing agent.

▶ Vermin Control

Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practicable, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected.

HOUSEKEEPING AND WEATHER RELATED CONDITIONS

It is the position of Kier Construction that every employee has the right to work in an environment free of unnecessary clutter, debris, snow, ice, and refuse of any kind. It is the policy of Kier Construction that all direct hire, subcontractor and sub-tiered contractor work areas, lay down areas, lunch and office trailers, material storage areas and parking areas will be kept in a clean and orderly manner, and free from excessive ice and snow.

Work areas shall not be overly stocked with materials as to create or cause undue congestion or cramped conditions. Store only material which will be utilized in the near future whenever possible.

An appropriate number of refuse containers shall be located as near the work stations, trailers etc., as possible and accessible to the site workers. Ensure containers are dumped as needed. Also ensure appropriate containers are available and labeled for hazardous waste items.

Workers are instructed to keep their individual work stations free of excess debris, refuse, etc. Clean up of the work area shall be ongoing. Scrap materials shall not be allowed to accumulate.

Site management shall see that lunch trailers and office trailers are routinely cleaned and disinfected if appropriate. On jobsites with office trailers, food shall be kept and stored so as not to attract insects and rodents. An ample supply of refuse containers shall be located to facilitate refuse removal.

Each employee is responsible for maintaining a clean and orderly jobsite – free from slip, trip and stumbling hazards. All materials will be stored in a safe manner. Usable scrap materials will be placed in proper storage areas around the jobsite. Points of access and egress, corridors and walkways shall be kept clear and clean.

All walkways in and out of the workplace must be kept in a safe condition during inclement weather.



Toilet facilities shall be available on site in adequate numbers to meet minimum requirements as shown in the table under Sanitation.

Special attention shall be given to the storage of tools, materials and supplies in tool rooms and trailers. Tool rooms and trailers are to be maintained in a neat and orderly fashion at all times. Materials and supplies that are not compatible shall be stored separate from one another; consult the Materials Safety Data Sheet for compatibility information. Flammable liquids shall be stored in approved areas of the tool room and so designed to resist spills and fire.

HAZARD COMMUNICATION (HAZ-COM)

The objective of a Haz-Com program is to provide information and training regarding hazardous materials found on jobsites, and to maintain the support systems of Safety Data Sheets (SDS) and container labels as necessary to operate and manage a comprehensive Haz-Com Program.

This written “Haz-Com” program applies to all Kier Construction operations which may expose workers and visitors alike to hazardous materials, their by-products or residue as a result of normal working conditions.

Unless otherwise notified, the Superintendent of each jobsite is designated as the responsible person for implementing this written program. The Safety Director will coordinate this effort and assist the Superintendent as needed.

HAZ-COM Program

- ▶ Identification of hazardous materials used in the workplace
 - A material is considered hazardous if it is a physical or health hazard and if it is:
 - Specifically listed in the law, 29 CFR 1910.1000, subpart Z, Toxic and Hazardous Substances;
 - Assigned a threshold limit value (TLV); or
 - Determined to be cancer causing, corrosive, toxic, an irritant, a sensitizer or has damaging effects on specific body organs.
 - Refer also to CFR 1926.55 and 1926.1100.
 - “Exposure” means an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential exposure.
 - Each Superintendent will maintain for each jobsite a list of all hazardous materials which an employee may be exposed. The list should include the same chemical name referenced on the appropriate SDS for those materials.
 - A master list of all substances on the jobsite as well as a complete set of SDSs will be maintained in the jobsite trailer. Kier Construction uses the services of the 3E Company for all SDS information. Each project trailer has a 3E service station attached.
 - Superintendents are to update the Safety Director with any significant changes to the SDS which may occur. Subcontractors are required to provide SDSs for their materials used on site as they arrive on the jobsite and prior to their use.
 - Superintendents shall ensure proper personal protective equipment (PPE) is being worn and supplied per requirements listed in the SDS sheets.
- ▶ Labels
 - Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.
 - When hazardous materials arrive on site, the Superintendent will examine the containers to verify the labels provide the following information:
 - Identify the hazardous materials they contain
 - Appropriate warnings of physical and health hazards associated with those materials
 - Manufacturer’s name and address



- Containers will also indicate the subcontractors name in order to better manage jobsite removal.
 - When hazardous materials are transferred into portable containers, they are required to be labeled as described above. Label does not need to be a manufacturers label. Exception: When an employee transfers a hazardous substance into a portable container strictly for their own use, for that day, that portable container need not be labeled.
 - The Superintendent will ensure the hazardous materials container labels are not removed or defaced, unless the containers are immediately relabeled with the required information as described above.
 - Containers without complete labels or with defaced labels will be removed from the jobsite by the responsible contractor.
- ▶ Safety Data Sheets
- The Hazard Communication Standard (HCS) (29 CFR 1910.1200(g)), revised in 2012, requires that the chemical manufacturer, distributor, or importer provide Safety Data Sheets (SDSs) (formerly MSDSs or Material Safety Data Sheets) for each hazardous chemical to downstream users to communicate information on these hazards. The information contained in the SDS is largely the same as the MSDS, except now the SDSs are required to be presented in a consistent user-friendly, 16-section format.
 - OSHA requires that SDS preparers provide specific minimum information as detailed in Appendix D of 29 CFR 1910.1200. The information contained in the SDS must be in English (although it may be in other languages as well). The SDS 16-section format detailed in Appendix D of 29 CFR 1910.1200 must include information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. The SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.
 - The Safety Director with the assistance of the Superintendents will be responsible for obtaining and maintaining the master SDS file and other information on hazardous materials used or found on the jobsites (3E station).
 - Each Superintendent will maintain at each jobsite a complete SDS for each substance found (3E station). It may be necessary for the Superintendent to obtain the SDS from the manufacturer or seller. A hazardous material will not be used if an SDS for the material is not “in-hand.” (3E station.)
 - SDSs will be available to any employee upon request; SDSs will also be available to an individual’s designated representative, physician and to any OSHA representative (3E station).
 - When doing renovation or remodeling work, the Superintendent will be alert to the dangers that might exist for our employees who work under or near unlabeled pipes or containers which may contain hazardous substances. Proper precautions shall be taken.
 - The Superintendent will be alert to other employers, such as subcontractors, whose work on the jobsite may expose our employees (or others) to additional hazards. When it appears such exposure will occur, our employees will require the proper training and information. Contact the Safety Director for training needs.

Subcontractors on each project are required to submit copies of SDSs for their hazardous materials prior to bringing those materials onto the project.

- ▶ Information and Training
- When employees are or can be exposed to hazardous materials in their work area, they will be provided with the information contained on the SDS and may receive additional training as deemed necessary.
 - Training shall be provided before employees are assigned duties which may cause exposure to hazardous materials. Training shall be given when new hazardous materials are introduced into the work area or when an SDS is changed.
 - Training is to be **conducted** and **documented** at a weekly “Tool Box Safety” meeting, providing at least the following:
 - How to read and interpret information on SDSs and labels.
 - Any physical or health hazard associated with the use of hazardous materials or mixtures being used in the work area.



- What personal protective equipment (PPE) is to be used when handling hazardous materials.
 - Proper precautions for handling, including specific procedures the company has implemented to protect workers from exposures, such as protective equipment and work practices.
 - Emergency procedures for spills, fires, disposal and first aid.
 - Methods and observations that can be used to detect the presence of a hazardous material, (i.e., odor, visual appearance, other monitoring techniques).
 - The right of employees or their physicians to receive information on hazardous materials to which they may be exposed.
 - The right against discharge or discrimination due to an employee's exercise of rights afforded by law.
 - The details of this written Haz-Com program, the availability and location of this program, SDSs, or other information.
- ▶ **Hazardous Non-Routine Task Training:** When employees are assigned to non-routine tasks that may expose them to a hazardous material for which they have not yet been trained, they shall be trained in a manner required as described above.
- ▶ **Access to Information by other Employers:** When employees of another employer, such as subcontractors, may be exposed to hazardous materials while working on one of Kier's jobsites, the Superintendent shall provide the employer access to the SDS book or master list (see 3E station). Also give the employer suggestions for appropriate protective measures, exposure controls and manufacturer's information so the employer may obtain SDS's and other information.
- ▶ **List of Hazardous Materials:** The Superintendent shall post and update a list of specific hazardous materials known to be present on the jobsite using the chemical name referenced on its SDS. (see 3E Station)
- ▶ **Toxic Spills:** **Call 9-1-1 for all HAZMAT emergencies.**

LEAD

Scope: This section applies to all construction work where an employee may be occupationally exposed to lead. All construction work excluded from coverage in the general industry standard for lead by 29 CFR 910.1025(a)(2) is covered by this standard. Construction work is defined as work for construction, alteration and/or repair, including painting and decorating. It includes but is not limited to the following:

- ▶ Demolition or salvage of structures where lead or materials containing lead are present;
- ▶ Removal or encapsulation of materials containing lead;
- ▶ New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;
- ▶ Installation of products containing lead;
- ▶ Lead contamination/emergency cleanup;
- ▶ Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed, and
- ▶ Maintenance operations associated with the construction activities described in this paragraph.

Action level means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air (30 mg/m³) calculated as an 8 hour time weighted average (TWA).

Permissible Exposure Limit: The employer shall assure no employee is exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 µg/m³) averaged over an 8-hour period. Exposure limits shall be in accordance with CFR 1926.62(c).

Allowable employee exposure (in µg/m³) = 400 divided by hours worked in the day.



Exposure Assessment: Each employer who has a workplace or operation covered by this standard shall initially determine if any employee may be exposed to lead at or above the action level. All exposure assessment shall be in accordance with CFR 1926.52(d)(1).

Protection of Employees During Assessment of Exposure: With respect to the lead related tasks where lead is present, until the employer performs an employee exposure assessment and documents that the employee performing any of the listed tasks is not exposed above the PEL, the employer shall treat the employee as if the employee were exposed above the PEL, and not in excess of ten (10) times the PEL, and shall implement employee protective measures in accordance with CFR 1926.52(d)(2)(v).

The tasks covered by this requirement are: Where lead containing coatings or paint are present: Manual demolition of structures (i.e., dry wall), manual scraping, manual sanding, heat gun applications and power tool cleaning with dust collection systems; rivet busting; spray painting with lead paint; using lead containing mortar; lead burning; abrasive blasting; welding, cutting, and torch burning.

Until the employer performs an employee exposure assessment, the employer shall provide interim protection as follows:

- ▶ Appropriate respiratory protection;
- ▶ Appropriate personal protective clothing and equipment;
- ▶ Change areas;
- ▶ Hand washing facilities;
- ▶ Biological monitoring to consist of blood sampling and analysis for lead and zinc protoporphyrin levels; and
- ▶ Training regarding Hazard Communication and the use of respirators

Basis of Initial Determination: The employer shall monitor employee exposures and shall base initial determinations on the employee exposure monitoring results and any of the following, relevant considerations: Any information, observations, or calculations which would indicate employee exposure to lead; any previous measurements of airborne lead; and any employee complaints of symptoms which may be attributable to exposure to lead.

Monitoring for the initial determination may be limited to a representative sample of the exposed employees who the employer reasonably believes are exposed to the greatest airborne concentrations of lead in the workplace.

Where the employer has previously monitored for lead exposures, and the data were obtained within the past 12 months during work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results if the sampling and analytical methods meet the accuracy and confidence levels in accordance with CFR 1926.62 (d)(3)(6)(10).

Where the employer has objective data, demonstrating that a particular product or material containing lead or a specific process, operation or activity involving lead cannot result in employee exposure to lead at or above the action level during processing, use, or handling, the employer may rely upon such data instead of implementing initial monitoring.

Positive Initial Determination and Initial Monitoring: Where a determination conducted shows the possibility of any employee exposure at or above the action level the employer shall conduct monitoring which is representative of the exposure for each employee in the workplace who is exposed to lead.

Where the employer has previously monitored for lead exposure, and the data were obtained within the past 12 months during work operations conducted under workplace conditions closely resembling the processes, type of



material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the employer may rely on such earlier monitoring results. Must be accordance with CFR 1926.62(d)(4).

Negative Initial Determination: Where a determination is made that no employee is exposed to airborne concentrations of lead at or above the action level the employer shall make a written record of such determination. The record shall include the date of determination, location within the worksite, and the name and social security number of each employee monitored in accordance with CFR 1926.62(d)(5).

Frequency: Shall be in accordance with CFR 1926.62 (d)(6).

Employee Notification: Within five (5) working days after completion of the exposure assessment the employer shall notify each employee in writing of the results which represent that employee's exposure.

Whenever the results indicate the representative employee exposure, without regard to respirators, is at or above the PEL the employer shall include in the written notice a statement that the employee's exposure was at or above that level and a description of the corrective action taken or to be taken to reduce exposure to below that level.

The employer shall use a method of monitoring and analysis which has an accuracy (to a confidence level of 95 percent) of not less than plus or minus 25 percent for airborne concentrations of lead equal to or greater than 30 $\mu\text{g}/\text{m}^3$.

Methods of Compliance: The employer shall implement engineering and work practice controls, including administrative controls, to reduce and maintain employee exposure to lead to 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 in accordance with CFR 1926.62(f).

When ventilation is used to control lead exposure, the employer shall evaluate the mechanical performance of the system in controlling exposure as necessary to maintain its effectiveness.

If administrative controls are used as a means of reducing employees TWA exposure to lead, the employer shall establish and implement a job rotation schedule which includes: Name or identification number of each affected employee; duration and exposure levels at each job or work station where each affected employee is located; and any other information which may be useful in assessing the reliability of administrative controls to reduce exposure to lead.

The employer shall ensure that, to the extent relevant, employees follow good work practices in accordance with CFR 1926.62 Appendix B.

Respiratory Protection: Employees using respirators must ensure they comply with the requirements of CFR 1926.62(f). Respirators must be used during:

- ▶ Periods when an employee's exposure to lead exceeds the PEL.
- ▶ Work operations for which engineering and work-practice controls are not sufficient to reduce employee exposures to or below the PEL.
- ▶ Periods when an employee requests a respirator.
- ▶ Periods when respirators are required to provide interim protection of employees.

Protective Work Clothing and Equipment: Where an employee is exposed to lead above the PEL without regard to the use of respirators, where employees are exposed to lead compounds which may cause skin or eye irritation (e.g. lead arsenate, lead azide), and as interim protection for employees performing tasks as specified, the employer



shall provide at no cost to the employee and assure the employee uses appropriate protective work clothing and equipment that prevents contamination of the employee and the employee's garments such as, but not limited to: Coveralls or similar full-body work clothing; gloves, hats, and shoes or disposable shoe coverlets; and face shields, vented goggles, or other appropriate protective equipment.

The employer shall provide the protective clothing required in a clean and dry condition at least weekly, and daily to employees whose exposure levels without regard to a respirator are over 200 µg/m³ of lead as an 8-hour TWA.

The employer shall provide for the cleaning, laundering, and disposal of protective clothing and equipment.

The employer shall repair or replace required protective clothing and equipment as needed to maintain their effectiveness.

The employer shall assure all protective clothing is removed at the completion of a work shift only in change areas provided for that purpose.

The employer shall assure contaminated protective clothing which is to be cleaned, laundered, or disposed of, is placed in a closed container in the change area which prevents dispersion of lead outside the container.

The employer shall inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.

The employer shall assure the containers of contaminated protective clothing and equipment are labeled as follows:

**Caution: Clothing contaminated with lead.
Do not remove dust by blowing or shaking.
Dispose of lead contaminated wash water in accordance
with applicable local, state, or federal regulations.**

The employer shall prohibit the removal of lead from protective clothing or equipment by blowing, shaking, or any other means which disperses lead into the air.

Housekeeping: All surfaces shall be maintained as free as practicable of accumulations of lead.

Clean-up of floors and other surfaces where lead accumulates shall wherever possible, be cleaned by vacuuming or other methods that minimize the likelihood of lead becoming airborne.

Shoveling, dry or wet sweeping, and brushing may be used only where vacuuming or other equally effective methods have been tried and found not to be effective.

Where vacuuming methods are selected, the vacuums shall be equipped with HEPA filters and used and emptied in a manner which minimizes the reentry of lead into the workplace.

Compressed air shall not be used to remove lead from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the airborne dust created by the compressed air.

Hygiene Facilities and Practices: The employer shall assure that in areas where employees are exposed to lead above the PEL without regard to the use of respirators, food or beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied.



The employer shall provide clean change areas for employees whose airborne exposure to lead is above the PEL, and as interim protection for employees performing tasks, without regard to the use of respirators.

The employer shall assure change areas are equipped with separate storage facilities for protective work clothing and equipment and for street clothes which prevent cross-contamination.

The employer shall assure employees do not leave the workplace wearing any protective clothing or equipment required to be worn during the work shift.

The employer shall provide shower facilities, where feasible, for use by employees whose airborne exposure to lead is above the PEL.

The employer shall assure, where shower facilities are available, employees shower at the end of the work shift and shall provide an adequate supply of cleansing agents and towels for use by affected employees.

The employer shall provide lunchroom facilities or eating areas for employees whose airborne exposure to lead is above the PEL, without regard to the use of respirators.

The employer shall assure lunchroom facilities or eating areas are as free as practicable from lead contamination and are readily accessible to employees.

The employer shall assure employees whose airborne exposure to lead is above the PEL, without regard to the use of a respirator, wash their hands and face prior to eating, drinking, smoking or applying cosmetics.

The employer shall assure employees do not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed by vacuuming, downdraft booth, or other cleaning method that limits dispersion of lead dust.

The employer shall provide adequate hand washing facilities for use by employees exposed to lead.

Where showers are not provided the employer shall assure employees wash their hands and face at the end of the work-shift.

Medical Surveillance: All medical surveillance shall be in accordance with CFR 1926.62(j)(1).

Biological Monitoring: All biological monitoring shall be in accordance with CFR 1926.62(j)(2)

Medical Examinations and Consultations: All medical examinations and consultations shall be in accordance with CFR 1926.62(j)(3).

Chelation: The employer shall assure that any person whom he retains, employs, supervises or controls does not engage in prophylactic chelation of any employee at any time.

If therapeutic or diagnostic chelation is to be performed, the employer shall assure that it be done under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring and that the employee is notified in writing prior to its occurrence.

Medical Removal Protection: All medical removal protection shall be in accordance with CFR 1926.62(k).

Signs: The employer may use signs required by other statutes, regulations or ordinances in addition to, or in combination with, signs required by this section.



The employer shall assure no statement appears on or near any sign required by this program which contradicts or detracts from the meaning of the required sign.

The employer shall post the following warning signs in each work area where an employees exposure to lead is above the PEL.

**WARNING, LEAD WORK AREA, POISON, NO
SMOKING OR EATING.**

The employer shall assure signs required by this program are illuminated and cleaned as necessary so the legend is readily visible.

Recordkeeping: All recordkeeping shall be in accordance with CFR 1926.62(n).

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye and Face Protection: Required eye and face protection equipment shall meet the requirements specified in ANSI Z87.1-1968. Eye and face protection equipment shall be kept clean and in good repair. The use of this type equipment with structural or optical defects shall be prohibited.

Employees shall use eye and face protection equipment when machines or operations present potential eye and/or eye and face injury from physical, chemical or radiation agents.

Employees whose vision requires the use of corrective lenses in eye glasses, when required by OSHA regulations to wear eye protection, shall be protected by goggles or eyeglasses of one of the following types:

- ▶ Eyeglasses with protective lenses which provide optical correction.
- ▶ Goggles that can be worn over corrective eyeglasses without disturbing the adjustment of the eyeglasses.
- ▶ Safety glasses that fit over the corrective lenses.

Protectors shall meet the following minimum requirements:

- ▶ They shall provide adequate protection against the particular hazards for which they are designed.
- ▶ They shall be reasonably comfortable when worn under the designated conditions.
- ▶ They shall fit snugly and shall not unduly interfere with the movements of the wearer.
- ▶ They shall be durable.
- ▶ They shall be capable of being disinfected.
- ▶ They shall be easily cleanable.
- ▶ Every protector shall be distinctly marked to facilitate identification only of the manufacturer.
- ▶ When limitations or precautions are indicated by the manufacturer, they shall be transmitted to the user and care taken to see that such limitations and precautions are strictly observed.

Head Protection: Approved hard hats shall be worn correctly at all times by Kier personnel and all subcontractors. Hard hats shall meet ANSI 789.1-1969 safety regulations for industrial head protection.

Hearing Protection: Whenever it is not feasible to reduce noise levels or duration of exposures to those specified in CFR 1926.52, permissible noise exposures, hearing protection devices shall be provided and used. The standard mentioned above measures noise levels in decibels. The rule of thumb in regards to hearing protection is if you have to raise your voice to be heard above the surrounding noise level, you need hearing protection.



Playing of audio equipment is prohibited unless approved by the Superintendent.

Respiratory Protection: Respiratory protection may be required for specific job tasks. All respirator use will be in accordance with the written Respiratory Protection Program included in this manual and in compliance with CFR 1926.134. If respiratory protection is needed, contact the Safety Director prior to use.

Clothing: An ANSI Class 2 vest, shirt, or jacket is required on all Kier Construction job-sites. ANSI Class 2 has more high visibility and reflective areas present on the article of clothing. The vest, shirt, or jacket must have at least 775 inches of safety yellow or safety orange back ground material and 201 square inches of reflective striping.

Good heavy work boots are required and steel toed boots, for specific job tasks, are recommended and/or required as per OSHA. An, all leather, above the ankle work boot is recommended.

Full length trousers shall be worn. Shirts with a minimum of tee-shirt sleeves and length. Tank tops, shirts cut off at the midriff, cutoffs, sandals, sneakers, jogging shoes, etc., are prohibited. **Subcontractors and visitors are required to maintain the same dress code.**

Gloves: Gloves shall be worn during all work functions except when their use would affect safe work habits such as gripping. It is understood that certain duties such as putting nuts and bolts together is cumbersome while wearing gloves, etc. Wearing of company supplied gloves will prevent many hand injuries.

Safety Harnesses and Lanyards: Full body harnesses and shock absorbing lanyards will be worn and used anytime the employee is:

- ▶ Working higher than six (6) feet above ground level.
- ▶ Within six (6) feet of roof or platform edges.
- ▶ On scaffolds without handrails.
- ▶ On swing stages.
- ▶ On boatswain chairs.
- ▶ On equipment and structures.

When using a full body harness you must first make sure you have been trained to do so and you have inspected it before each use. Worn or damaged harnesses or lanyards shall not be used, but should be taken to your Superintendent. Anytime a harness is being worn all leg straps and chest straps must be fastened as if the employee is exposed to a fall.

Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

Shock Absorbing Lanyards: Only shock absorbing lanyards may be attached to the center back “D” ring for purposes of fall protection. Lanyards should only be attached to side “D” rings when used for positioning.

Lifelines shall be secured above the point of operation to an anchorage or structural member capable of supporting a minimum dead weight of 5,400 pounds.

Safety nets shall be provided when work places are more than 25 feet above the ground or water surface, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines or safety belts is impractical.



RESPIRATORY PROTECTION

Purpose: The purpose of this program is to ensure all Kier Construction employees are protected from exposure to respiratory hazards.

Engineering controls, such as ventilation and substitution of less toxic materials should be the first line of defense; however, when engineering controls are not feasible or will not control the hazard, respirators and other protective equipment must be used. Respirators are needed to protect employees' health during emergencies as well.

If an employee expresses a desire to wear respirators during certain operations that do not require respiratory protection, Kier will review each of these requests on a case-by-case basis. As outlined in the Scope and Application section, voluntary respirator use is subject to certain requirements.

Scope and Application: This program applies to all employees who are required to wear respirators during normal work operations, and during some non-routine or emergency operations such as the spill of a hazardous substance. In addition, any employee who voluntarily wears a respirator when a respirator is not required is subject to the medical evaluation, cleaning, maintenance and storage elements of this program.

Employees participating in the respiratory protection program do so at no cost to them. The expense associated with training, medical evaluations and respiratory protection equipment will be borne by Kier Construction.

Responsibilities

- ▶ **Program Administrator:** The Program Administrator (Safety Director) is responsible for administering the respiratory protection program. Duties include:
 - Identifying work areas, processes or tasks that require workers to wear respirators, and evaluating hazards.
 - Selection of respiratory protection options.
 - Monitoring respirator use to ensure respirators are used in accordance with their certifications.
 - Arranging for and/or conducting training.
 - Ensuring proper storage and maintenance of respirator protection equipment.
 - Conducts or ensures qualitative fit testing is performed.
 - Administering the medical surveillance program.
 - Maintain records required by the program.
 - Evaluate the program.
 - Update written program as needed.

- ▶ **Supervisors:** Supervisors are responsible for ensuring the respiratory protection program is implemented on their particular jobsite. In addition to being knowledgeable about the program requirements for their own protection, Supervisors must also ensure the program is understood and followed by the employees under their charge. Duties include:
 - Ensuring employees under their supervision (including new hires) have received appropriate training, fit testing and medical evaluations.
 - Ensure the availability of appropriate respirators and accessories.
 - Being aware of tasks requiring the use of respiratory protection.
 - Enforcing the proper use of respiratory protection when necessary.
 - Ensuring respirators are properly cleaned, maintained and stored according to the respiratory protection program.
 - Ensuring respirators fit well and do not cause discomfort.
 - Continually monitoring work areas and operations to identify respiratory hazards.



- Coordinating with the Program Administrators on how to address respiratory hazards or other concerns regarding the program.
- ▶ Employees: Each employee has the responsibility to wear his or her respirator when and where required and in the manner in which they were trained. Employees must also:
 - Care for and maintain their respirators as instructed, and store them in a clean sanitary location.
 - Inform their supervisor if the respirator no longer fits well, and request a new one that fits properly.
 - Inform their supervisor or the Program Administrator of any respiratory hazards they feel are not adequately addressed in the workplace and of any other concerns they have regarding this program.

Program Elements

- ▶ **Selection Procedures:** The Program Administrator or supervisor/ superintendent shall select respirators to be used on site, based on the hazards to which workers are exposed and in accordance with all OSHA standards. The employer shall select a NIOSH certified respirator. The respirator shall be used in compliance with the conditions of its certification and in accordance with the OSHA Assigned Protection Factors.

The Program Administrator shall conduct a hazard evaluation for each operation, process or work area where airborne contaminants may be present in routine operations or during an emergency. The hazard evaluation will include:

- Identification and development of a list of hazardous substances used in the workplace or work process.
 - Review of work processes to determine where potential exposures to these hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing process records and talking with employees and supervisors.
 - Exposure monitoring to quantify potential hazardous exposures. Monitoring may be contracted out.
 - Updating the Hazard Assessment. The Program Administrator must revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure). If an employee feels respiratory protection is needed during a particular activity, he is to contact his supervisor or the Program Administrator. The Program Administrator will evaluate the potential hazard, arranging for outside assistance as necessary. The Program Administrator will then communicate the results of that assessment back to the employees. If it is determined respiratory protection is necessary, all other elements of this program will be in effect for those tasks and this program will be updated accordingly.
 - NIOSH Certification. All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while it is in use.
- ▶ **Voluntary Respirator Use:** The Program Administrator will provide all employees who voluntarily choose to wear respirators at no charge with a copy of Appendix D of the OSHA Standard. The Program Administrator shall authorize voluntary use of respiratory protection equipment as requested by all other workers on a case-by-case basis, depending on specific workplace conditions and the results of the medical evaluations.
 - ▶ **Medical Evaluations:** Employees who are either required to wear respirators, or who choose to wear a respirator voluntarily, must pass a medical examination before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician has determined they are medically able to do so. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

A licensed physician at an IHC WorkMed clinic or hospital, where all company medical services are provided,



will provide the medical examination. Medical examination procedures are as follows:

- The medical examination will be conducted using the questionnaire provided in Appendix C of the respiratory protection standard. The Program Administrator will provide a copy of this questionnaire to all employees requiring medical examinations.
- To the extent feasible, the company will assist employees who are unable to read the questionnaire (by providing help in reading the questionnaire). When this is not possible, the employee will be sent directly to the physician for examination.
- All affected employees will be given a copy of the medical questionnaire to fill out, along with a stamped and addressed envelope for mailing the questionnaire to the company physician or assigned professional health provider. Employees will be permitted to fill out the questionnaire on company time.
- Follow-up medical examinations will be granted to employees as required by the standard, and/or as deemed necessary by the Program Administrator.
- All employees will be granted the opportunity to speak with the physician about their medical examination, if they so request.
- The Program Administrator will provide the physician with a copy of this program, a copy of the respiratory protection standard, the list of hazardous substances by work area, and for each employee requiring evaluation; his work area or job title, proposed respirator type and weight, length of time required to wear respirator, expected physical work load (light, moderate or heavy), potential temperature and humidity extremes, and any additional protective clothing required.
- Any employee required for medical reasons to wear a positive pressure air purifying respirator will be provided with a powered air purifying respirator.
- After an employee has received clearance and begun to wear his respirator, additional medical evaluations will be provided under the following circumstances:
 - Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains or wheezing.
 - The physician or supervisor informs the Program Administrator that employee needs to be reexamined.
 - Information from this program including observations made during fit testing and program evaluation, indicates a need for reevaluation.
 - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

All examinations and questionnaires are to remain confidential between the employee and the physician.

- ▶ Fit Testing: Fit testing is required for all employees who are required or voluntarily wear respirators. Employee will be fit tested:
 - Prior to being allowed to wear any respirator with a tight fitting face piece.
 - Annually.
 - When there are changes in the employee's physical condition that could affect respirator fit (e.g., obvious change in body weight, facial scarring, etc.)

Employees will be fit tested with the make, model and size of respirator they will actually wear. Employees will be provided with several models and sizes of respirators so they may find an optimal fit. Fit testing of PAPRs is to be conducted in the negative pressure mode. Fit tests will be conducted according to OSHA standards. (CFR 1926.134 Appendix A.)

- ▶ Respirator Use
 - General Use Procedures:
 - Employees will use their respirators under conditions specified by this program, and in accordance



with the training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.

- All employees shall conduct user seal checks each time they wear their respirator. Employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in Appendix B-1 of the respiratory protection standard.
- All employees shall be permitted to leave the work area to maintain their respirator for the following reasons: to wash their faces and respirator face pieces as necessary to prevent eye or skin irritation associated with use; to clean their respirator if the respirator is impeding their ability to work, change filters or cartridges, replace parts, or to inspect the respirator if it stops functioning as intended; if they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece. Employees shall notify their supervisor before leaving the work area.
- Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair or missing dentures, that prevents them from achieving a good seal.
- Employees are not permitted to wear headphones, jewelry or other articles that may interfere with the face piece-to-face seal.
- If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the face piece to the face of the user.

- Emergency Procedures: In the event hazardous materials are being used at the jobsite which pose the threat of a hazardous spill, respirators shall be readily available for this type of emergency. These types of hazards shall have been anticipated by the superintendent and subcontractors and all training, testing and physical examinations performed prior to any activity involving hazardous materials.

- ▶ Air Quality: For supplied-air respirators and SCBAs, only Grade D breathing air shall be used in the cylinders. The Program Administrator or superintendent will coordinate deliveries of compressed air and certify the air in the cylinders meets the specifications of Grade D breathing air. An adequate supply of cylinder replacements shall be maintained on site.

- ▶ Cleaning, Maintenance, Change Schedules and Storage

- Cleaning: Respirators are to be regularly cleaned and disinfected at a designated respirator cleaning station. Respirators issued for the exclusive use of an employee shall be cleaned as often as necessary, but at least once a day during regular use. Atmosphere supplying and emergency use respirators are to be cleaned and disinfected after each use.

The following procedures are to be used when cleaning and disinfecting respirators:

- Remove filters, cartridges or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure demand valve assemblies, hoses or any components recommended by the manufacturer. Discard or repair any defective parts.
- Wash components in warm (43 °C [110 °F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum), preferably running water. Drain.
- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following: Hypochlorite solution; aqueous solution of iodine; or other commercial disinfectants (per OSHA guidelines).
- Rinse components thoroughly in clean, warm (43 °C [110 °F] maximum), preferably running water.



Drain.

- Components should be hand dried with a clean lint free cloth or air dried.
- Reassemble.
- Test the respirator to ensure all components work properly.

NOTE: The Program Administrator or superintendent shall ensure an adequate supply of appropriate cleaning and disinfection materials at the jobsite. If supplies are low, employees should contact their supervisor, who will inform the superintendent.

- **Maintenance:** Respirators are to be properly maintained at all times in order to ensure they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer. Repairs to regulators or alarms of atmosphere supplying respirators will be conducted by the manufacturer.

All respirators used in routine situations shall be inspected before each use and during cleaning.

The following checklist shall be used when inspecting respirators:

- Face piece:
 - ✓ cracks, tears, or holes
 - ✓ facemask distortion
 - ✓ cracked or loose lens/face shield
- Head straps:
 - ✓ breaks or tears
 - ✓ broken buckles
- Valves:
 - ✓ residue or dirt
 - ✓ cracks or tears in valve material
- Filters/Cartridges:
 - ✓ approval designation
 - ✓ gasket
 - ✓ proper cartridge for hazard
- Air Supply Systems:
 - ✓ breathing air quality/grade
 - ✓ condition of supply hoses
 - ✓ hose connections
 - ✓ settings on regulators and valves

Employees are permitted to leave the work area to perform limited maintenance on their respirator in a designated area free of respiratory hazards. Specific situations include washing their face and respirator face piece to prevent any eye or skin irritation, replacing the filter, cartridge or canister and if they detect vapor or gas breakthrough or leakage in the face piece, or if they detect any other damage to the respirator or its components.

- **Storage:** Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own air-purifying respirator in accordance with the provisions of this program and will store their respirator in a plastic bag. Each employee shall have his/her name on the bag and that bag will only be used to store that employee's respirator. Atmosphere supplying respirators will be stored at the office when not in use.



- Defective Respirators: Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his/her supervisor. Supervisors will give all defective respirators to the Program Administrator who will decide whether to:
 - Temporarily take the respirator out of service until it can be repaired.
 - Perform a simple fix on the spot such as replacing a head strap.
 - Dispose of the respirator due to an irreparable problem or defect.
- ▶ Training: The Program Administrator will provide training to respirator users and their supervisors on the contents of the Kier Construction respiratory protection program and their responsibilities under it, and on the OSHA respiratory protection standard. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.

The training course will cover the following:

- Kier's respiratory protection program
- OSHA's respiratory protection standard
- Respiratory hazards likely to be encountered at the jobsite
- Proper selection and use of respirators
- Limitations of respirators
- Respirator donning and user seal (fit) checks
- Fit testing
- Emergency use procedures
- Maintenance and storage
- Medical signs and symptoms limiting the effective use of respirators

Employees will be retrained annually or as needed (e.g., if they change jobs or need to use a different respirator). Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Program Administrator and the documentation will include the type, model and size of respirator for which each employee has been trained and fit tested.

- ▶ Program Evaluation: The Program Administrator will conduct periodic evaluations of the workplace to ensure the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and a review of records.

Problems identified will be noted in an inspection log and addressed by the Program Administrator. These findings will be reported to management, and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

- ▶ Documentation and Recordkeeping: A written copy of this program and the OSHA standard is kept in the Program Administrator's office and is available to all employees who wish to review it.

Also maintained in the Program Administrator's office are copies of training and fit test records. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

The Program Administrator will maintain copies of the medical records for all employees covered under the



respirator program as well. The completed medical questionnaire and the physician's documented findings are confidential and will remain at the clinic or hospital. The company will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

FIRE PREVENTION / PROTECTION

All employees, subcontractors and guests are prohibited from smoking within twenty-five (25) feet of any entrance, exit, air intake, or window of the building (which can be opened) as required under the 1994 Utah Clean Air Act. Kier Construction reserves the right to designate certain construction jobsites as non-smoking sites or as smoking in designated areas only.

Firefighting equipment shall be conspicuously located and readily accessible at all times, shall be periodically inspected and be maintained in an operable condition.

Portable fire extinguishing equipment, suitable for the fire hazard involved, shall be provided at convenient, conspicuously accessible locations on all construction jobsites.

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

One or more fire extinguishers, rated not less than 2A, shall be provided on each floor. In multistory buildings, at least one fire extinguisher shall be located adjacent to each stairway.

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 jobsite.

Carbon tetrachloride and other toxic vaporizing liquid fire extinguishers are prohibited.

A fire alarm system shall be established on each jobsite so employees and the local fire department can be alerted for an emergency. The alarm code and reporting instructions shall be conspicuously posted.

Electrical wiring and equipment for light, heat or power purposes shall be installed in compliance with OSHA requirements.

Smoking shall not be permitted at or in the vicinity of operations which constitute a fire hazard, and shall be conspicuously posted: "**NO SMOKING OR OPEN FLAME.**"

Internal combustion engine powered equipment shall be so located that the exhausts are well away from combustible materials. When the exhausts are piped to outside the building under construction, a clearance of at least six (6) inches shall be maintained between such piping and combustible material.

Portable battery powered lighting equipment, used in connection with the storage, handling or use of flammable gases or liquid, shall be of the type approved for the hazardous locations.

No temporary building shall be erected where it will adversely affect any means of exit.

Temporary buildings, when located within another building or structure, shall be of either noncombustible construction or of combustible construction having a fire resistance of not less than one (1) hour.



Temporary buildings, located other than inside another building and not used for the storage, handling or use of flammable or combustible liquids, flammable gases, explosives or blasting agents, or similar hazardous materials, shall be located at a distance of not less than 10 feet from another building or structure.

The method of piling combustible materials shall be solid wherever possible and in orderly and regular piles and in no case higher than 20 feet. No combustible material shall be stored outdoors within 10 feet of a building or structure.

All storage of flammable and combustible materials shall be in compliance with CFR 1926.151 and 1926.152 standards.

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

If the facility being constructed includes the installation of automatic sprinkler protection, the installation shall closely follow the construction and be placed in service as soon as applicable laws permit following completion of each story.

During demolition or alterations, existing automatic sprinkler installations shall be retained in service as long as reasonable. The operation of sprinkler control valves shall be permitted only by properly authorized persons. Modification of sprinkler systems to permit alterations or additional demolition should be expedited so the automatic protection may be returned to service as quickly as possible. Sprinkler control valves shall be checked daily at close of work to ascertain the protection is in service.

Driveways between and around combustible storage piles shall be at least 15 feet wide and maintained free from accumulation of rubbish, equipment, or other articles or materials. Driveways shall be so spaced that a maximum grid system unit of 50 feet by 150 feet is produced.

Storage shall not obstruct, or adversely affect, means of exit from indoor storage areas.

All materials shall be stored, handled and piled with due regard to their fire characteristics.

Material shall be piled to minimize the spread of fire internally and to permit convenient access for firefighting. Stable piling shall be maintained at all times. Aisle space shall be maintained to safely accommodate the widest vehicle that may be used within the building for firefighting purposes.

Clearance of at least 36 inches shall be maintained between the top level of the stored material and the sprinkler deflectors.

Clearance shall be maintained around lights and heating units to prevent ignition of combustible materials.

A clearance of 24 inches shall be maintained around the path of travel of fire doors unless a barricade is provided in which case no clearance is needed. Material shall not be stored within 36 inches of a fire door opening.

HOT WORK PERMIT

a Hot Work Permit is required any time work involves the use of open flame or spark producing equipment. This includes welding, cutting, burning, grinding, and or soldering operation.



Prior to commencing work, all work specific/area hazards shall be understood and communicated and all appropriated permits shall be obtained.

All appropriate permits shall be posted in the area of work.

All personnel in the surrounding work area shall be properly warned of the hazardous work area by the use of barricades or other communication means.

Prior to work within 35 feet of work area:

1. Flammable liquids, dust, lint and oily deposits are to be removed.
2. Explosive atmosphere is eliminated or if not possible, monitored.
3. Floors are swept clean.
4. Combustible floors are wet down, combustibles in the area removed or covered with fire resistive protection.
5. Floor and wall openings covered.
6. Fire resistive tarpaulins are suspended beneath work.

A fire watch will be posted while Hot Work is ongoing and for 60 minutes after, with fire extinguishing equipment immediately available at the work area.

Fire watch personnel will be trained in the use of the fire protection equipment provided.

SIGNS, SIGNALS AND BARRICADES

Signs, signals and barricades shall be visible at all times when a hazard exists, and covered promptly when the hazard no longer exists. All signs, signals and barricades shall be obeyed by construction personnel.

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 additional sign wording.

Caution signs shall be used only to warn against potential hazards or to 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.

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 three-fourths inch in width.

Safety instruction signs, when used, 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.

Directional signs, other than automotive traffic signs, shall be white with a black panel and a white directional symbol. Any additional wording on the sign shall be black letters on the white background.

Traffic signs. All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed highly visual warning signs. Barricades shall be located at the nearest intersecting public highway or street on each side of the block section. All traffic control signs or devices used for protection of construction workmen shall conform to American National Standards Institute D6.1-



1971, Manual on Uniform Traffic Control Devices for Streets and Highways.

Accident prevention tags shall be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. They shall not be used in place of, or as a substitute for, accident prevention signs.

When operations are such that signs, signals and barricades do not provide the necessary protection on or adjacent to a highway or street, flagmen or other appropriate traffic controls shall be provided. Flagmen shall be provided with and wear a red or orange warning garment while flagging. Warning garments worn at night shall be of reflectorized material.

Regulations for crane and hoist signaling will be found in applicable American National Standards Institute standards.

All hot electrical rooms must have signs identifying it as such. Other than an electrician working in these rooms or other crafts performing work in these rooms no one shall be in these areas and in most cases these rooms should be locked.

Barricade means an obstruction to deter the passage of persons or vehicles.

Signs are the warnings of hazard, temporarily or permanently affixed or placed, at locations where hazards exist.

Signals are moving signs, provided by workers, such as flaggers, or by devices, such as flashing lights, to warn of possible or existing hazards.

Tags are temporary signs, usually attached to a piece of equipment or part of a structure, to warn of existing or immediate hazards.

MATERIAL HANDLING

All materials shall be stored in tiers stacked, blocked or otherwise secured to prevent sliding, falling or collapse.

Maximum safe load limits of floors within buildings and structures, in pounds per square foot, shall be conspicuously posted in all storage areas, except for floor or slab on grade. Maximum safe loads shall not be exceeded.

Aisles and passageways shall be kept clear to provide for the free and safe movement of material handling equipment and personnel.

When a difference in road or working levels exist, means such as ramps, blocking or grading shall be used to ensure the safe movement of vehicles between the two levels.

Never store materials in any way that would block access to emergency equipment or electrical disconnects.

Materials stored inside buildings under construction shall not be placed within six (6) feet of any hoistway or inside floor openings, nor within ten (10) feet of an exterior wall which does not extend above the top of the material stored.

No material shall be stored within four (4) feet of working edges.



Non-compatible materials shall be segregated in storage.

Materials shall not be stored on scaffolds or runways in excess of supplies needed for immediate operations.

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.

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.

Used lumber shall have all nails withdrawn before stacking. Lumber shall be stacked on level and solidly supported sills. Lumber shall be so stacked as to be stable and self-supporting. Lumber piles shall not exceed 20 feet in height. Lumber to be handled manually shall not be stacked more than 16 feet high.

To avoid hand injuries, all employees shall wear gloves anytime there is a chance of injury.

When lifting materials by hand, you should know the weight of the material being lifted and always lift with your legs keeping your back straight.

Only approved containers or portable tanks shall be used to store flammable materials or combustible liquids.

Use good housekeeping practices at all times to ensure safe material handling.

Store materials as close to your work areas as possible. Pre-planning in this regard can help save time and prevent exposure for material handling incidents.

Structural steel, poles, pip, bar stock and other cylindrical materials, unless racked, shall be stacked and blocked so as to prevent spreading or tilting.

Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion or pest harborage. Vegetation control will be exercised when necessary.

Rigging: Never ride or get under loads which are being moved by cranes, hoists or other equipment.

Make sure you clear the path in which you are moving materials (construction debris, wood, plastic, pipe). All floors or walking surfaces should be free from ice, water, grease or other slick surfaces.

For specific rigging specifications, refer to CFR 1926.251 standards.

TOOLS AND EQUIPMENT

All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition.

Guarding: When power operated tools are designed to accommodate guards, they shall be equipped with such guards when in use.

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded if such parts are exposed to contact by employees or otherwise create a



hazard. Guarding shall meet the requirements as set forth in American National Standards Institute, B15.1-1953 (R1958).

One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks. Examples of guarding methods are - barrier guards, two-hand tripping devices, electronic safety devices, etc.

The point of operation of machines whose operation exposes an employee to injury, shall be guarded. The guarding device shall be in conformity with all appropriate standards, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.

Special hand tools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other guarding required, but can only be used to supplement protection provided.

Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazard.

All hand held powered platen sanders, grinders with wheels 2 inch diameter or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws, and jigsaws with blade shanks one-fourth of an inch (1/4") wide or less may be equipped with only a positive "on-off" control.

All hand held powered drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels greater than 2 inches in diameter, disc sanders, belt sanders, reciprocating saws, saber saws and other similar operating powered tools shall be equipped with a momentary contact "on-off" control and may have a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

All other hand held powered tools, such as circular saws, chain saws, and percussion tools without positive accessory holding means, shall be equipped with a constant pressure switch that will shut off the power when the pressure is released.

Hand Tools: Employers shall not issue or permit the use of unsafe hand tools.

Wrenches, including adjustable, pipe, end and socket wrenches shall not be used when jaws are sprung to the point that slippage occurs. Impact tools such as drift pins, wedges and chisels, shall be kept free of mushroomed heads. The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

Power Operated Hand Tools: Electric power operated tools shall either be of the approved double-insulated type or grounded.

The use of electric cords for hoisting or lowering tools shall not be permitted.

Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected.

Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to



prevent attachments from being accidentally expelled.

All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 PSI pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.

Compressed air shall not be used for cleaning purposes except where reduced to less than 30 PSI and then only with effective chip guarding and personal protective equipment. The 30 PSI requirement does not apply for concrete form, mill scale and similar cleaning purposes.

The manufacturer's safe operating pressure for hoses, pipes, valves, filters and other fittings shall not be exceeded, the use of hoses for hoisting or lowering tools shall not be permitted.

All hoses exceeding one-half (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.

Abrasive blast cleaning nozzles shall be equipped with an operating valve which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.

All fuel powered tools shall be stopped while being refueled, serviced or maintained, and fuel shall be transported, handled, and stored in accordance with CFR 1926 Subpart F.

When fuel powered tools are used in enclosed spaces, the applicable requirements for concentrations of toxic gases and use of personal protective equipment, as outlined in CFR Subpart D and E.

The fluid used in hydraulic powered tools shall be fire-resistant fluids approved under Schedule 30 of the U.S. Bureau of Mines, Department of the Interior, and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.

The manufacturer's safe operating pressures for hoses, valves, pipes, filters and other fittings shall not be exceeded.

Powder Actuated Tools: Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool.

The tool shall be tested each day before loading to ensure safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.

Any tool found not in proper working order, or that develops a defect during use, shall be immediately removed from service and not used until properly repaired.

Personal protective equipment shall be worn at all times during use.

Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any employees. Hands shall be kept clear of the open barrel end.

Loaded tools shall not be left unattended.

Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.



Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.

No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.

Tools shall not be used in an explosive or flammable atmosphere.

All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.

Powder-actuated tools used by employees shall meet all other applicable requirements of American National Standards Institute, A10.3-1970, Safety Requirements for Explosive-Actuated Fastening Tools.

Abrasive Wheels and Tools: All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation.

Grinding machines shall be equipped with safety guards in conformance with the requirements of American National Standards Institute, B7.1-1970.

The safety guard shall cover the spindle end, nut and flange projections. The safety guard shall be mounted so as to maintain proper alignment with the wheel, and the strength of the fastenings shall exceed the strength of the guard, except: Safety guards on all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and outer flange are exposed; and where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted; and the spindle end, nut and outer flange may be exposed on machines designed as portable saws.

Floor stand and bench mounted abrasive wheels, used for external grinding, shall be provided with safety guards. The maximum angular exposure of the grinding wheel periphery and sides shall be not more than 90°, except that when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 125°. In either case, the exposure shall begin not more than 65° above the horizontal plane of the spindle. Safety guards shall be strong enough to withstand the effect of a bursting wheel.

Floor and bench mounted grinders shall be provided with work rests which are rigidly supported and readily adjustable. Such work rests shall be kept at a distance not to exceed one-eighth (1/8) inch from the surface of the wheel.

Cup type wheels used for external grinding shall be protected by either a revolving cup guard or a band type guard in accordance with the provisions of the ANSI code.

Portable abrasive wheel used for internal grinding shall be provided with safety flanges.

When safety guards are required, they shall be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings shall be of sufficient strength to retain fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 180 degrees.

When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure the pieces of the wheel will be retained in case of accidental breakage, shall be used.

All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure they are free from cracks



or defects.

Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place.

All employees using abrasive wheels shall be protected by eye protection equipment, except when adequate eye protection is afforded by eye shields which are permanently attached to the bench or floor stand.

On offhand grinding machines, work rests shall be used to support the work. They shall be of rigid construction and designed to be adjustable to compensate for wheel wear. Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth (1/8) inch to prevent the work from being jammed between the wheel and the rest. The work rest shall be securely clamped after each adjustment. The adjustment shall not be made with the wheel in motion.

Woodworking Tools: All fixed power driven woodworking tools shall be provided with a disconnect switch that can either be locked or tagged in the off position.

The operating speed shall be etched or otherwise permanently marked on all circular saws over 20 inches in diameter or operating at over 10,000 peripheral feet per minute. Any saw so marked shall not be operated at a speed other than marked on the blade. When a marked saw is re-tensioned for a different speed, the marking shall be corrected to show the new speed.

Automatic feeding devices shall be installed on machines whenever the nature of the work will permit. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points.

Automatic feeding devices shall be installed on machines whenever the nature of the work will permit,. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points.

All portable, power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

The upper hood on a radial saw shall completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor. The upper hood shall be constructed in such a manner and of such material that

it will protect the operator from flying splinters, broken saw teeth, etc., and will deflect sawdust away from the operator. The sides of the lower exposed portion of the blade shall be guarded to the full diameter of the blade by a device that will automatically adjust itself to the thickness of the stock and remain in contact with stock being cut to give maximum protection possible for the operation being performed.

Each circular hand-fed ripsaw shall be guarded by a hood which shall completely enclose the portion of the saw above the table and that portion of the saw above the material being cut. The hood and mounting shall be arranged so the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut but it shall not offer any considerable resistance to the insertion of material. The hood shall be made of adequate strength to resist blows and strains, and shall be designed to protect the operator from flying splinters and broken



teeth. The hood shall be mounted to insure its operation will be positive, reliable and in true alignment.

Jacks: The manufacturer's rated capacity shall be legibly marked on all jacks and shall not be exceeded.

All jacks shall have a positive stop to prevent over travel.

When it is necessary to provide a firm foundation, the base of the jack shall be blocked or cribbed. Where there is a possibility of slippage of the metal cap of the jack, a wood block shall be placed between the cap and the load.

After the load has been raised, it shall be cribbed, blocked or otherwise secured at once.

Hydraulic jacks exposed to freezing temperatures shall be supplied with adequate antifreeze liquid.

All jacks shall be properly lubricated at regular intervals.

Each jack shall be thoroughly inspected at times which depend upon the service conditions.

Repair or replacement parts shall be examined for possible defects.

Jacks which are out of order shall be tagged accordingly, and shall not be used until repairs are made.

Lasers: Only qualified and trained employees shall be assigned to install, adjust and operate laser equipment.

Areas in which lasers are used shall be posted with standard laser warning placards.

Employees shall wear proper eye protection when working in areas where there is a potential exposure to direct or reflected laser light greater than 0.005 watts.

Beam shutters or caps shall be utilized, or laser turned off when laser transmission is not actually required. When the laser is left unattended for a substantial period of time, such as during lunch hour, overnight or at change of shifts, the laser shall be turned off.

The laser beam shall not be directed at employees.

WELDING AND CUTTING

Only experienced and certified individuals shall be allowed to do any type of welding or cutting. No one is to do any type of welding or cutting in a hazardous area without proper instructions and a written permit from the proper authority.

Safety concerning welding and cutting operations is of vital importance. Improper processes can result in loss of life and property by fire or explosions. Therefore, it is essential safety precautions be observed during all phases of welding and cutting operations. The use of permits to weld or cut in a hazardous location is one method of reducing a potentially serious situation from developing.

Do not weld or cut so sparks, hot metal or severed sections fall on cylinders, hoses, machinery, legs or feet, flammable materials or where they may strike personnel working below.

When practical, objects to be welded, cut or heated shall be moved to a designated safe location or, if the objects



cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place, or otherwise protected.

When welding, cutting or heating is performed on walls, floors and ceilings, since direct penetration of sparks or heat transfer may introduce a fire hazard to an adjacent area, the same precautions shall be taken on the opposite side as are taken on the side on which the welding is being performed.

A fire watch shall be established to patrol all exposed areas of the welding or cutting operation if the potential for a fire exists.

Portable fire extinguishers shall be located at each work site.

Mechanical or local exhaust ventilation shall be provided whenever welding or cutting is performed in a confined space.

Never cut on any closed container that may hold flammable substances without thoroughly purging the container.

Any faulty or defective equipment shall be reported to the Superintendent and the use of the equipment shall be discontinued until it's safe or has been fixed or repaired.

No welding, cutting or heating shall be done where the application of flammable paints, or the presence of other flammable compounds or heavy dust concentrations creates a fire hazard.

Always wear the proper personal protective equipment (PPE).

- ▶ Goggles with proper filter lenses.
- ▶ Head shield/hood with proper filter lenses.
- ▶ Fire retardant gauntlet gloves.
- ▶ Shirts with long sleeves, trousers without cuffs and high top shoes or boots.
- ▶ Respirator when burning materials that give off fumes.

Gas Welding and Cutting Procedures

Valve protection caps shall be in place and secured.

When cylinders are hoisted, they shall be secured on a cradle, sling board or pallet. They shall not be hoisted or transported by means of magnets or choker slings.

Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck or permitted to strike each other violently.

When cylinders are transported by powered vehicles, they shall be secured in a vertical position.

Valve protection caps shall not be used for lifting cylinders from one vertical position to another. Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen. Warm, not boiling, water shall be used to thaw cylinders loose.

Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.



A suitable cylinder truck, chain or other steadying device shall be used to keep cylinders from being knocked over while in use.

When work is finished, when cylinders are empty, or when cylinders are moved at any time, the cylinder valve shall be closed.

Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least five (5) feet (1.5 m) high having a fire-resistance rating of at least one-half hour.

Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 feet (6.1 m) from highly combustible materials such as oil or excelsior. Cylinders should be stored in assigned places away from elevators, stairs, or gangways. Assigned storage places shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

Cylinders shall be kept far enough away from the actual welding or cutting operation so sparks, hot slag or flame will not reach them. When this is impractical, fire resistant shields shall be provided and used.

Cylinders shall be placed where they cannot become part of an electrical circuit. Electrodes shall not be struck against a cylinder to strike an arc.

Fuel gas cylinders shall be placed with valve end up whenever they are in use. They shall not be placed in a location where they would be subject to open flame, hot metal or other sources of artificial heat.

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

Cylinders, whether full or empty, shall not be used as rollers or supports.

No person other than the gas supplier shall attempt to mix gases in a cylinder. No one except the owner of the cylinder or person authorized by owner, shall refill a cylinder. No one shall use a cylinder's contents for purposes other than those intended by the supplier.

Damaged or defective cylinders shall NOT be used.

Fuel Gas and Oxygen Manifolds

Fuel gas and oxygen manifolds shall bear the name of the substance they contain in letters at least one (1) inch high which shall be either painted on the manifold or on a sign permanently attached to it.

Fuel gas and oxygen manifolds shall be placed in safe, well ventilated and accessible locations. They shall not be located within enclosed spaces.

Manifold hose connections, including both ends of the supply hose that lead to the manifold, shall be such that the hose cannot be interchanged between fuel gas and oxygen manifolds and supply header connections. Adapters shall not be used to permit the interchange of hose. Hose connections shall be kept free of grease and oil.



When not in use, manifold and header hose connections shall be capped.

Nothing shall be placed on top of a manifold, when in use, which will damage the manifold or interfere with the quick closing of the valves.

Fuel Gas and Oxygen Hose

Fuel gas hose and oxygen hose shall be easily distinguishable from each other. Oxygen and fuel gas hoses shall not be interchangeable. A single hose having more than one gas passage shall not be used.

When parallel sections of oxygen and fuel gas hose are taped together, not more than 4 inches out of 12 inches shall be covered by tape.

All hose in use, carrying acetylene, oxygen, natural or manufactured fuel gas, or any gas or substance which may ignite or enter into combustion, or be in any way harmful to employees, shall be inspected at the beginning of each working shift. Defective hose shall be removed from service.

Hose which has been subject to flashback, or which shows evidence of severe wear or damage, shall be tested to twice the normal pressure to which it is subject, but in no case less than 300 psi. defective hose, or hose in doubtful condition, shall not be used.

Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull without rotary motion.

Boxes used for the storage of gas hose shall be ventilated.

Hoses, cables and other equipment shall be kept clear of passageways, ladders and stairs.

Torches

Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills or other devices designed for such purpose.

Torches in use shall be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings and tip connections. Defective torches shall not be used.

Torches shall be lighted by friction lighters or other approved devices, and not by matches or from hot work.

Oxygen and fuel gas pressure regulators, including their related gauges, shall be in proper working order while in use.

Oxygen cylinders and fittings shall be kept away from oil or grease. Cylinders, cylinder caps and valves, couplings, regulators, hose and apparatus shall be kept free from oil or greasy substances and shall not be handled with oily hands or gloves. Oxygen shall not be directed at oily surfaces, greasy clothes or within a fuel oil or other storage tank or vessel.

Arc Welding and Cutting Procedures

Only manual electrode holders which are specifically designed for arc welding and cutting, and are of a capacity



capable of safely handling the maximum rated current required by the electrodes, shall be used.

Any current-carrying parts passing through the portion of the holder which the arc welder or cutter grips in his hand, and the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

All arc welding and cutting cables shall be of the completely insulated, flexible type, capable of handling the maximum current requirements of the work in progress, taking into account the duty cycle under which the arc welder or cutter is working.

Only cable free from repair or splices for a minimum distance of 10 feet from the cable end to which the electrode holder is connected shall be used, except that cables with standard insulated connectors or with splices whose insulating quality is equal to that of the cable are permitted.

When it becomes necessary to connect or splice lengths of cable one to another, substantial insulated connectors of a capacity at least equivalent to that of the cable shall be used. If connections are effected by means of cable lugs, they shall be securely fastened together to give good electrical contact, and the exposed metal parts of the lugs shall be completely insulated.

Cables in need of repair shall not be used. When a cable becomes worn to the extent of exposing bare conductors, the portion thus exposed shall be protected by means of rubber and friction tape or other equivalent insulation.

Employers shall instruct employees in the safe means of arc welding and cutting as follows:

- ▶ When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected so they cannot make electrical contact with employees or conducting objects.
- ▶ Hot electrode holders shall not be dipped in water; to do so may expose the arc welder or cutter to electric shock.
- ▶ When the arc welder or cutter has occasion to leave his work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved, the power supply switch to the equipment shall be opened.
- ▶ Any faulty or defective equipment shall be reported to the supervisor.

Whenever practicable, all arc welding and cutting operations shall be shielded by noncombustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

CRYSTALLINE SILICA STANDARD

Crystalline silica is a common mineral that is found in construction materials such as sand, stone, concrete, brick, and mortar. When workers cut, grind, drill, or crush materials that contain crystalline silica, very small dust particles are created. These tiny particles known as “respirable” particles can travel deep into workers’ lungs and increase their risk of developing serious silica-related diseases. In most cases, these diseases occur after years of exposure to respirable crystalline silica.

OSHA’s Respirable Crystalline Silica Standard (29 CFR 1926.1153) requires employers to take steps to protect workers from and limit exposure to respirable crystalline silica. Employers can either use a control method or they can measure workers’ exposure to silica and independently decide which dust controls work best to limit exposures to the permissible exposure limit (PEL). Table 1 of the OSHA standard (29 CFR 1926.1153) matches 18 common construction tasks with effective dust control method such as using water to keep dust from getting into the air;



using a vacuum dust collection system to capture dust; or in some operations, respirators may also be needed.

Regardless of which exposure control method is used, all construction employers covered by the standard are required to:

- Establish and implement a **written exposure control plan** that identifies tasks that involve exposure and methods used to protect workers, including procedures to restrict access to work areas where high exposures may occur;
- Designate a **competent person** to implement the written exposure control plan;
- Restrict **housekeeping** practices that expose workers to silica, such as use of compressed air without a ventilation system to capture the dust and dry sweeping, where effective, safe alternatives are available;
- Offer **medical exams**—including chest X-rays and lung function tests—every three years for workers who are required by the standard to wear a respirator for 30 or more days per year;
- **Train workers** on the health effects of silica exposure, workplace tasks that can expose them to silica, and ways to limit exposure; and
- **Keep records** of workers' silica exposure and medical exams.

VENTILATION

Whenever hazardous substances such as dusts, fumes, mists, vapors or gases exist or are produced in the course of construction work, their concentrations shall not exceed the limits specified in CFR 1926.55(a). When ventilation is used as an engineering control method, the system shall be installed and operated according to the requirements of CFR 1926.55.

Local exhaust ventilation when used as described above, shall be designed to prevent dispersion into the air of dusts, fumes, mists, vapors and gases in concentrations causing harmful exposure. Such exhaust systems shall be so designed that dusts, fumes, mists, vapors or gases are not drawn through the work area of employees.

Exhaust fans, jets, ducts, hoods, separators and all necessary appurtenances, including refuse receptacles, shall be so designed, constructed, maintained and operated as to ensure the required protection by maintaining a volume and velocity of exhaust air sufficient to gather dusts, fumes, vapors or gases from said equipment or process, and to convey them to suitable points of safe disposal, thereby preventing their dispersion in harmful quantities into the atmosphere where employees work.

The exhaust system shall be in operation continually during all operations which it is designed to serve. If the employee remains in the contaminated zone, the system shall continue to operate after the cessation of said operations, the length of time to depend upon the individual circumstances and effectiveness of the general ventilation system.

The air outlet from every dust separator, and the dusts, fumes, mists, vapors or gases collected by an exhaust or ventilating system shall discharge to the outside atmosphere. Collecting systems which return air to work area may be used if concentrations which accumulate in the work area air do not result in harmful exposure to employees. Dust and refuse discharged from an exhaust system shall be disposed of in such a manner that it will not result in harmful exposure to employees.

When working in enclosed areas, the air quality shall be monitored periodically for dangerous levels of dusts, fumes, vapors or gases (e.g., carbon monoxide, carbon dioxide, etc.). All test data shall be recorded in the Superintendent's daily log.



Testing instruments are available from the Safety Director for air quality tests. An air quality control test may also be performed by the Industrial Commission at no charge.

FLAMMABLE AND COMBUSTIBLE LIQUIDS

Only approved containers and portable tanks shall be used for storing and handling flammable and combustible liquids. Approved safety cans shall be used for the handling and use of flammable liquids in quantities of five (5) gallons or less. For quantities of one (1) gallon or less, the original container may be used, for storage, use and handling of flammable liquids.

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

Quantities of flammable and combustible liquid in excess of 25 gallons shall be stored in an acceptable or approved cabinet in accordance with CFR 1926.152(b)(2).

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

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 (3) such cabinets may be located in a single storage area. Quantities in excess of this shall be stored in an inside storage room.

Materials which will react with water and create a fire hazard shall not be stored in the same room with flammable or combustible liquids.

Storage of containers (not more than 60 gallons each) shall not exceed 1,100 gallons in any one pile or area. Piles or groups of containers shall be separated by a five (5) foot clearance. Piles or groups of containers shall not be nearer than 20 feet to a building.

Within 200 feet of each pile of containers, there shall be a 12-foot-wide access way to permit approach of fire control apparatus.

The storage area shall be graded in a manner to divert possible spills away from buildings or other exposures, or shall be surrounded by a curb or earth dike at least 12 inches high. When curbs or dikes are used, provisions shall be made for draining off accumulations of ground or rain water, or spills of flammable or combustible liquids. Drains shall terminate at a safe location and shall be accessible to operation under fire conditions.

Portable tanks shall not be nearer than 20 feet from any building. Two or more portable tanks, grouped together, having a combined capacity in excess of 2,200 gallons, shall be separated by a five (5) foot clear area. Individual portable tanks exceeding 1,100 gallons shall be separated by a five (5) foot clear area.

Within 200 feet of each portable tank, there shall be a 12-foot-wide access way to permit approach of fire control apparatus.

Storage areas shall be kept free of weeds, debris and other combustible materials not necessary to the storage.

Portable tanks shall be provided with emergency venting and other devices.



Fire Control

At least one portable fire extinguisher, having a rating of not less than 20-B units, shall be located outside of, but not more than 10 feet from, the door opening into any room used for storage of more than 60 gallons of flammable or combustible liquids.

At least one portable fire extinguisher having a rating of not less than 20-B units shall be located not less than 25 feet, nor more than 75 feet, from any flammable liquid storage area located outside.

When sprinklers are provided, they shall be installed in accordance with the Standard for the Installation of Sprinkler Systems, NFPA 13-1969.

At least one portable fire extinguisher having a rating of not less than 20-B:C units shall be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible liquids.

Dispensing liquids

Areas in which flammable or combustible liquids are transferred at one time, in quantities greater than five (5) gallons from one tank or container to another tank or container, shall be separated from other operations by 25-foot distance or by construction having a fire resistance of at least one (1) hour. Drainage or other means shall be provided to control spills. Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower flammable limit.

Transfer of flammable liquids from one container to another shall be done only when containers are electrically interconnected (bonded).

Flammable or combustible liquids shall be drawn from or transferred into vessels, containers, or tanks within a building or outside only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container, or portable tanks, by gravity or pump, through an approved self-closing valve. Transferring by means of air pressure on the container or portable tanks is prohibited.

The dispensing units shall be protected against collision damage.

Dispensing devices and nozzles for flammable liquids shall be of an approved type.

Flammable liquids shall be kept in closed containers when not actually in use.

Leakage or spillage of flammable or combustible liquids shall be disposed of promptly and safely.

Flammable liquids may be used only where there are no open flames or other sources of ignition within 50 feet of the operation, unless conditions warrant greater clearance.

Flammable or combustible liquids shall be stored in approved closed containers, in tanks located underground, or in above ground portable tanks.

There shall be no smoking or open flames in the areas used for fueling, servicing fuel systems for internal combustion engines, receiving or dispensing of flammable or combustible liquids.

Conspicuous and legible signs prohibiting smoking shall be posted.



The motors of all equipment being fueled shall be shut off during the fueling operation.

Each service or fueling area shall be provided with at least one (1) fire extinguisher having a rating of not less than 20-B:C located so an extinguisher will be within 75 feet of each pump, dispenser, underground fill pipe opening, and lubrication or service area.

ELECTRICAL INSTALLATIONS

All electrical conductors and equipment shall be approved. The employer shall ensure electrical equipment is free from recognized hazards that are likely to cause death or serious physical harm to employees.

Listed, labeled or certified equipment shall be installed and used in accordance with instructions included in the listing, labeling or certification for the identified purpose of the equipment.

Equipment intended to break current shall have an interrupting rating at system voltage sufficient for the current that must be interrupted.

Conductors shall be spliced or joined with splicing devices designed for the use or by brazing, welding or soldering with a fusible metal or alloy. Soldered splices shall first be so spliced or joined as to be mechanically and electrically secure without solder and then soldered. All splices and joints and the free ends of conductors shall be covered with an insulation equivalent to that of the conductors or with an insulating device designed for the purpose.

Parts of electric equipment which in ordinary operation produce arcs, sparks, flames or molten metal shall be enclosed or separated and isolated from all combustible material.

Electrical equipment shall not be used unless the manufacturer's name, trademark or other descriptive marking by which the organization responsible for the product may be identified, is placed on the equipment and unless other markings are provided giving voltage, current, wattage or other ratings as necessary. The markings shall be of sufficient durability to withstand the environment involved.

Each disconnecting means for motors and appliances shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident. Each service, feeder, and branch circuit, at its disconnecting means or over-current device, shall be legibly marked to indicate its purpose, unless located and arranged so the purpose is evident.

Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.

Live parts of electric equipment operating at 50 volts or more shall be guarded against accidental contact by cabinets or other forms of enclosures (per CFR 1926.403(i)2)(i).

In locations where electric equipment would be exposed to physical damage, enclosures or guards shall be so arranged and of such strength as to prevent such damage.

Entrances to rooms and other guarded locations containing exposed live parts shall be marked with conspicuous warning signs forbidding unqualified persons to enter.

Electrical installations open to unqualified persons shall be made with metal enclosed equipment or shall be



enclosed in a vault or in an area, to which access is controlled by a lock. All equipment shall be marked with caution signs. Guards shall be provided to prevent damage from vehicular traffic. Venting shall guarded so objects inserted through openings will be deflected from energized parts.

Sufficient space shall be provided and maintained around electric equipment to permit ready and safe operation and maintenance of such equipment. Where energized parts are exposed, the minimum clear workspace shall not be less than six (6) feet six (6) inches (1.98 m) high measured vertically from the floor or platform, or less than three (3) feet (914 mm) wide measured parallel to the equipment.

Unguarded live parts above working space shall be maintained at least 10 feet above ground level.

Wire Design and Protection

A conductor used as a grounded conductor shall be identifiable and distinguishable from all other conductors. A conductor used as an equipment grounding conductor shall be identifiable and distinguishable from all other conductors.

No grounded conductor shall be attached to any terminal or lead so as to reverse designated polarity.

A grounding terminal or grounding type device on a receptacle, cord connector, or attachment plug shall not be used for purposes other than grounding.

Employers must provide either ground-fault circuit interrupters (GFCIs) or an assured equipment grounding conductor program to protect employees from ground-fault hazards on construction sites. All Kier Construction projects shall use the GFCI program.

Outlet devices shall have an ampere rating not less than the load to be served and shall comply with the following:

- ▶ A single receptacle installed on an individual branch circuit shall have an ampere rating of not less than that of the branch circuit.
- ▶ Where connected to a branch circuit supplying two (2) or more receptacles or outlets, receptacle ratings shall conform to the values listed below.

<u>Circuit rating Amps</u>	<u>Receptacle rating Amps</u>
15	Not over 15
20	15 or 20
30	30
40	40 or 50
50	50

- ▶ The rating of an attachment plug or receptacle used for cord and plug connection of a motor to a branch circuit shall not exceed 15 amperes at 125 volts or 10 amperes at 250 volts if individual overload protection is omitted.

Outside Conductors and Lamps

Conductors supported on poles shall provide a horizontal climbing space not less than 30 inches.



Open conductors shall conform to the following minimum clearances:

- ▶ Ten (10) feet (3.05 m) above finished grade, sidewalks, or from any platform or projection from which they might be reached.
- ▶ Twelve (12) feet (3.66 m) over areas subject to vehicular traffic other than truck traffic.
- ▶ Fifteen (15) feet (4.57 m) over areas that are subject to truck traffic.
- ▶ Eighteen (18) feet (5.49 m) over public streets, alleys, roads, and driveways.

Conductors shall have a clearance of at least 3 feet (914 mm) from windows, doors, fire escapes, or similar locations.

Conductors above roof space accessible to employees on foot shall have a clearance from the highest point of the roof surface of not less than 8 feet (2.44 m) vertical clearance for insulated conductors, not less than 10 feet (3.05 m) vertical or diagonal clearance for covered conductors, and not less than 15 feet (4.57 m) for bare conductors. See CFR 1926.404(c)(1)(iv) for exceptions.

Lamps for outdoor lighting shall be located below all live conductors, transformers, or other electric equipment, unless such equipment is controlled by a disconnecting means that can be locked in the open position or unless adequate clearances or other safeguards are provided for relamping operations.

Means shall be provided to disconnect all conductors in a building or other structure from the service-entrance conductors.

Overcurrent Protection

The following requirements apply to overcurrent protection of circuits rated 600 volts, nominal, or less.

- ▶ Conductors and equipment shall be protected from overcurrent in accordance with their ability to safely conduct current.
- ▶ Except for motor-running overload protection, overcurrent devices shall not interrupt the continuity of the grounded conductor unless all conductors of the circuit are opened simultaneously.
- ▶ Overcurrent devices shall be readily accessible.
- ▶ Overcurrent devices shall not be located where they could create an employee safety hazard by being exposed to physical damage or located in the vicinity of easily ignitable material.
- ▶ Fuses and circuit breakers shall be so located or shielded so employees will not be burned or otherwise injured by their operation.

Circuit Breakers

Circuit breakers shall clearly indicate whether they are in the open (off) or closed (on) position.

Where circuit breaker handles on switchboards are operated vertically rather than horizontally or rotationally, the up position of the handle shall be the closed (on) position.

Feeders and branch circuits over 600 volts, nominal, shall have short circuit protection.

The following systems which supply premises wiring shall be grounded:

- ▶ All 3-wire DC systems shall have their neutral conductor grounded.



- ▶ Two-wire DC systems operating at over 50 volts through 300 volts between conductors shall be grounded unless they are rectifier-derived from an AC system.
- ▶ AC circuits of less than 50 volts shall be grounded if they are installed as overhead conductors outside of buildings or if they are supplied by transformers and the transformer primary supply system is ungrounded or exceeds 150 volts to ground.
- ▶ AC systems of 50 volts to 1000 volts shall be grounded under any of the following conditions:
 - If the system can be so grounded that the maximum voltage to ground on the ungrounded conductors does not exceed 150 volts;
 - If the system is nominally rated 480Y/277 volt, 3-phase, 4-wire in which the neutral is used as a circuit conductor;
 - If the system is nominally rated 240/120 volt, 3-phase, 4-wire in which the midpoint of one phase is used as a circuit conductor; or
 - If a service conductor is uninsulated.
- ▶ AC systems of 50 volts to 1000 volts are not required to be grounded if the system is separately derived and is supplied by a transformer that has a primary voltage rating less than 1000 volts, provided all of the following conditions are met:
 - The system is used exclusively for control circuits,
 - The conditions of maintenance and supervision assure only qualified persons will service the installation,
 - Continuity of control power is required, and
 - Ground detectors are installed on the control system.
- ▶ Separately derived systems requiring grounding of wiring systems whose power is derived from generator, transformer, or converter windings and has no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system.

Generators

- ▶ Under the following conditions, the frame of a portable generator need not be grounded and may serve as the grounding electrode for a system supplied by the generator:
 - The generator supplies only equipment mounted on the generator and/or cord- and plug-connected equipment through receptacles mounted on the generator, and
 - The noncurrent carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame.
- ▶ Vehicle-mounted generators. Under the following conditions the frame of a vehicle may serve as the grounding electrode for a system supplied by a generator located on the vehicle:
 - The frame of the generator is bonded to the vehicle frame, and
 - The generator supplies only equipment located on the vehicle and/or cord- and plug-connected equipment through receptacles mounted on the vehicle or on the generator, and
 - The noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame, and
 - The system complies with all other provisions of this section.
- ▶ Neutral conductor bonding. A neutral conductor shall be bonded to the generator frame if the generator is a component of a separately derived system. No other conductor need be bonded to the generator frame.
- ▶ For AC premises wiring systems the identified conductor shall be grounded.

Grounding Connections

For a grounded system, a grounding electrode conductor shall be used to connect both the equipment grounding conductor and the grounded circuit conductor to the grounding electrode. Both the equipment grounding conductor and the grounding electrode conductor shall be connected to the grounded circuit conductor on the supply side of



the service disconnecting means, or on the supply side of the system disconnecting means or overcurrent devices if the system is separately derived.

For an ungrounded service-supplied system, the equipment grounding conductor shall be connected to the grounding electrode conductor at the service equipment. For an ungrounded separately derived system, the equipment grounding conductor shall be connected to the grounding electrode conductor at, or ahead of, the system disconnecting means or overcurrent devices.

The path to ground from circuits, equipment, and enclosures shall be permanent and continuous.

All metal cable trays, metal raceways, and metal enclosures for conductors shall be grounded.

Metal enclosures for service equipment shall be grounded.

Exposed noncurrent-carrying metal parts of fixed equipment which may become energized shall be grounded.

Exposed noncurrent-carrying metal parts of cord- and plug-connected equipment which may become energized shall be grounded.

The metal parts of the following non-electrical equipment shall be grounded: Frames and tracks of electrically operated cranes; frames of non-electrically driven elevator cars to which electric conductors are attached; hand-operated metal shifting ropes or cables of electric elevators, and metal partitions, grill work, and similar metal enclosures around equipment of over 1kV between conductors.

Cabinets, Boxes, and Fittings

Conductors entering boxes, cabinets, or fittings shall be protected from abrasion, and openings through which conductors enter shall be effectively closed. Unused openings in cabinets, boxes, and fittings shall also be effectively closed.

All pull boxes, junction boxes, and fittings shall be provided with covers. If metal covers are used, they shall be grounded. In energized installations each outlet box shall have a cover, faceplate, or fixture canopy. Covers of outlet boxes having holes through which flexible cord pendants pass shall be provided with bushings designed for the purpose or shall have smooth, well-rounded surfaces on which the cords may bear.

In addition to other requirements in this section for pull and junction boxes, the following shall apply to these boxes for systems over 600 volts, nominal:

- ▶ Complete enclosure. Boxes shall provide a complete enclosure for the contained conductors or cables.
- ▶ Covers. Boxes shall be closed by covers securely fastened in place. Underground box covers that weigh over 100 pounds (43.6 kg) meet this requirement. Covers for boxes shall be permanently marked "HIGH VOLTAGE." The marking shall be on the outside of the box cover and shall be readily visible and legible.

Single-throw knife switches shall be connected so the blades are dead when the switch is in the open position. Single-throw knife switches shall be placed so gravity will not tend to close them. Single-throw knife switches approved for use in the inverted position shall be provided with a locking device that will ensure the blades remain in the open position when so set. Double-throw knife switches may be mounted so the throw will be either vertical or horizontal. However, if the throw is vertical, a locking device shall be provided to ensure the blades remain in the open position when so set.



Switchboards that have any exposed live parts shall be located in permanently dry locations and accessible only to qualified persons. Panelboards shall be mounted in cabinets, cutout boxes, or enclosures designed for the purpose and shall be dead front. However, panelboards other than the dead front externally-operable type are permitted where accessible only to qualified persons. Exposed blades of knife switches shall be dead when open.

Enclosures for Damp or Wet Locations

Cabinets, cutout boxes, fittings, boxes, and panel board enclosures in damp or wet locations shall be installed so as to prevent moisture or water from entering and accumulating within the enclosures. In wet locations the enclosures shall be weatherproof.

Switches, circuit breakers, and switchboards installed in wet locations shall be enclosed in weatherproof enclosures.

All conductors used for general wiring shall be insulated. The conductor insulation shall be of a type suitable for the voltage, operating temperature, and location of use. Insulated conductors shall be distinguishable by appropriate color or other means as being grounded conductors, ungrounded conductors, or equipment grounding conductors.

Flexible Cords and Cables

Flexible cords and cables shall be suitable for conditions of use and location, and used only for:

- ▶ Pendants;
- ▶ Wiring of fixtures;
- ▶ Connection of portable lamps or appliances;
- ▶ Elevator cables;
- ▶ Wiring of cranes and hoists;
- ▶ Connection of stationary equipment to facilitate their frequent interchange;
- ▶ Prevention of the transmission of noise or vibration; or
- ▶ Appliances where the fastening means and mechanical connections are designed to permit removal for maintenance and repair.

Flexible cords and cables shall not be used:

- ▶ As a substitute for the fixed wiring of a structure;
- ▶ Where run through holes in walls, ceilings, or floors;
- ▶ Where run through doorways, windows, or similar openings;
- ▶ Where attached to building surfaces; or
- ▶ Where concealed behind building walls, ceilings, or floors.

A conductor of a flexible cord or cable used as a grounded conductor or an equipment grounding conductor shall be distinguishable from other conductors.

Type SJ, SJO, SJT, SJTO, S, SO, ST, and STO cords shall not be used unless durably marked on the surface with the type designation, size, and number of conductors.

Flexible cords shall be used only in continuous lengths without splice or tap. Hard service flexible cords No. 12 or larger may be repaired if spliced so the splice retains the insulation, outer sheath properties, and usage characteristics of the cord being spliced.



Flexible cords shall be connected to devices and fittings so strain relief is provided which will prevent pull from being directly transmitted to joints or terminal screws.

Flexible cords and cables shall be protected by bushings or fittings where passing through holes in covers, outlet boxes, or similar enclosures.

Multi-conductor portable cable for use in supplying power to portable or mobile equipment at over 600 volts, nominal, shall consist of No. 8 or larger conductors employing flexible stranding.

Cables operated at over 2000 volts shall be shielded for the purpose of confining the voltage stresses to the insulation. Grounding conductors shall be provided. Connectors for these cables shall be of a locking type with provisions to prevent their opening or closing while energized. Strain relief shall be provided at connections and terminations. Portable cables shall not be operated with splices unless the splices are of the permanent molded, vulcanized, or other equivalent type. Termination enclosures shall be marked with a high voltage hazard warning, and terminations shall be accessible only to authorized and qualified personnel.

Fixture Wires

Fixture wires shall be suitable for the voltage, temperature, and location of use. A fixture wire which is used as a grounded conductor shall be identified.

Fixture wires may be used:

- ▶ For installation in lighting, fixtures and in similar equipment where enclosed or protected and not subject to bending or twisting in use; or
- ▶ For connecting lighting fixtures to the branch-circuit conductors supplying the fixtures.

Fixture wires shall not be used as branch-circuit conductors except as permitted for Class 1 power-limited circuits.

Equipment for General Use

Fixtures, lamp holders, lamps, rosettes, and receptacles shall have no live parts normally exposed to employee contact. However, rosettes and cleat-type lamp holders and receptacles located at least 8 feet (2.44 m) above the floor may have exposed parts.

Fixtures, lamp holders, rosettes, and receptacles shall be securely supported. A fixture that weighs more than 6 pounds (2.72 kg) or exceeds 16 inches (406 mm) in any dimension shall not be supported by the screw shell of a lamp holder.

Portable lamps shall be wired with flexible cord and an attachment plug of the polarized or grounding type. If the portable lamp uses an Edison-based lamp holder, the grounded conductor shall be identified and attached to the screw shell and the identified blade of the attachment plug. In addition, portable hand lamps shall comply with the following:

- ▶ Metal shell, paper lined lamp holders shall not be used;
- ▶ Hand lamps shall be equipped with a handle of molded composition or other insulating material;
- ▶ Hand lamps shall be equipped with a substantial guard attached to the lamp holder or handle;
- ▶ Metallic guards shall be grounded by the means of an equipment grounding conductor run within the power supply cord.

Lamp holders of the screw-shell type shall be installed for use as lamp holders only. Lamp holders installed in wet



or damp locations shall be of the weatherproof type.

Fixtures installed in wet or damp locations shall be identified for the purpose and shall be installed so water cannot enter or accumulate in wire ways, lamp holders, or other electrical parts.

Receptacles, cord connectors, and attachment plugs shall be constructed so no receptacle or cord connector will accept an attachment plug with a different voltage or current rating than for which the device is intended.

Appliances, other than those in which the current-carrying parts at high temperatures are necessarily exposed, shall have no live parts normally exposed to employee contact. A means shall be provided to disconnect each appliance. Each appliance shall be marked with its rating in volts and amperes or volts and watts.

If specified that one (1) piece of equipment shall be "in sight from" another piece of equipment, one shall be visible and not more than 50 feet (15.2 m) from the other.

The operating voltage of exposed live parts of transformer installations shall be indicated by warning signs or visible markings on the equipment or structure.

Transformers over 35 kV. Dry-type, high fire point liquid-insulated, and askarel-insulated transformers installed indoors and rated over 35 kV shall be in a vault.

If they present a fire hazard to employees, oil-insulated transformers installed indoors shall be in a vault.

Combustible material, combustible buildings and parts of buildings, fire escapes, and door and window openings shall be safeguarded from fires which may originate in oil-insulated transformers attached to or adjacent to a building or combustible material.

Transformer vaults shall be constructed so as to contain fire and combustible liquids within the vault and to prevent unauthorized access. Locks and latches shall be arranged so a vault door can be readily opened from the inside.

Materials shall not be stored in transformer vaults.

All capacitors, except surge capacitors or capacitors included as a component part of other apparatus, shall be provided with an automatic means of draining the stored charge and maintaining the discharged state after the capacitor is disconnected from its source of supply.

Capacitors rated over 600 volts, nominal, shall comply with the following additional requirements: isolating or disconnecting switches (with no interrupting rating) shall be interlocked with the load interrupting device or shall be provided with prominently displayed caution signs to prevent switching load current.

For more specific electrical requirements, see CFR 1926.400 through 1926.408.

ELECTRICAL WORK PRACTICES

No employer shall permit an employee to work in such proximity to any part of an electric power circuit that the employee could contact the electric power circuit in the course of work, unless the employee is protected against electric shock by deenergizing the circuit and grounding it or by guarding it effectively by insulation or other means.



In work areas where the exact location of underground electric power lines is unknown, employees using jackhammers, bars or other hand tools which may contact a line shall be provided with insulated protective gloves.

Before work is begun the employer shall ascertain by inquiry or direct observation, or by instruments, whether any part of an energized electric power circuit, exposed or concealed, is so located that the performance of the work may bring any person, tool or machine into physical or electrical contact with the electric power circuit. The employer shall post and maintain proper warning signs where such a circuit exists. The employer shall advise employees of the location of such lines, the hazards involved and the protective measures to be taken.

Barriers or other means of guarding shall be provided to ensure workspace for electrical equipment will not be used as a passageway during periods when energized parts of electrical equipment are exposed.

Working spaces, walkways and similar locations shall be kept clear of cords so as not to create a hazard to employees.

In existing installations, no changes in circuit protection shall be made to increase the load in excess of the load rating of the circuit wiring.

When fuses are installed or removed with one or both terminals energized, special tools insulated for the voltage shall be used.

Worn or frayed electric cords or cables shall not be used.

Extension cords shall not be fastened with staples, hung from nails, or suspended by wire.

Controls that are to be deactivated during the course of work on energized or deenergized equipment or circuits shall be tagged.

Equipment or circuits that are deenergized shall be rendered inoperative and shall have tags attached at all points where such equipment or circuits can be energized.

Tags shall be placed to identify plainly the equipment or circuits being worked on.

Flexible cords must be connected to devices and fittings so strain relief is provided which will prevent pull from being directly transmitted to joints or terminal screws.

Only approved electrical equipment may be used on the jobsite.

Do not alter electrical tools or equipment. Only authorized personal may repair equipment.

Do not leave junction boxes, circuit breakers panels, etc. unlabeled or uncovered.

The use of metal junction boxes or extension cords, two (2) or four (4) way, etc. is not permitted.

Extension cords and cables shall not be used as ropes for lifting or lowering materials.

Ensure that no flammable gases, vapors, liquids, combustible dust or mist are near electrical equipment, temporary breaker boxes, electrical volt rooms which are hot, etc.



If work is to be done near overhead power lines, employees need to ensure the longest conductive object he or she may contact, can't come closer to any unguarded energized overhead line less than 10 feet. Ten (10) feet, if less than 50 KV, for voltages over 50 KV 10' + four (4) inches for every 10 KV over 50 KV.

Special care must be taken when working in man lifts around overhead power lines. NEVER, use any machines, tools or equipment from within the basket, which should not come within 10' of overhead power which is energized.

LOCK-OUT / TAG-OUT (LOTO) PROCEDURES

Policy: Equipment shall be properly and uniformly locked and tagged whenever it is down for any reason, in order to protect the exposed employees from inadvertent equipment operation and potential harm.

Purpose: The purpose of this section is to provide a safe method for rendering inactive any electrical equipment or operating systems (including motor vehicles and heavy equipment) when equipment is down for any reason, such as repair, removal or replacement. This procedure is provided in an effort to identify certain LOTO procedural elements.

Responsibilities: When needed, the Superintendent is responsible to ensure a LOTO procedure is put in place. The Superintendent is responsible to ensure all construction employees are trained and familiar with and use the procedure, whenever and wherever it applies.

Anyone who may be exposed to the sudden release of energy or materials will be familiar with and abide by the established LOTO procedure.

Implementation: A LOTO procedure should include these basic phases of work on any system:

- ▶ Notification of equipment shutdown
- ▶ Shutting down equipment
- ▶ Repairing or installing equipment
- ▶ Notification of equipment startup
- ▶ Startup of equipment

It is likely some situations will not include all phases as such; however, regardless of the operation and the phase or phases involved, the "Lock-out/Tag-out" clearance procedure must be observed to assure the safety of the operation.

Even though this procedure generally provides for locking and tagging of equipment, **the danger tag alone is to be considered an inviolable device** and any equipment bearing such a tag must not be operated under any circumstances. Also, locks must be used in conjunction with a tag to afford maximum personnel protection (whenever possible).

Prior to starting any major operation which would involve these locking and tagging procedures, a meeting shall be set up by project supervision. All employees involved shall attend this meeting. A specific procedure will be adopted and reviewed by all concerned with the operation prior to the commencement of work.

NOTE: Where work is to be performed on existing, operational systems, a site specific LOTO program shall be used.



Shutdown and Repair of Equipment or Systems: All personnel, before working on equipment should assure that:

- ▶ Others are not already working on the piece of equipment or system, and if others are working on it, the procedure will not endanger any personnel on the equipment.
- ▶ Equipment is not under pressure, energized, at elevated temperature or otherwise unsafe to be worked upon. Others adjacent to the work area are not endangered.
- ▶ Before starting work, the responsible Superintendent shall contact the designated supervisor responsible for the equipment or system. This supervisor will show him the device(s) that requires tagging; e.g., switches, starters, valves and lockout controls. This will be accomplished by using an approved danger tag and lock.
- ▶ The main disconnect shall be opened in addition to any remote control switches. On electrical work, it is advisable as a further precaution for the electrician to remove the supply fuses. On piped systems, the main valves shall be closed and pressure relieved. The supervisor shall make sure the equipment or system is inoperative.
- ▶ After assuring the equipment has been properly shut down in accordance with the procedures described above, the Superintendent and employees involved in the work shall positively determine the equipment or system has been locked and tagged. A distinctive danger tag and lock will be attached to each device. This tag shall be dated and signed by the individuals doing the work. A short explanation of the reason for the tag should appear in the provided spaces. Only authorized personnel will repair specific equipment with system danger tags.
- ▶ If mechanically possible, a padlock (to which only the employee placing the lock shall have access to keys) shall be placed on equipment in such a manner as to render the equipment inoperable.

Starting Up Equipment or Systems: As soon as the work is completed, the danger tags and locks shall be removed, only by the individuals installing them.

In the event the shift ends before the work is completed, the status of the work is to be reported in detail to the oncoming shift personnel and the tags and locks on the system replaced by the oncoming shift personnel.

Upon completion of the work, the supervisor will make certain all tags and locks have been removed and personnel are clear of the equipment or system. The equipment will be returned to normal operating conditions.

General: In an emergency, or if the person who placed the tag and lock is not available, the Lock and Tag Removal Procedure established in each task or project specific LOTO procedure will be implemented. (Safety personnel will assist in writing and implementing LOTO and Lock and Tag Removal procedures upon request).

Personnel deviating from these instructions, or unauthorized removal of danger tags, may be subject to disciplinary action which may include termination.

Safety Engineering Standard for Lock-Out/Tag-Out Procedure : Whenever it becomes necessary to perform service, maintenance or alterations to electrically powered equipment, the following procedure is to be followed.

The supervisor (and employees working on the system) having care and custody of the equipment will secure tags and locks to all stations from which the equipment can be started and initiated. An electrical lock-out/tag-out record shall be completed prior to calling an electrician to lock and tag the power source.

The electrician will obtain the electrical lock-out procedure from the Superintendent and will isolate the appropriate power source and affix a lock and a lock-out tag in such a manner as to prevent the power source from being energized. The electrician will then sign the lock-out tag and identify the reason for equipment being locked out. The Superintendent will log the lock-out tag number into a log book.

The responsible electrician and the construction Superintendent will verify the designated equipment has been isolated by attempting a start from one of the start stations. The “try” attempt must be made on all locked and tagged equipment.



When the crew arrives at the work site, a lock-out tag(s) will be assigned and will be prominently displayed at all start stations. The Superintendent will verify the lock-out is in place by witnessing a representative attempting to start the equipment from the field start switch or visually checking the lock-out in a substation.

A set procedure must be established to energize equipment. This procedure must include the responsible Superintendent and electrician. The procedure established must ensure equipment is not inadvertently energized and is fool-proof.

Work Continuing Beyond Shift Change: If work is to be continued beyond the “normal” shift, the lock-out tag will be returned to the responsible Superintendent with a review indicating the status of the job.

The responsible Superintendent shall transfer the tag to the Superintendent of the oncoming shift after relating the status of the job and all precautions needed to perform the work safely.

If the work is not carried on continuously by an oncoming shift, the responsible Superintendent’s lock-out tag and log book must indicate the status of any extended lockout conditions.

Testing: The above procedure will apply to the electrical testing of circuits with the following addition: Electrical testing circuits or “bumping” motors may energize the circuit for short periods of time while testing without voiding the lock-out procedure provided:

- ▶ Supervising electrician has the responsible Superintendent’s permission to test.
 - He has all lock-out tags in his possession.
 - Testing may be done only when no other work is being performed by any other crew on the equipment being tested.
 - It is extremely important all remote start switches be tagged by the responsible electrician to prevent inadvertent operation of the equipment during test periods.
- ▶ If more than one crew is assigned to work on the equipment initially or at any subsequent time during the duration of the job, each crew will independently obtain a lock-out tag and lock device to assure circuits / equipment cannot be energized by any crew acting independently. Additionally, each man on the crew will have his own lock and tag.

ILLUMINATION

Construction areas, ramps, runways, corridors, offices, shops and storage areas where work is in progress, shall be lighted to not less than the minimum illumination intensities listed below.

<u>Foot-Candles</u>	<u>Area(s) of Operation</u>
5	General construction area lighting
3	General construction areas, concrete placement, excavation, waste areas, access ways, active storage areas, loading platforms, refueling and field maintenance areas
5	Indoor warehouses, corridors, hallways and exit ways
5	Tunnels, shafts and general underground work areas
10	General construction plants and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenters shops, rigging lofts and active store rooms, barracks or living quarters, locker or dressing rooms, mess halls, indoor toilets and workrooms)
30	First aid stations, infirmaries and offices

Temporary lights shall be equipped with guards to prevent accidental contact with the bulb, except when the light is



deeply recessed and protected by the lamp holder.

In a multistory building, when a stairwell is being used, it shall be properly illuminated by either natural or artificial means, and completely and substantially covered over at a point not less than two floors below the floor on which work is being performed, and access to the floor where the work is in progress shall be through a properly lighted, protected and separate passageway.

TEMPORARY HEATING

Fresh air shall be supplied in sufficient quantities to maintain the health and safety of workmen. Where natural means of fresh air supply is inadequate, mechanical ventilation shall be provided.

When heaters are used in confined spaces, special care shall be taken to provide sufficient ventilation in order to ensure proper combustion, maintain the health and safety of workmen and limit temperature rise in the area.

Temporary heating devices shall be installed to provide clearance to combustible material not less than the amount shown in the following table.

Temporary heating devices, which are listed for installation with lesser clearances than specified in the following table, may be installed in accordance with their approval.

Heating appliances	Minimum clearance, (inches)		
	Sides	Rear	Chimney Connector
Room Heater, circulating type	12	12	18
Room Heater, radiant type	36	36	18

Heaters not suitable for use on wood floors shall not be set directly upon them or other combustible materials. When such heaters are used, they shall rest on suitable heat insulating material or at least 1-inch concrete, or equivalent. The insulating material shall extend beyond the heater two (2) feet or more in all directions.

Heaters used in the vicinity of combustible tarpaulins, canvas or similar coverings shall be located at least 10 feet from the coverings. The coverings shall be securely fastened to prevent ignition or upsetting of the heater due to wind action on the covering or other material.

Heaters, when in use, shall be set horizontally level, unless otherwise permitted by the manufacturer's markings.

Solid fuel salamanders are prohibited in buildings and on scaffolds.

Flammable liquid-fired heaters shall be equipped with a primary safety control to stop the flow of fuel in the event of flame failure. Barometric or gravity oil feed shall not be considered a primary safety control.

Heaters designed for barometric or gravity oil feed shall be used only with the integral tanks.

Heaters specifically designed and approved for use with separate supply tanks may be directly connected for gravity feed, or an automatic pump, from a supply tank.

Attendants should be aware of the possibility of carbon monoxide poisoning. Adequate provisions for monitoring the air quality shall be made. Should there be a buildup of harmful gases, evacuate the area immediate and notify the Superintendent and Safety Director.



SCAFFOLDS

Capacity: Scaffolds shall be designed by a qualified person and shall be constructed and loaded in accordance with that design.

Except as outlined in CFR 1926.451, each scaffold and scaffold component shall be capable of supporting, without failure, its own weight and at least four (4) times the maximum intended load applied or transmitted to it.

Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, shall be capable of resisting at least four (4) times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.

Each suspension rope, including connecting hardware, used on non-adjustable suspension scaffolds shall be capable of supporting, without failure, at least six (6) times the maximum intended load applied or transmitted to that rope.

Each suspension rope, including connecting hardware, used on adjustable suspension scaffolds shall be capable of supporting, without failure, at least six (6) times the maximum intended load applied or transmitted to that rope with the scaffold operating at either the rated load of the hoist, or two (2) (minimum) times the stall load of the hoist, whichever is greater.

The stall load of any scaffold hoist shall not exceed three (3) times its rated load.

Scaffold Platform Construction: Each platform on all working levels of scaffolds shall be fully planked or decked between the front uprights and the guardrail supports as follows:

- ▶ Each platform unit (e.g., scaffold plank, fabricated plank, fabricated deck, or fabricated platform) shall be installed so the space between adjacent units and the space between the platform and the uprights is no more than one (1) inch (2.5 cm) wide, except where the employer can demonstrate that a wider space is necessary (for example, to fit around uprights when side brackets are used to extend the width of the platform).
- ▶ Where the employer makes the demonstration provided for wider space, the platform shall be planked or decked as fully as possible and the remaining open space between the platform and the uprights shall not exceed 9½ inches (24.1 cm).
- ▶ The requirement to provide full planking or decking does not apply to platforms used solely as walkways or solely by employees performing scaffold erection or dismantling.

Except as provided in CRF 1926.451(b)(2)(i) and(ii), each scaffold platform and walkway shall be at least 18 inches (46 cm) wide.

Each ladder jack scaffold, top plate bracket scaffold, roof bracket scaffold and pump jack scaffold shall be at least 12 inches (30 cm) wide. There is no minimum width requirement for boatswains' chairs.

Where scaffolds must be used in areas where the employer can demonstrate are so narrow that platforms and walkways cannot be at least 18 inches (46 cm) wide, such platforms and walkways shall be as wide as feasible, and employees on those platforms and walkways shall be protected from fall hazards by the use of guardrails and/or personal fall arrest systems.

The front edge of all platforms shall not be more than 14 inches (36 cm) from the face of the work, unless guardrail systems are erected along the front edge and/or personal fall arrest systems are used to protect employees from falling, except as follows:

- ▶ The maximum distance from the face for outrigger scaffolds shall be three (3) inches (8 cm).



- ▶ The maximum distance from the face for plastering and lathing operations shall be 18 inches (46 cm).

Each end of a platform, unless cleated or otherwise restrained by hooks or equivalent means, shall extend over the centerline of its support at least six (6) inches (15 cm).

Each end of a platform 10 feet or less in length shall not extend over its support more than 12 inches (30 cm) unless the platform is designed and installed so the cantilevered portion of the platform is able to support employees and/or materials without tipping, or has guardrails which block employee access to the cantilevered end.

Each platform greater than 10 feet in length shall not extend over its support more than 18 inches (46 cm), unless it is designed and installed so the cantilevered portion of the platform is able to support employees without tipping, or has guardrails which block employee access to the cantilevered end.

On scaffolds where scaffold planks are abutted to create a longer platform, each abutted end shall rest on a separate support surface. This provision does not preclude the use of common support members, such as "T" sections, to support abutting planks, or hook on platforms designed to rest on common supports.

On scaffolds where platforms are overlapped to create a long platform, the overlap shall occur only over supports, and shall not be less than 12 inches (30 cm) unless the platforms are nailed together or otherwise restrained to prevent movement.

At all points of a scaffold where the platform changes direction, such as turning a corner, any platform that rests on a bearer at an angle other than a right angle shall be laid first, and platforms which rest at right angles over the same bearer shall be laid second, on top of the first platform.

Wood platforms shall not be covered with opaque finishes, except platform edges may be covered or marked for identification. Platforms may be coated periodically with wood preservatives, fire-retardant finishes and slip-resistant finishes; however, the coating may not obscure the top or bottom wood surfaces.

Scaffold components manufactured by different manufacturers shall not be intermixed unless the components fit together without force and the scaffold's structural integrity is maintained by the user. Scaffold components manufactured by different manufacturers shall not be modified in order to intermix them unless a competent person determines the resulting scaffold is structurally sound.

Scaffold components made of dissimilar metals shall not be used together unless a competent person has determined that galvanic action will not reduce the strength of any component to a level below that.

Criteria for Supported Scaffolds: Supported scaffolds with a height to base width (including outrigger supports, if used) ratio of more than four to one (4:1) shall be restrained from tipping by guying, tying, bracing or equivalent means, according the following:

- ▶ Guys, ties and braces shall be installed at locations where horizontal members support both inner and outer legs.
- ▶ Guys, ties and braces shall be installed according to the scaffold manufacturer's recommendations or at the closest horizontal member to the 4:1 height and be repeated vertically at locations of horizontal members every 20 feet (6.1 m) or less thereafter for scaffolds 3 feet (0.91 m) wide or less, and every 26 feet (7.9 m) or less thereafter for scaffolds greater than 3 feet (0.91 m) wide. The top guy, tie or brace of completed scaffolds shall be placed no further than the 4:1 height from the top. Such guys, ties and braces shall be installed at each end of the scaffold and at horizontal intervals not to exceed 30 feet (9.1 m) (measured from one end [not both] towards the other).
- ▶ Ties, guys, braces or outriggers shall be used to prevent the tipping of supported scaffolds in all circumstances



where an eccentric load, such as a cantilevered work platform, is applied or is transmitted to the scaffold.

Supported scaffold poles, legs, posts, frames and uprights shall bear on base plates and mud sills or other adequate firm foundation.

- ▶ Footings shall be level, sound, rigid and capable of supporting the loaded scaffold without settling or displacement.
- ▶ Unstable objects shall not be used to support scaffold or platform units.
- ▶ Unstable objects shall not be used as working platforms.
- ▶ Front-end loaders 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.
- ▶ Forklifts shall not be used to support scaffold platforms unless the entire platform is attached to the fork and the forklift is not moved horizontally while the platform is occupied.

Supported scaffold poles, legs, posts, frames and uprights shall be plumb and braced to prevent swaying and displacement.

Criteria for Suspension Scaffolds: All suspension scaffold support devices, such as outrigger beams, cornice hooks, parapet clamps, and similar devices, shall rest on surfaces capable of supporting at least four (4) times the load imposed on them by the scaffold operating at the rated load of the hoist (or at least 1.5 times the load imposed on them by the scaffold at the stall capacity of the hoist, whichever is greater).

Suspension scaffold outrigger beams, when used, shall be made of structural metal or equivalent strength material, and shall be restrained to prevent movement.

The inboard ends of suspension scaffold outrigger beams shall be stabilized by bolts or other direct connections to the floor or roof deck, or they shall have their inboard ends stabilized by counterweights, except masons' multi-point adjustable suspension scaffold outrigger beams shall not be stabilized by counterweights.

Before the scaffold is used, direct connections shall be evaluated by a competent person who shall confirm, based on the evaluation, the supporting surfaces are capable of supporting the loads to be imposed. In addition, masons' multi-point adjustable suspension scaffold connections shall be designed by an engineer experienced in such scaffold design.

Counterweights shall be made of non-flowable material. Sand, gravel and similar materials that can be easily dislocated shall not be used as counterweights.

Only those items specifically designed as counterweights shall be used to counterweight scaffold systems. Construction materials such as, but not limited to, masonry units and rolls of roofing felt, shall not be used as counterweights.

Counterweights shall be secured by mechanical means to the outrigger beams to prevent accidental displacement.

Counterweights shall not be removed from an outrigger beam until the scaffold is disassembled.

Outrigger beams which are not stabilized by bolts or other direct connections to the floor or roof deck shall be secured by tiebacks.

Tiebacks shall be equivalent in strength to the suspension ropes.

Outrigger beams shall be placed perpendicular to its bearing support (usually the face of the building or structure). However, where it can be demonstrated that it is not possible to place an outrigger beam perpendicular to the face



of the building or structure because of obstructions, the outrigger beam may be placed at some other angle, provided opposing angle tiebacks are used.

Tiebacks shall be secured to a structurally sound anchorage on the building or structure. Sound anchorages include structural members, but do not include standpipes, bents, other piping systems or electrical conduit.

Tiebacks shall be installed perpendicular to the face of the building or structure, or opposing angle tiebacks shall be installed. Single tiebacks installed at an angle are prohibited.

Suspension scaffold outrigger beams shall be:

- ▶ Provided with stop bolts or shackles at both ends;
- ▶ Securely fastened together with the flanges turned out when channel iron beams are used in place of I-beams;
- ▶ Installed with all bearing supports perpendicular to the beam center line;
- ▶ Set and maintained with the web in a vertical position; and
- ▶ When an outrigger beam is used, the shackle or clevis with which the rope is attached to the outrigger beam shall be placed directly over the center line of the stirrup.

Suspension scaffold support devices such as cornice hooks, roof hooks, roof irons, parapet clamps or similar devices shall be:

- ▶ Made of steel, wrought iron, or materials of equivalent strength;
- ▶ Supported by bearing clocks; and
- ▶ Secured against movement by tiebacks installed at right angles to the face of the building or structure, or opposing angle tiebacks shall be installed and secured to a structurally sound point of anchorage on the building or structure.

When winding drum hoists are used on a suspension scaffold, they shall contain not less than four (4) wraps of the suspension rope at the lowest point of scaffold travel. When other types of hoists are used, the suspension ropes shall be long enough to allow the scaffold to be lowered to the level below without the rope end passing through the hoist, or the rope end shall be configured or provided with means to prevent the end from passing through the hoist.

The use of repaired wire rope as suspension rope is prohibited.

Wire suspension ropes shall not be joined together except through the use of eye splice thimbles connected with shackles or cover plates and bolts.

The load end of wire suspension ropes shall be equipped with proper size thimbles and secured by eye splicing or equivalent means.

Ropes shall be inspected for defects by a competent person prior to each work shift and after every occurrence which could affect a rope's integrity. Ropes shall be replaced if any of the following conditions exist: Any physical damage which impairs the function and strength of the rope; Kinks that might impair the tracking or wrapping of rope around the drum(s) or sheave(s); six (6) randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay; Abrasion, corrosion, scrubbing, flattening or peening causing loss of more than one-third of the original diameter of the outside wires; Heat damage caused by a torch or any damage caused by contact with electrical wires; Evidence that the secondary brake has been activated during an over speed condition and has engaged the suspension rope.

Swaged attachments or spliced eyes on wire suspension ropes shall not be used unless they are made by the wire rope manufacturer or a qualified person.



When wire rope clips are used on suspension scaffolds:

- ▶ There shall be a minimum of 3 wire rope clips installed, with the clips a minimum of 6 rope diameters apart;
- ▶ Clips shall be installed according to the manufacturer's recommendations;
- ▶ Clips shall be retightened to the manufacturer's recommendations after the initial loading;
- ▶ Clips shall be inspected and retightened to the manufacturer's recommendations at the start of each work shift thereafter;
- ▶ U-bolt clips shall not be used at the point of suspension for any scaffold hoist;
- ▶ When U-bolt clips are used, the U-bolt shall be placed over the dead end of the rope, and the saddle shall be placed over the live end of the rope.

Suspension scaffold power-operated hoists and manual hoists shall be tested by a qualified testing laboratory.

Gasoline-powered equipment and hoists shall not be used on suspension scaffolds.

Gears and brakes of power-operated hoists used on suspension scaffolds shall be enclosed.

In addition to the normal operating brake, suspension scaffold power-operated hoists and manually operated hoists shall have a braking device or locking pawl which engages automatically when a hoist makes either of the following uncontrolled movements: an instantaneous change in momentum or an accelerated over speed.

Manually operated hoists shall require a positive crank force to descend.

Two-point and multi-point suspension scaffolds shall be tied or otherwise secured to prevent them from swaying, as determined to be necessary based on an evaluation by a competent person. Window cleaners' anchors shall not be used for this purpose.

Devices whose sole function is to provide emergency escape and rescue shall not be used as working platforms. This provision does not preclude the use of systems which are designed to function both as suspension scaffolds and emergency systems.

Access: When scaffold platforms are more than two (2) feet (0.6 m) above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers (scaffold stairways/towers), stairway-type ladders (such as ladder stands), ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface shall be used. Cross braces shall not be used as a means of access.

Portable, hook-on, and attachable ladders shall be:

- ▶ Positioned so as to not tip the scaffold;
- ▶ Positioned so their bottom rung is not more than 24 inches (61 cm) above the scaffold supporting level;
- ▶ When hook-on and attachable ladders are used on a supported scaffold more than 35 feet (10.7 m) high, they shall have rest platforms at 35 foot (10.7 m) maximum vertical intervals.
- ▶ Hook-on and attachable ladders shall be specifically designed for use with the type of scaffold used;
- ▶ Hook-on and attachable ladders shall have a minimum rung length of 11½ inches (29 cm);
- ▶ Hook-on and attachable ladders shall have uniformly spaced rungs with a maximum spacing between rungs of 16 ¾ inches.

Stairway-type ladders shall:

- ▶ Be positioned such that their bottom step is not more than 24 inches (61 cm) above the scaffold supporting level;
- ▶ Be provided with rest platforms at 12 foot (3.7 m) maximum vertical intervals;
- ▶ Have a minimum step width of 16 inches (41 cm), except that mobile scaffold stairway type ladders shall have a minimum step width of 11½ inches (30 cm); and



- ▶ Have slip-resistant treads on all steps and landings.

Stair towers (scaffold stairway/towers) shall be positioned such that their bottom step is not more than 24 inches (61 cm) above the scaffold supporting level.

- ▶ A stair rail consisting of a top rail and a mid rail shall be provided on each side as a handrail, unless a separate handrail is provided.
- ▶ The top rail of each stair rail system shall also be capable of serving as a handrail, unless a separate handrail is provided.
- ▶ Handrails, and top rails that serve as handrails, shall provide an adequate handhold for employees grasping them to avoid falling.
- ▶ Stair rail systems and handrails shall be surfaced to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.
- ▶ The ends of stair rail systems and handrails shall be constructed so they do not constitute a projection hazard.
- ▶ Handrails, and top rails used as handrails, shall be at least three (3) inches (7.62 cm) from other objects.
- ▶ Stair rails shall be not less than 28 inches (71 cm) nor more than 37 inches (94 cm) from the upper surface of the stair rail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
- ▶ A landing platform at least 18 inches (45.7 cm) wide by at least 18 inches (45.7 cm) long shall be provided at each level.
- ▶ Each scaffold stairway shall be at least 18 inches (45.7 cm) wide between stair rails.
- ▶ Treads and landings shall have slip-resistant surfaces.
- ▶ Stairways shall be installed between 40 degrees and 60 degrees from the horizontal.
- ▶ Guardrails shall be provided on the open sides and ends of each landing.
- ▶ Riser height shall be uniform, with 1/4 inch, (0.6 cm) for each flight of stairs. Greater variations in riser height are allowed for the top and bottom steps of the entire system, not for each flight of stairs.
- ▶ Tread depth shall be uniform, within 1/4 inch, for each flight of stairs.

Ramps and walkways six (6) feet (1.8 m) or more above lower levels shall have guardrail systems which comply with fall protection standards.

- ▶ No ramp or walkway shall be inclined more than a slope of one (1) vertical to three (3) horizontal (20 degrees above the horizontal).
- ▶ If the slope of a ramp or a walkway is steeper than one (1) vertical in eight (8) horizontal, the ramp or walkway shall have cleats not more than fourteen (14) inches (35 cm) apart which are securely fastened to the planks to provide footing.

Integral prefabricated scaffold access frames shall:

- ▶ Be specifically designed and constructed for use as ladder rungs;
- ▶ Have a rung length of at least 8 inches (20 cm);
- ▶ Not be used as work platforms when rungs are less than 11½ inches in length, unless each affected employee uses fall protection, or a positioning device, which complies with OSHA standards;
- ▶ Be uniformly spaced within each frame section;
- ▶ Be provided with rest platforms at 35 foot (10.7 m) maximum vertical intervals on all supported scaffolds more than 35 feet (10.7 m) high; and
- ▶ Have a maximum spacing between rungs of 16 ¾ inches (43 cm). Non-uniform rung spacing caused by joining end frames together is allowed, provided the resulting spacing does not exceed 16 ¾ inches (43 cm).

Steps and rungs of ladder and stairway type access shall line up vertically with each other between rest platforms.

Direct access to or from another surface shall be used only when the scaffold is not more than 14 inches (36 cm) horizontally and not more than 24 inches (61 cm) vertically from the other surface.

Effective September 2, 1997, access for employees erecting or dismantling supported scaffolds shall be in accordance with the following:



- ▶ The employer shall provide safe means of access for each employee erecting or dismantling a scaffold where the provision of safe access is feasible and does not create a greater hazard. The employer shall have a competent person determine whether it is feasible or would pose a greater hazard to provide, and have employees use a safe means of access. This determination shall be based on site conditions and the type of scaffold being erected or dismantled.
- ▶ Hook-on or attachable ladders shall be installed as soon as scaffold erection has progressed to a point that permits safe installation and use.
- ▶ When erecting or dismantling tubular welded frame scaffolds, (end) frames, with horizontal members that are parallel, level and are not more than 22 inches apart vertically may be used as climbing devices for access, provided they are erected in a manner that creates a usable ladder and provides good hand hold and foot space.
- ▶ Cross braces on tubular welded frame scaffolds shall not be used as a means of access or egress.

Use

Scaffolds and scaffold components shall not be loaded in excess of their maximum intended loads or rated capacities, whichever is less.

The use of shore or lean-to scaffolds is prohibited.

Scaffolds and scaffold components shall be inspected for visible defects by a competent person before each work shift, and after any occurrence which could affect a scaffold's structural integrity.

Any part of a scaffold damaged or weakened such that its strength is less than required shall be immediately repaired or replaced, braced to meet those provisions, or removed from service until repaired.

Scaffolds shall not be moved horizontally while employees are on them, unless they have been designed by a registered professional engineer specifically for such movement or, for mobile scaffolds.

The clearance between scaffolds and power lines shall be as follows: Scaffolds shall not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than as follows:

Insulated Lines:

Voltage	Minimum distance	Alternatives
Less than 300 volts	Three (3) feet (0.9 m)	
300 volts to 50 kv	10 feet (3.1 m)	
More than 50 kv	10 feet (3.1m) plus 0.4 inches (1.0 cm) for each 1 kv over 50 kv	Two (2) times the length of the line insulator, but never less than 10 feet (3.1 m)

Uninsulated Lines:

Voltage	Minimum distance	Alternatives
Less than 50 kv	10 feet (3.1 m)	
More than 50 kv	10 feet (3.1 m) plus 0.4 inches (1.0 cm) for each 1 kv over 50 kv	Two (2) times the length of the lines insulator, but never less than 10 feet (3.1 m)

Exception: Scaffolds and materials may be closer to power lines than specified above where such clearance is necessary for performance of work, and only after the utility company, or electrical system operator, has been notified of the need to work closer and the utility company, or electrical system operator, has deenergized the lines,



relocated the lines or installed protective coverings to prevent accidental contact with the lines.

Scaffolds shall be erected, moved, dismantled or altered only under the supervision and direction of a competent person qualified in scaffold erection, moving, dismantling or alteration. Such activities shall be performed only by experienced and trained employees selected for such work by the competent person.

Employees shall be prohibited from working on scaffolds covered with snow, ice or other slippery material except as necessary for removal of such materials.

Where swinging loads are being hoisted onto or near scaffolds such that the loads might contact the scaffold, tag lines or equivalent measures to control the loads shall be used.

Suspension ropes supporting adjustable suspension scaffolds shall be of a diameter large enough to provide sufficient surface area for the functioning of brake and hoist mechanisms.

Suspension ropes shall be shielded from heat-producing processes. When acids or other corrosive substances are used on a scaffold, the ropes shall be shielded, treated to protect against the corrosive substances, or shall be of a material that will not be damaged by the substance being used.

Work on or from scaffolds is prohibited during storms or high winds unless a competent person has determined it is safe for employees to be on the scaffold and those employees are protected by a personal fall arrest system or wind screens. Wind screens shall not be used unless the scaffold is secured against the anticipated wind forces imposed.

Debris shall not be allowed to accumulate on platforms.

Makeshift devices, such as but not limited to boxes and barrels, shall not be used on top of scaffold platforms to increase the working level height of employees.

Ladders shall not be used on scaffolds to increase the working level height of employees, except on large area scaffolds where employees' employers have satisfied the following criteria:

- ▶ When the ladder is placed against a structure which is not a part of the scaffold, the scaffold shall be secured against the sideways thrust exerted by the ladder;
- ▶ The platform units shall be secured to the scaffold to prevent their movement;
- ▶ The ladder legs shall be on the same platform or other means shall be provided to stabilize the ladder against unequal platform deflection, and
- ▶ The ladder legs shall be secured to prevent them from slipping or being pushed off the platform.

To reduce the possibility of welding current arcing through the suspension wire rope when performing welding from suspended scaffolds, precautions listed in CFR 1926.451(f)(17)(i) through (vi) shall be met.

Fall Protection

Each employee on a scaffold more than 10 feet (3.1 m) above a lower level shall be protected from falling to that lower level. Criteria in CRF 1926.451(g)(1)(i) through (vii) shall be met.

Effective September 2, 1997, the employer shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.

In addition to meeting the requirements of CFR 1926.502(d), personal fall arrest systems used on scaffolds shall be



attached by lanyard to a vertical lifeline, horizontal lifeline or scaffold structural member. Vertical lifelines shall not be used when overhead components, such as overhead protection or additional platform levels, are part of a single-point or two-point adjustable suspension scaffold. Criteria in CRF 1926.451(g)(3)(i) through (iv) shall be met.

Guardrail systems shall be installed along all open sides and ends of platforms. Guardrail systems shall be installed before the scaffold is released for use by employees other than erection/ dismantling crews.

The top edge height of top rails or equivalent members on supported scaffolds manufactured or placed in service after January 1, 2000 shall be installed between 38 inches (0.97 m) and 45 inches (1.2 m) above the platform surface. The top edge height on supported scaffolds manufactured and placed in service before January 1, 2000, and on all suspended scaffolds where both a guardrail and a personal fall arrest system are required shall be between 36 inches (0.9 m) and 45 inches (1.2 m). When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria.

When mid rails, screens, mesh, intermediate vertical members, solid panels or equivalent structural members are used they shall be installed between the top edge of the guardrail system and the scaffold platform.

When mid rails are used, they shall be installed at a height approximately midway between the top edge of the guardrail system and the platform surface.

When screens and mesh are used, they shall extend from the top edge of the guardrail system to the scaffold platform, and along the entire opening between the supports.

When intermediate members (such as balusters or additional rails) are used, they shall not be more than 19 inches (48 cm) apart.

Each top rail or equivalent member of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along its top edge of at least 100 pounds (445 n) for guardrail systems installed on single-point adjustable suspension scaffolds or two-point adjustable suspension scaffolds, and at least 200 pounds (890 n) for guardrail systems installed on all other scaffolds.

Mid rails, screens, mesh, intermediate vertical members, solid panels and equivalent structural members of a guardrail system shall be capable of withstanding, without failure, a force applied in any downward or horizontal direction at any point along the mid rail or other member of at least 75 pounds (333 n) for guardrail systems with a minimum 100 pound top rail capacity, and at least 150 pounds (666 n) for guardrail systems with a minimum 200 pound top rail capacity.

Suspension scaffold hoists and non-walk-through stirrups may be used as end guardrails, if the space between the hoist or stirrup and the side guardrail or structure does not allow passage of an employee to the end of the scaffold.

Guardrails shall be surfaced to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

The ends of all rails shall not overhang the terminal posts except when such overhang does not constitute a projection hazard to employees.

Steel or plastic banding shall not be used as a top rail or mid rail.

Manila or plastic (or other synthetic) rope being used for top rails or mid rails shall be inspected by a competent person as frequently as necessary to ensure it continues to meet the strength requirements.



Cross bracing is acceptable in place of a mid rail when the crossing point of two braces is between 20 inches (0.5 m) and 30 inches (0.8 m) above the work platform or as a top rail when the crossing point of two braces is between 38 inches (0.97 m) and 48 inches (1.3 m) above the work platform. The end points at each upright shall be no more than 48 inches (1.3 m) apart.

Falling Object Protection

In addition to wearing hard hats each employee on a scaffold shall be provided with additional protection from falling hand tools, debris and other small objects through the installation of toeboards, screens or guardrail systems, or through the erection of debris nets, catch platforms, or canopy structures that contain or deflect the falling objects. When the falling objects are too large, heavy or massive to be contained or deflected by any of the above-listed measures, the employer shall place such potential falling objects away from the edge of the surface from which they could fall and shall secure those materials as necessary to prevent their falling.

Where there is a danger of tools, materials or equipment falling from a scaffold and striking employees below, the following provisions apply:

- ▶ The area below the scaffold to which objects can fall shall be barricaded, and employees shall not be permitted to enter the hazardous area; or
- ▶ A toeboard shall be erected along the edge of platforms more than 10 feet (3.1 m) above lower levels for a distance sufficient to protect employees below;
- ▶ Where tools, materials or equipment are piled to a height higher than the top edge of the toeboard, paneling or screening extending from the toeboard or platform to the top of the guardrail shall be erected for a distance sufficient to protect employees below; or
- ▶ A guardrail system shall be installed with openings small enough to prevent passage of potential falling objects; or
- ▶ A canopy structure, debris net or catch platform strong enough to withstand the impact forces of the potential falling objects shall be erected over the employees below.
- ▶ Canopies, when used for falling object protection, shall comply with the following criteria:
 - Canopies shall be installed between the falling object hazard and the employees.
 - When canopies are used on suspension scaffolds for falling object protection, the scaffold shall be equipped with additional independent support lines equal in number to the number of points supported, and equivalent in strength to the strength of the suspension ropes.
 - Independent support lines and suspension ropes shall not be attached to the same points of anchorage.

Where used, toeboards shall be:

- ▶ Capable of withstanding, without failure, a force of at least 50 pounds (222 n) applied in any downward or horizontal direction at any point along the toeboard; and
- ▶ At least three and one-half inches (9 cm) high from the top edge of the toeboard to the level of the walking/working surface. Toeboards shall be securely fastened in place at the outermost edge of the platform and have not more than 1/4 inch (0.7 cm) clearance above the walking/working surface. Toeboards shall be solid or with openings not over one inch (2.5 cm) in the greatest dimension.

FALL PROTECTION

General: The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.

Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is six (6) feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems or personal fall arrest systems.



Each employee who is constructing a leading edge six (6) feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems or personal fall arrest systems. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of CFR 1926.502(k).

Each employee on a walking/working surface six (6) feet (1.8 m) or more above a lower level where leading edges are under construction, but who is not engaged in the leading edge work, shall be protected from falling by a guardrail system, safety net system or personal fall arrest system. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

Each employee in a hoist area shall be protected from falling six (6) feet (1.8 m) or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, [or chain, gate, or guardrail] or portions thereof, are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.

Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than six (6) feet (1.8 m) above lower levels, by personal fall arrest systems, covers or guardrail systems erected around such holes.

Each employee on a walking/working surface shall be protected from tripping in or stepping into or through holes (including skylights) by covers.

Each employee on a walking/working surface shall be protected from objects falling through holes (including skylights) by covers.

Each employee on the face of formwork or reinforcing steel shall be protected from falling six (6) feet (1.8 m) or more to lower levels by personal fall arrest systems, safety net systems or positioning device systems.

Each employee on ramps, runways and other walkways shall be protected from falling six (6) feet (1.8 m) or more to lower levels by guardrail systems.

Each employee at the edge of an excavation six (6) feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier; each employee at the edge of a well, pit, shaft and similar excavation six (6) feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

Each employee less than six (6) feet (1.8 m) above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards. Each employee six (6) feet (1.8 m) or more above dangerous equipment shall be protected from fall hazards by guardrail systems, personal fall arrest systems, or safety net systems.

Except as otherwise provided, each employee performing overhand bricklaying and related work six (6) feet (1.8 m) or more above lower levels, shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems or shall work in a controlled access zone.

Each employee reaching more than 10 inches (25 cm) below the level of the walking/working surface on which they are working, shall be protected from falling by a guardrail system, safety net system or personal fall arrest system.

Each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges six (6) feet (1.8



m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system, or warning line system and safety monitoring system. Or, on roofs 50-feet (15.25 m) or less in width use of a safety monitoring system alone [i.e. without the warning line system] is permitted.

Each employee on a steep roof with unprotected sides and edges six (6) feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems or personal fall arrest systems.

Each employee engaged in the erection of precast concrete members (including, but not limited to the erection of wall panels, columns, beams and floor and roof "tees") and related operations such as grouting of precast concrete members, who is six (6) feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems or personal fall arrest systems. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of CFR 1926.502(k).

Note: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above-listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with CFR 1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

Each employee engaged in residential construction activities six (6) feet (1.8 m) or more above lower levels shall be protected by guardrail systems, safety net system or personal fall arrest system. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements CFR 1926.502(k).

Each employee working on, at, above or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is six (6) feet (1.8 m) or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches (1.0 m) above the walking/working surface, shall be protected from falling by the use of a guardrail system, a safety net system or a personal fall arrest system.

Except as provided in CFR 1926.500(a)(2) or in CFR 1926.501(b)(1) through (b)(14), each employee on a walking/working surface six (6) feet (1.8 m) or more above lower levels shall be protected from falling by a guardrail system, safety net system or personal fall arrest system.

When an employee is exposed to falling objects, the employer shall have each employee wear a hard hat and shall implement one of the following measures: erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels; or, erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so those objects would not go over the edge if they were accidentally displaced; or, barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so those objects would not go over the edge if they were accidentally displaced.

Fall Protection Systems Criteria and Practices: Employers shall provide and install all fall protection systems required by CFR 1926.502 for an employee, and shall comply with all other pertinent requirements of CFR 1926.502 before that employee begins the work that necessitates the fall protection.

Guardrail Systems

Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches (1.1 m) plus or minus three (3) inches (8 cm) above the walking/working level. When conditions warrant, the height of the top edge may



exceed the 45-inch height, provided the guardrail system meets all other criteria.

Note: When employees are using stilts, the top edge height of the top rail, or equivalent member, shall be increased an amount equal to the height of the stilts.

Mid rails, screens, mesh, intermediate vertical members or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches (53 cm) high.

Mid rails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.

Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.

Intermediate members (such as balusters), when used between posts, shall not be more than 19 inches (48 cm) apart.

Other structural members (such as additional mid rails and architectural panels) shall be installed so there are no openings in the guardrail system more than 19 inches (.5 m) wide.

Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 N) applied within two (2) inches (5.1 cm) of the top edge, in any outward or downward direction, at any point along the top edge.

When the 200 pound (890 N) test load is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than 39 inches (1.0 m) above the walking/working level. Guardrail system components shall be constructed in accordance with Appendix B of CFR 1926.502.

Mid rails, screens, mesh, intermediate vertical members, solid panels and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds (666 N) applied in any downward or outward direction at any point along the mid rail or other member.

Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

The ends of all top rails and mid rails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.

Steel banding and plastic banding shall not be used as top rails or mid rails.

Top rails and mid rails shall be at least one-quarter inch (0.6 cm) nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than six (6) foot intervals with high-visibility material.

When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.

When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.

When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use,



it shall be closed over with a cover, or a guardrail system shall be provided along all unprotected sides or edges.

When guardrail systems are used around holes which are used as points of access (such as ladder ways), they shall be provided with a gate, or be so offset that a person cannot walk directly into the hole.

Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.

Manila, plastic or synthetic rope being used for top rails or mid rails shall be inspected as frequently as necessary to ensure it continues to meet the strength requirements of CFR 1926.502.

Safety Net Systems: Safety net systems and their use shall be in accordance with CFR 1926.502(c)(1) through (9).

Personal Fall Arrest Systems

Effective January 1, 1998, body belts are not acceptable as part of a personal fall arrest system. Note: The use of a body belt in a positioning device system is acceptable and is regulated under CFR 1926.502(e).

Connectors shall be drop forged, pressed or formed steel or made of equivalent materials.

Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.

Dee-rings and snaphooks shall have a minimum tensile strength of 5,000 pounds (22.2 kN).

Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking or taking permanent deformation.

Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. Effective January 1, 1998, only locking type snaphooks shall be used.

Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged: directly to webbing, rope or wire rope; to each other; to a dee-ring to which another snaphook or other connector is attached; to a horizontal lifeline; or to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.

Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.

Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).

Except as provided in CFR 1926.502(d)(10)(ii), when vertical lifelines are used, each employee shall be attached to a separate lifeline.

During the construction of elevator shafts, two employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is 10,000 pounds [5,000 pounds per employee attached] (44.4 kN); and all other specified criteria for lifelines have



been met.

Lifelines shall be protected against being cut or abraded.

Self-retracting lifelines and lanyards which automatically limit free fall distance to two (2) feet (0.61 m) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.3 kN) applied to the device with the lifeline or lanyard in the fully extended position.

Self-retracting lifelines and lanyards which do not limit free fall distance to two (2) feet (0.61 m) or less, rip stitch lanyards and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN) applied to the device with the lifeline or lanyard in the fully extended position.

Ropes and straps (webbing) used in lanyards, lifelines and strength components of body belts and body harnesses shall be made from synthetic fibers.

Anchorage used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as follows: as part of a complete personal fall arrest system which maintains a safety factor of at least two (2); and under the supervision of a qualified person.

Personal fall arrest systems, when stopping a fall, shall: limit maximum arresting force on an employee to 900 pounds (4 kN) when used with a body belt; limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness; be rigged such that an employee can neither free fall more than six (6) feet (1.8 m), nor contact any lower level; bring an employee to a complete stop and limit maximum deceleration distance an employee travels to three and one-half (3.5) feet (1.07 m); and, have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of six (6) feet (1.8 m), or the free fall distance permitted by the system, whichever is less.

Note: If the personal fall arrest system meets the criteria and protocols, and if the system is being used by an employee having a combined person and tool weight of less than 310 pounds (140 kg), the system will be considered to be in compliance. If the system is used by an employee having a combined tool and body weight of 310 pounds (140 kg) or more, then the employer must appropriately modify the criteria and protocols to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of CFR 1926.502(d)(16).

The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.

Body belts, harnesses and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

The employer shall provide for prompt rescue of employees in the event of a fall or shall assure employees are able to rescue themselves.

Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.

Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as



specified in other subparts of CFR 1926.502.

When a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

Positioning Device Systems: Positioning device systems and their use shall be in accordance with CFR 1926.502(e).

Warning Line Systems: Warning line systems and their use shall comply with the following provisions:

- ▶ The warning line shall be erected around all sides of the roof work area.
 - When mechanical equipment is not being used, the warning line shall be erected not less than six (6) feet (1.8 m) from the roof edge.
 - When mechanical equipment is being used, the warning line shall be erected not less than six (6) feet (1.8 m) from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than 10 feet (3.1 m) from the roof edge which is perpendicular to the direction of mechanical equipment operation.
 - Points of access, materials handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.
 - When the path to a point of access is not in use, a rope, wire, chain or other barricade, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.
- ▶ Warning lines shall consist of Ropes, wires or chains, and supporting stanchions erected as follows:
 - The rope, wire or chain shall be flagged at not more than six (6) foot (1.8 m) intervals with high visibility material;
 - The rope, wire or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches (.9 m) from the walking/working surface and its highest point is no more than 39 inches (1.0 m) from the walking/working surface;
 - After being erected, with the rope, wire or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion, 30 inches (.8 m) above the walking/working surface, perpendicular to the warning line, and in the direction of the floor, roof or platform edge;
 - The rope, wire or chain shall have a minimum tensile strength of 500 pounds (2.22 kN), and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as previously stated; and
 - The line shall be attached at 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 adjacent sections before the stanchion tips over.
 - No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area.
 - Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system.

Controlled Access Zones: When used to control access to areas where leading edge and other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

When control lines are used, they shall be erected not less than six (6) feet (1.8 m) nor more than 25 feet (7.7 m) from the unprotected or leading edge, except when erecting precast concrete members.

When erecting precast concrete members, the control line shall be erected not less than six (6) feet (1.8 m) nor more than 60 feet (18 m) or half the length of the member being erected, whichever is less, from the leading edge.



The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

The control line shall be connected on each side to a guardrail system or wall.

When used to control access to areas where overhand bricklaying and related work are taking place:

- ▶ The controlled access zone shall be defined by a control line erected not less than 10 feet (3.1 m) nor more than 15 feet (4.5 m) from the working edge.
- ▶ The control line shall extend for a distance sufficient for the controlled access zone to enclose all employees performing overhand bricklaying and related work at the working edge and shall be approximately parallel to the working edge.
- ▶ Additional control lines shall be erected at each end to enclose the controlled access zone.
- ▶ Only employees engaged in overhand bricklaying or related work shall be permitted in the controlled access zone.

Control lines shall consist of ropes, wires, tapes, or equivalent materials, and supporting stanchions as follows:

- ▶ Each line shall be flagged or otherwise clearly marked at not more than six (6) foot (1.8 m) intervals with high-visibility material.
- ▶ Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches (1 m) from the walking/working surface and its highest point is not more than 45 inches (1.3 m) (50 inches [1.3 m] when overhand bricklaying operations are being performed) from the walking/working surface.
- ▶ Each line shall have a minimum breaking strength of 200 pounds (.88 kN).

On floors and roofs where guardrail systems are not in place prior to the beginning of overhand bricklaying operations, controlled access zones shall be enlarged, as necessary, to enclose all points of access, material handling areas and storage areas.

On floors and roofs where guardrail systems are in place, but need to be removed to allow overhand bricklaying work or leading edge work to take place, only that portion of the guardrail necessary to accomplish that day's work shall be removed.

Safety Monitoring Systems: Safety monitoring systems and their use shall comply with the following provisions:

- ▶ The employer shall designate a competent person to monitor the safety of other employees and the employer shall ensure the safety monitor complies with the following requirements:
 - The safety monitor shall be competent to recognize fall hazards;
 - The safety monitor shall warn the employee when it appears the employee is unaware of a fall hazard or is acting in an unsafe manner;
 - The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee being monitored;
 - The safety monitor shall be close enough to communicate orally with the employee; and
 - The safety monitor shall not have other responsibilities which could take the monitor's attention from the monitoring function.
- ▶ Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations on low-slope roofs.
- ▶ No employee, other than an employee engaged in roofing work (on low slope roofs) or an employee covered by a fall protection plan, shall be allowed in an area where an employee is being protected by a safety monitoring system.
- ▶ Each employee working in a controlled access zone shall be directed to comply promptly with fall hazard warnings from safety monitors.

Covers: Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

- ▶ Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice



the maximum axle load of the largest vehicle expected to cross over the cover.

- ▶ All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment and materials that may be imposed on the cover at any one time.
- ▶ All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment or employees.
- ▶ All covers shall be color coded or they shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

Note: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

Protection From Falling Objects

Toeboards, when used as falling object protection, shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below.

Toeboards shall be capable of withstanding, without failure, a force of at least 50 pounds (222 N) applied in any downward or outward direction at any point along the toeboard.

Toeboards shall be a minimum of three (3) ½ inches (9 cm) in vertical height from their top edge to the level of the walking/working surface. They shall have not more than 1/4 inch (0.6 cm) clearance above the walking/working surface. They shall be solid or have openings not over one (1) inch (2.5 cm) in greatest dimension.

Where tools, equipment or materials are piled higher than the top edge of a toeboard, paneling or screening shall be erected from the walking/working surface or toeboard to the top of a guardrail system's top rail or mid rail, for a distance sufficient to protect employees below.

Guardrail systems, when used as falling object protection, shall have all openings small enough to prevent passage of potential falling objects.

During the performance of overhand bricklaying and related work:

- ▶ No materials or equipment except masonry and mortar shall be stored within four (4) feet (1.2 m) of the working edge.
- ▶ Excess mortar, broken or scattered masonry units, and all other materials and debris shall be kept clear from the work area by removal at regular intervals.

During the performance of roofing work:

- ▶ Materials and equipment shall not be stored within six (6) feet (1.8 m) of a roof edge unless guardrails are erected at the edge.
- ▶ Materials which are piled, grouped or stacked near a roof edge shall be stable and self-supporting.

Canopies, when used as falling object protection, shall be strong enough to prevent collapse and to prevent penetration by any objects which may fall onto the canopy.

Fall Protection Plan: All Fall Protection Plans shall be in accordance with CFR 1926.502(k).

STEEL ERECTION

Before authorizing the commencement of steel erection, the controlling contractor shall ensure the steel erector is provided with the following written notifications:

- ▶ The concrete in the footings, piers and walls and the mortar in the masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.
- ▶ Any repairs, replacements and modifications to the anchor bolts were conducted in accordance with CFR



1926.755(b).

A steel erection contractor shall not erect steel unless it has received written notification that the concrete in the footings, piers and walls or the mortar in the masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.

The controlling contractor shall ensure the following is provided and maintained:

- ▶ Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment and the material to be erected and means and methods for pedestrian and vehicular control. Exception: this requirement does not apply to roads outside of the construction site.
- ▶ A firm, properly graded, drained area, readily accessible to the work with adequate space for the safe storage of materials and the safe operation of the erector's equipment.

All hoisting operations in steel erection shall be pre-planned to ensure the requirements of CFR 1926.753(d) are met.

Where employers elect, due to conditions specific to the site, to develop alternate means and methods that provide employee protection in accordance with CFR 1926.753(c)(5), 1926.757(a)(4) or 1926.757(e)(4), a site-specific erection plan shall be developed by a qualified person and be available at the work site.

All hoisting and rigging shall be in accordance with CFR 1926.753(a) through (e).

Structural Steel Assembly: Structural stability shall be maintained at all times during the erection process.

The following additional requirements shall apply for multi-story structures:

- ▶ The permanent floors shall be installed as the erection of structural members progresses, and there shall not be more than eight (8) stories between the erection floor and the upper-most permanent floor, except where the structural integrity is maintained as a result of the design.
- ▶ At no time shall there be more than four (4) floors or 48 feet (14.6 m), whichever is less, of unfinished bolting or welding above the foundation or uppermost permanently secured floor, except where the structural integrity is maintained as a result of the design.
- ▶ A fully planked or decked floor or nets shall be maintained within two (2) stories or 30 feet (9.1 m), whichever is less, directly under any erection work being performed.

Walking/Working Surfaces

Shear connectors (such as headed steel studs, steel bars or steel lugs), reinforcing bars, deformed anchors or threaded studs shall not be attached to the top flanges of beams, joists or beam attachments so they project vertically from or horizontally across the top flange of the member until after the metal decking, or other walking/working surface, has been installed.

When shear connectors are used in construction of composite floors, roofs and bridge decks, employees shall lay out and install the shear connectors after the metal decking has been installed, using the metal decking as a working platform. Shear connectors shall not be installed from within a controlled decking zone (CDZ), as specified in CFR 1926.760(c)(8).

Plumbing-Up: When deemed necessary by a competent person, plumbing-up equipment shall be installed in conjunction with the steel erection process to ensure the stability of the structure. When used, plumbing-up equipment shall be in place and properly installed before the structure is loaded with construction material such as loads of joists, bundles of decking or bundles of bridging. Plumbing-up equipment shall be removed only with the



approval of a competent person.

Metal Decking: All metal decking shall be performed in accordance with CFR 1926.754(e).

Column Anchorage: All column anchorage shall be performed in accordance with CFR 1926.755.

Beams and Columns: All beams and columns shall be constructed in accordance with CFR 1926.756.

Open Web Steel Joists: All open web steel joists shall be constructed in accordance with CFR 1926.757.

Systems-Engineered Metal Buildings: All systems-engineered metal buildings shall be constructed in accordance with CFR 1926.758.

Falling Object Protection: All materials, equipment, and tools, which are not in use while aloft, shall be secured against accidental displacement. The controlling contractor shall bar other construction processes below steel erection unless overhead protection from falling objects for the employees below is provided.

Fall Protection

Except as provided in CRF 1926.760(a)(3), each employee engaged in a steel erection activity who is on a walking/working surface with an unprotected side or edge more than 15 feet (4.6 m) above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.

On multi-story structures, perimeter safety cables shall be installed at the final interior and exterior perimeters of the floors as soon as the metal decking has been installed.

Connectors and employees working in controlled decking zones shall be protected from fall hazards as provided above. Each connector shall:

- ▶ Be protected from fall hazards of more than two (2) stories or 30 feet (9.1 m) above a lower level, whichever is less;
- ▶ Have completed connector training; and
- ▶ Be provided, at heights over 15 and up to 30 feet above a lower level, with a personal fall arrest system, positioning device system or fall restraint system and wear the equipment necessary to be able to be tied off; or be provided with other means of protection from fall hazards.

A controlled decking zone (CDZ) may be established in that area of the structure over 15 and up to 30 feet above a lower level where metal decking is initially being installed and forms the leading edge of a work area. In each CDZ, the following shall apply:

- ▶ Each employee working at the leading edge in a CDZ shall be protected from fall hazards of more than two (2) stories or 30 feet (9.1 m), whichever is less.
- ▶ Access to a CDZ shall be limited to only those employees engaged in leading edge work.
- ▶ The boundaries of a CDZ shall be designated and clearly marked. The CDZ shall not be more than 90 feet (27.4 m) wide and 90 (27.4 m) feet deep from any leading edge. The CDZ shall be marked by the use of control lines or the equivalent.
- ▶ Each employee working in a CDZ shall have completed CDZ training.
- ▶ Unsecured decking in a CDZ shall not exceed 3,000 square feet (914.4 m²).
- ▶ Safety deck attachments shall be performed in the CDZ from the leading edge back to the control line and shall have at least two attachments for each metal decking panel.
- ▶ Final deck attachments and installation of shear connectors shall not be performed in the CDZ.

Guardrail systems, safety net systems, personal fall arrest systems, positioning device systems and their



components shall conform to the criteria in CFR 1926.502 Appendix G.

Fall arrest system components shall be used in fall restraint systems and shall conform to the criteria in CFR 1926.502 Appendix G.

Perimeter safety cables shall meet the criteria for guardrail systems in CFR 1926.502 Appendix G.

Fall protection provided by the steel erector shall remain in the area where steel erection activity has been completed, to be used by other trades, only if the controlling contractor or its authorized representative: Has directed the steel erector to leave the fall protection in place; and has inspected and accepted control and responsibility of the fall protection prior to authorizing persons other than steel erectors to work in the area.

CRANES, DERRICKS and HOISTS

Kier Construction shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks. 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. Attachments used with cranes shall not exceed the capacity, rating or scope recommended by the manufacturer.

Rated load capacities, and recommended operating speeds, special hazard warnings or instructions, shall be conspicuously posted on all equipment. Instructions or warnings shall be visible to the operator while he is at his control station.

Only trained and qualified company authorized employees shall operate cranes for Kier Construction. All operators shall comply with the manufacturer's specifications and limitations.

Hand signals to crane and derrick operators shall be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the signals shall be posted at the jobsite.

A competent person shall inspect all machinery and equipment prior to each use, and during use, to ensure it is in safe operating condition. Any deficiencies shall be repaired, or defective parts replaced, before continued use.

A thorough, annual inspection of the hoisting machinery shall be made by a competent person, or by a government or private agency recognized by the U.S. Department of Labor. A record of the dates and results of inspections for each hoisting machine and piece of equipment shall be maintained.

Wire rope shall be taken out of service when any of the following conditions exist:

- ▶ In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay;
- ▶ Wear of one-third the original diameter of outside individual wires. Kinking, crushing, bird caging or any other damage resulting in distortion of the rope structure;
- ▶ Evidence of any heat damage from any cause.
- ▶ Reductions from nominal diameter of more than one-sixty-fourth inch for diameters up to and including five-sixteenths inch, one-thirty-second inch for diameters three-eighths inch to and including one-half inch, three-sixty-fourths inch for diameters nine-sixteenths inch to and including three-fourths inch, one-sixteenth inch for diameters seven-eighths inch to 1 1/8 inches inclusive, three-thirty-seconds inch for diameters 1 1/4 to 1 1/2 inches inclusive;
- ▶ In standing ropes, more than two broken wires in one lay in sections beyond end connections or more than one broken wire at an end connection.

Wire rope safety factors shall be in accordance with American National Standards Institute B 30.5-1968 or SAE



J959-1966.

Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or other moving parts or equipment shall be guarded if such parts are exposed to contact by employees, or otherwise create a hazard. Guarding shall meet the requirements of the American National Standards Institute B 15.1-1958 Rev.

Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, shall be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.

All exhaust pipes shall be guarded or insulated in areas where contact by employees is possible in the performance of normal duties.

Whenever internal combustion engine powered equipment exhausts in enclosed spaces are used, tests shall be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres.

All windows in cabs shall be of safety glass, or equivalent, that introduces no visible distortion that will interfere with the safe operation of the machine.

Where necessary for rigging or service requirements, a ladder, or steps, shall be provided to give access to a cab roof.

Guardrails, handholds, and steps shall be provided on cranes for easy access to the car and cab, conforming to American National Standards Institute B30.5.

Platforms and walkways shall have anti-skid surfaces.

Fuel tank filler pipe shall be located in such a position, or protected in such manner, as to not allow spill or overflow to run onto the engine, exhaust or electrical equipment of any machine being fueled.

Except where electrical distribution and transmission lines have been deenergized and visibly grounded at point of work or where insulating barriers, not a part of or an attachment to the equipment or machinery, have been erected to prevent physical contact with the lines, equipment or machines shall be operated proximate to power lines only in accordance with the following:

- ▶ For lines rated 50 kV. or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet;
- ▶ For lines rated over 50 kV., minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV. over 50 kV., or twice the length of the line insulator, but never less than 10 feet;
- ▶ In transit with no load and boom lowered, the equipment clearance shall be a minimum of four (4) feet for voltages less than 50 kV., and 10 feet for voltages over 50 kV., up to and including 345 kV., and 16 feet for voltages up to and including 750 Kv;
- ▶ A person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means;
- ▶ Cage-type boom guards, insulating links, or proximity warning devices may be used on cranes, but the use of such devices shall not alter the requirements of any other regulation of this part even if such device is required by law or regulation;
- ▶ Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities indicate it is not an energized line and it has been visibly grounded;
- ▶ Prior to work near transmitter towers where an electrical charge can be induced in the equipment or materials



being handled, the transmitter shall be de-energized or tests shall be made to determine if electrical charge is induced on the crane. The following precautions shall be taken when necessary to dissipate induced voltages:

- The equipment shall be provided with an electrical ground directly to the upper rotating structure supporting the boom; and ground jumper cables shall be attached to materials being handled by boom equipment when electrical charge is induced while working near energized transmitters. Crews shall be provided with nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load and
- Combustible and flammable materials shall be removed from the immediate area prior to operations.

No modifications or additions which affect the capacity or safe operation of the equipment shall be made by the employer without the manufacturer's written approval. If such modifications or changes are made, the capacity, operation and maintenance instruction plates, tags or decals, shall be changed accordingly. In no case shall the original safety factor of the equipment be reduced.

All employees shall be kept clear of loads about to be lifted and of suspended loads.

Crawler, locomotive and truck cranes; hammerhead tower cranes; overhead and gantry cranes; derricks; floating cranes and derricks; crane or derrick suspended personnel platforms shall be used in accordance with CFR 1926.550 regulations.

Rigging

When a wire rope bridle is used to connect the personnel platform to the load line, each bridle leg shall be connected to a master link or shackle in such a manner to ensure the load is evenly divided among the bridle legs.

Hooks on overhaul ball assemblies, lower load blocks or other attachment assemblies shall be of a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.

Wire rope, shackles, rings, master links and other rigging hardware must be capable of supporting, without failure, at least five times the maximum intended load applied or transmitted to that component. Where rotation resistant rope is used, the slings shall be capable of supporting without failure at least ten times the maximum intended load.

All eyes in wire rope slings shall be fabricated with thimbles.

Bridles and associated rigging for attaching the personnel platform to the hoist line shall be used only for the platform and the necessary employees, their tools and the materials necessary to do their work and shall not be used for any other purpose when not hoisting personnel.

All trial lifts, inspections, proof testing and work practices shall be done in accordance with CFR 1926.550(g)(5) and (6).

No one shall ever be allowed to ride the ball or hook of the load at anytime.

POWERED INDUSTRIAL TRUCKS (Forklifts)

All powered industrial trucks shall meet the design and construction requirements in the American National Standard (ANSI).

Approved trucks shall bear a label or some other identifying mark indicating approval by the testing laboratory. If the trucks does not have a label, it is to be taken out of service and reported to the project superintendent or rental company.



Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturer's prior written approval.

If modifications or additions are made, the capacity, operation and maintenance instruction plates, tags or decals shall be changed accordingly.

If the truck is equipped with front-end attachments other than factory installed attachments, the user shall request the truck be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered.

The user shall ensure all nameplates and markings are in place and maintained in a legible condition.

Power operated industrial trucks shall not be used in atmospheres containing hazardous concentrations of acetylene, butadiene, ethylene oxide, hydrogen (or gases or vapors equivalent in hazard to hydrogen, such as manufactured gas), propylene oxide, acetaldehyde, cyclopropane, diethyl ether, ethylene, isoprene or unsymmetrical dimethyl hydrazine (UDMH).

Only approved industrial trucks shall be used in hazardous locations. (OSHA Standards 1910.178(c) Table N-1.)

The storage and handling of liquid fuels such as gasoline and diesel fuel shall be in accordance with NFPA Flammable and Combustible Liquids Code.

If changing and charging batteries procedures are performed, they shall be in accordance with OSHA Standards 1910.178(g).

Where general lighting is less than two (2) lumens per square foot, auxiliary directional lighting shall be provided on the truck.

Concentration levels of carbon monoxide gas created by powered industrial truck operations shall not exceed the levels specified in OSHA Standards 1910.1000.

The employer shall ensure each powered industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of a combination of formal instruction (classroom), practical training (demonstration) and evaluation of the operator's performance in the workplace. Refresher training and evaluation of each powered industrial truck operator's performance shall be conducted at least once every three (3) years. Annual performance and competency evaluations will be conducted for all operators.

Truck Operations

Trucks shall not be driven up to anyone standing in front of any fixed object.

No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.

Unauthorized personnel shall not be permitted to ride on powered industrial trucks.

No person is permitted to extend arms or legs outside the running lines of the truck or place them between the uprights of the mast.

A powered industrial truck is unattended when the operator is 25 feet or more away from the vehicle which remains in view, or whenever the operator leaves the vehicle and it is not in view.

When a powered industrial truck is left unattended, load engaging means shall be fully lowered, controls shall be



neutralized, power shall be shut off and brakes set. Wheels shall be blocked if the truck is parked on an incline.

When the operator of an industrial truck is dismounted and within 25 feet of the truck still in his view, the load engaging means shall be fully lowered, controls neutralized and the brakes set to prevent movement.

A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock or platform.

Brakes shall be set and wheel blocks shall be in place to prevent movement of trucks or trailers while loading or unloading.

Fixed jacks may be necessary to support a semitrailer during loading or unloading when the trailer is not coupled to a tractor.

The flooring of trucks and trailers shall be checked for breaks and weaknesses before they are driven onto.

There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler systems, etc.

An overhead guard shall be used as protection against falling objects.

A load backrest extension shall be used whenever necessary to minimize the possibility of the load or part of it from falling rearward.

Fire aisles, access to stairways and fire equipment shall be kept clear.

Traveling

All traffic regulations shall be observed, including authorized plant speed limits. A safe distance shall be maintained approximately three (3) truck lengths from the truck ahead. The truck shall be kept under control at all times.

The right of way shall be yielded to ambulances, fire trucks or other vehicles in emergency situations.

Other trucks traveling in the same direction at intersections, blind spots or other dangerous locations shall not be passed.

Drivers are required to slow down and sound the horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view, the driver shall be required to travel with the load trailing.

Railroad tracks shall be crossed diagonally wherever possible. Parking closer than eight (8) feet from the center of railroad tracks is prohibited.

Drivers are required to look in the direction of, and keep a clear view of the path of travel.

Grades shall be ascended or descended slowly.

When ascending or descending grades in excess of 10 percent, loaded trucks shall be driven with the load upgrade.

On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface.

Under all travel conditions the truck shall be operated at a speed that will permit it to be brought to a stop in a safe manner.



Stunt driving and horseplay shall not be permitted.

Drivers are required to slow down for wet and slippery floors.

Dockboards or bridgeplates shall be properly secured before they are driven over. Both shall be driven over slowly never exceeding rated capacity.

Elevators shall be approached slowly, and then entered squarely with load end forward after the elevator car is properly leveled. Once on the elevator, the controls shall be neutralized, power shut off and the brakes set.

Running over loose objects on roadway surfaces shall be avoided.

While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion. Except when maneuvering at a very low speed, the hand steering wheel shall be turned at a moderate, even rate.

Loading

Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads which cannot be centered.

Only loads within the rated capacity of the truck shall be handled. The load shall be broken down into several loads to meet load capacities.

Long or high loads which may affect capacity shall be adjusted.

Trucks equipped with attachments shall be operated as partially loaded trucks when not handling a load.

A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load.

Extreme care shall be used when tilting the load forward or backward, particularly when high tiering.

Maintenance

If at any time a powered industrial truck is found to be in need of repair, defective or in any way unsafe, the truck shall be taken out of service until it has been restored to safe operating condition. All repairs shall be made by authorized personnel.

Fuel tanks shall not be filled while the engine is running. Spillage shall be avoided.

Spillage of oil or fuel shall be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine.

No truck shall be operated with a leak in the fuel system until the leak has been corrected.

Open flames shall not be used for checking electrolyte levels in storage batteries or gasoline levels in fuel tanks.

Powered industrial trucks shall be examined before being placed in service, and shall not be placed in service if the examination shows any condition adversely affecting the safety of the vehicle. Such examination shall be made at least daily. Where trucks are used on a round-the-clock basis, they shall be examined after each shift.



Water mufflers shall be filled daily or as frequently as is necessary to prevent depletion of the supply of water below 75 percent of the filled capacity. Vehicles with mufflers having screens or other parts that may become clogged shall not be operated while such screens or parts are clogged.

Any vehicle emitting hazardous sparks or flames from the exhaust system shall be removed from service immediately, and not returned to service until the cause for the emission of such sparks and flames has been eliminated.

When the temperature of any part of any truck is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the vehicle shall be removed from service and not returned to service until the cause for such overheating has been eliminated.

Trucks shall be kept in a clean condition, free of lint, excess oil and grease. Noncombustible agents shall be used for cleaning trucks. Precautions regarding toxicity, ventilation and fire hazard shall be consonant with the agent or solvent used.

AERIAL LIFTS

Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to jobsites above ground: extensible boom platforms; aerial ladders; articulating boom platforms; vertical towers; and a combination of any such devices. Aerial equipment may be made of metal, wood, fiberglass reinforced plastic (FRP), or other material; may be powered or manually operated; and are deemed to be aerial lifts whether or not they are capable of rotating about a substantially vertical axis.

Aerial lifts may be "field modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in conformity with all applicable provisions of ANSI A92.2-1969 and CFR 1926.453, to be at least as safe as the equipment was before modification.

Only authorized and certified persons shall operate any type aerial lift.

Aerial ladders shall be secured in the lower traveling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.

Lift controls shall be tested each day prior to use to determine that such controls are in safe working condition.

Belting off to an adjacent pole, structure or equipment while working from an aerial lift shall not be permitted.

Employees shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders or other devices for a work position.

A body belt shall be worn and a lanyard attached to the boom or basket when working from an aerial lift.

Note: As of January 1, 1998, CFR Subpart M 1926.502(d) provides that body belts are not acceptable as part of a personal fall arrest system. The use of a body belt in a tethering system or in a restraint system is acceptable and is regulated under CFR 1926.502(e).

Boom and basket load limits specified by the manufacturer shall not be exceeded.

The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed.



An aerial lift truck shall not be moved when the boom is elevated in a working position with men in the basket, except for equipment which is specifically designed for this type of operation.

Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower level controls shall not be operated unless permission has been obtained from the employee in the lift, except in case of emergency.

Climbers shall not be worn while performing work from an aerial lift.

The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value.

Before moving an aerial lift for travel, the boom(s) shall be inspected to ensure it is properly cradled and outriggers are in stowed position except as provided in CFR 1926.453(b)(2)(viii).

All electrical tests shall conform to the requirements of ANSI A92.2-1969 section 5.

The provisions of the American National Standards Institute standard ANSI A92.2-1969, section 4.9 Bursting Safety Factor shall apply to all critical hydraulic and pneumatic components. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical components shall have a bursting safety factor of at least two (2) to one (1).

CONCRETE AND MASONRY OPERATIONS

No construction loads shall be placed on a concrete structure or portion of a concrete structure unless the employer determines, based on information received from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the loads.

All protruding reinforcing steel onto, and into which employees could fall, shall be guarded to eliminate the hazard of impalement.

No employee (except those essential to the post-tensioning operations) shall be permitted to be behind the jack during tensioning operations.

Signs and barriers shall be erected to limit employee access to the post-tensioning area during tensioning operations.

No employee shall be permitted to work under or ride concrete buckets, or any other loads which are being elevated or lowered into position.

To the extent practical, elevated concrete buckets shall be routed so no employee, or the fewest number of employees, are exposed to the hazards associated with falling concrete buckets.

No employee shall be permitted to apply a cement sand and water mixture through a pneumatic hose unless the employee is wearing protective head and face equipment.

Concrete pumping systems using discharge pipes shall be provided with pipe supports designed for 100 percent overload.

Compressed air hoses used on concrete pumping systems shall be provided with positive fail-safe joint connectors to prevent separation of sections when pressurized.



Concrete buckets equipped with hydraulic or pneumatic gates shall have positive safety latches or similar safety devices installed to prevent premature or accidental dumping.

Concrete buckets shall be designed to prevent concrete from hanging up on top and the sides.

Sections of tremies and similar concrete conveyances shall be secured with wire rope (or equivalent materials) in addition to the regular couplings or connections.

Bull float handles used which may contact energized electrical conductors shall be constructed of nonconductive material or insulated with a nonconductive sheath. The sheath should have electrical and mechanical characteristics which provide the equivalent protection of a handle constructed of non-conductive materials.

Masonry saws shall be guarded with a semicircular enclosure over the blade. A method of retaining blade fragments shall be incorporated in the design of the semicircular enclosure.

All concrete equipment shall be in accordance with CFR 1926.702 (a) through (j).

Cast-in-Place Concrete: Formwork shall be designed, fabricated, erected, supported, braced and maintained so it will be capable of supporting without failure all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork.

Drawings or plans, including all revisions, for the jack layout, formwork (including shoring equipment), working decks and scaffolds, shall be available at the jobsite.

All shoring equipment (including equipment used in reshoring operations) shall be inspected prior to erection to ensure the equipment meets the requirements specified in the formwork drawings.

Shoring equipment found to be damaged such that its strength is reduced to less than required shall not be used for shoring.

Erected shoring equipment shall be inspected immediately prior to, during, and immediately after concrete placement.

Shoring equipment found to be damaged or weakened after erection, such that its strength is reduced to less than required, shall be immediately reinforced.

The sills for shoring shall be sound, rigid and capable of carrying the maximum intended load.

All base plates, shore heads, extension devices and adjustment screws shall be in firm contact, and secured when necessary, with the foundation and the form.

Eccentric loads on shore heads and similar members shall be prohibited unless these members have been designed for such loading.

Whenever single post shores are used one on top of another (tiered), the employer shall comply with the following specific requirements in addition to the general requirements for formwork:

- ▶ The design of the shoring shall be prepared by a qualified designer and the erected shoring shall be inspected by an engineer qualified in structural design.
- ▶ The single post shores shall be vertically aligned.
- ▶ The single post shores shall be spliced to prevent misalignment.
- ▶ The single post shores shall be adequately braced in two mutually perpendicular directions at the splice level.



Each tier shall also be diagonally braced in the same two (2) directions.

Adjustment of single post shores to raises formwork shall not be made after the placement of concrete.

Reshoring shall be erected, as the original forms and shores are removed, whenever the concrete is required to support loads in excess of its capacity.

The steel rods or pipes on which jacks climb or by which the forms are lifted shall be:

- ▶ Specifically designed for that purpose; and
- ▶ Adequately braced where not encased in concrete.

Forms shall be designed to prevent excessive distortion of the structure during the jacking operation.

Jacks and vertical supports shall be positioned in such a manner that the loads do not exceed the rated capacity of the jacks.

The jacks or other lifting devices shall be provided with mechanical dogs or other automatic holding devices to support the slip forms whenever failure of the power supply or lifting mechanism occurs.

All vertical slip forms shall be provided with scaffolds or work platforms where employees are required to work or pass.

The form structure shall be maintained within all design tolerances specified for plumbness during the jacking operation.

Reinforcing steel for walls, piers, columns and similar vertical structures shall be adequately supported to prevent overturning and to prevent collapse.

Employers shall take measures to prevent unrolled wire mesh from recoiling.

Forms and shores (except those used for slabs on grade and slip forms) shall not be removed until the employer determines the concrete has gained sufficient strength to support its weight and superimposed loads.

Reshoring shall not be removed until the concrete being supported has attained adequate strength to support its weight and all loads placed on it.

Pre-Cast Concrete: Lift slab operations shall be designed and planned by a registered professional engineer who has experience in lift-slab construction.

Pre-cast concrete wall units, structural framing and tilt-up wall panels shall be adequately supported to prevent overturning and to prevent collapse until permanent connections are completed.

Lifting inserts which are embedded or otherwise attached to tilt-up pre-cast concrete members shall be capable of supporting at least two (2) times the maximum intended load applied or transmitted to them.

Lifting inserts which are embedded or otherwise attached to pre-cast concrete members, other than tilt-up members, shall be capable of supporting at least (4) four times the maximum intended load applied or transmitted to them.

Lifting hardware shall be capable of supporting at least five (5) times the maximum intended load applied transmitted to the lifting hardware.

No employee shall be permitted under pre-cast concrete members being lifted or tilted into position except those



employees required for the erection of those members.

Equipment shall be designed and installed so the lifting rods cannot slip out of position or the employer shall institute other measures, such as the use of locking or blocking devices, which will provide positive connection between the lifting rods and attachments and will prevent components from disengaging during lifting operations.

Masonry Construction

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

- ▶ The LAZ shall be established prior to the start of construction of the wall.
- ▶ The LAZ shall be equal to the heights of the wall to reconstructed plus four (4) feet, and shall run the entire length of the wall.
- ▶ The LAZ shall be established on the side of the wall which will be unscaffolded.
- ▶ The LAZ shall be restricted to entry by employees actively engaged in constructing the wall. No other employees shall be permitted to enter the zone.
- ▶ The LAZ shall remain in place until the wall is adequately supported to prevent overturning and to prevent collapse unless the height of the wall is over eight (8) feet, in which case, the LAZ shall remain in place until the requirements of the next paragraph have been met.

All masonry walls over eight (8) feet in height shall be adequately braces to prevent overturning and to prevent collapse unless the wall is adequately supported so it will not overturn or collapse. The bracing shall remain in place until permanent supporting elements of the structure are in place.

EXCAVATIONS AND TRENCHING

All surface encumbrances located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

Underground Installations

The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

Utility companies or owners shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility companies or owners cannot respond to installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

Access and Egress

Structural ramps shall be used solely by employees as a means of access or egress from excavations 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, and shall be constructed in accordance with the design.

A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are four (4) feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

Employees exposed to public vehicular traffic shall be provided with, and shall wear warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees 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 the vehicles are equipped, in accordance with 1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.

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. If possible, the grade should be away from the excavation.

Hazardous Atmospheres

Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than four (4) feet (1.22 m) in depth.

Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres.

Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.

Emergency rescue equipment, such as a breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.

Water Accumulation Hazards: Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water or use of a safety harness and lifeline.

If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation.

Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with OSHA CFR 1926.651(h).



Stability of Adjacent Structures: 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 the stability of such structures for the protection of employees.

Excavation below the level of the base or footing of any foundation or retaining wall that could reasonably be expected to pose a hazard to employees shall not be permitted except when:

- ▶ A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or
- ▶ The excavation is in stable rock; or
- ▶ A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
- ▶ A registered professional engineer has determined such excavation work will not pose a hazard to employees.

Sidewalks, pavements and appurtenant structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

Protection From Loose Rock or Soil: Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least two (2) feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Inspections: Daily inspections of excavations, the adjacent areas and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Fall Protection: Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with 1926.502(b) shall be provided where walkways are six (6) feet (1.8 m) or more above lower levels.

Protective Systems: Each employee in an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with CFR 1926.652(b) or (c).

The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with CFR 1926.652(b).

Support Systems: Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with CFR 1926.652(c).

Materials and Equipment: Materials and equipment used for protective systems shall be free from damage or



defects that might impair their proper function.

Manufactured materials and equipment used for protective systems shall be used and maintained in a manner consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

When material or equipment is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

Installation and Removal of Support: Members of support systems shall be securely connected together to prevent sliding, falling, kickouts or other predictable failure.

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

Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

Removal 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 of the structure or possible cave-in of the sides of the excavation.

Backfilling shall progress together with the removal of support systems from excavations.

Sloping and Benching Systems: Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

Shield Systems: Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand. Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

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

Soil Classification: Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with CFR 1926 subpart P.

The classification of the deposits shall be made based on the results of at least one (1) visual and at least one (1) manual analysis. Such analyses shall be conducted by a competent person using recognized methods of soil classification and testing.

The visual and manual analyses shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors and conditions affecting the classification of the deposits.



In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

If, after classifying a deposit, the properties, factors or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

Visual and manual soils testing must be conducted in compliance with OSHA CRF 1926 Subpart P Soil Classification.

Sloping and Benching: Soil and rock deposits shall be classified in accordance with Appendix A to subpart P of part 1926. The maximum allowable slope for a soil or rock deposit shall be determined from the following table.

Soil or Rock Type	Maximum Allowable Slopes (H:V)* For Excavations Less Than 20 Feet Deep **
Stable Rock	Vertical (90°)
Type A ***	3/4:1 (53°)
Type B	1:1 (45°)
Type C	1 1/2:1 (34°)

- * Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
- ** Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.
- *** A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth.
Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4HA1V (53°).

The actual slope shall not be steeper than the maximum allowable slope. The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least 1/2 horizontal to one (1) vertical (1/2H:1V) less steep than the maximum allowable slope. When surcharge loads from stored material or equipment, operating equipment or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with 1926.651(i).

Configurations of sloping and benching systems shall be in accordance with CFR 1926 subpart P Appendix B.

Timber Shoring for Trenches: Timber shoring for trenches shall be done in accordance with 1926 subpart P Appendix C.

Aluminum Hydraulic Shoring for Trenching: Aluminum hydraulic shoring for trenching shall be done in accordance with 1926 subpart P Appendix D.

CONFINED / ENCLOSED SPACES

Any employee required to enter into confined or enclosed spaces shall be instructed by their Superintendent/ Foreman or Project Manager as to the nature of the hazards involved, the necessary precautions to be taken, and in the use of protective and emergency equipment required prior to entry.

A confined or enclosed space is defined as any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. Confined or enclosed spaces include, but are not limited to:

- ▶ Storage tanks.
- ▶ Process vessels.
- ▶ Bins.



- ▶ Boilers.
- ▶ Ventilation or exhaust ducts.
- ▶ Tunnels.
- ▶ Pipelines.
- ▶ Open top spaces that are more than four (4) feet in depth, such as pits, tubs, vaults and vessels.

The employer shall evaluate the workplace to determine if any spaces are permit required confined spaces.

If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces.

NOTE: A sign reading “**DANGER – PERMIT REQUIRED CONFINED SPACE, DO NOT ENTER**” or using other similar language would satisfy the requirement for a sign.

Should this type of work be encountered, the Superintendent shall immediately notify the Safety Director for instructions. No employee is to enter a confined or enclosed space without consent and instructions from the Safety Director.



BURIED UTILITIES

Utility Location and Identification

Before excavating, know what lies beneath the soil’s surface. What you don’t see could hurt you! Notify an underground utility locating service at least two (2) working days prior to digging. Once a site is marked, you are responsible for determining the exact depth and routes of underground facilities. You must also safeguard underground lines once they are exposed.

At the start of each job, a **Competent Person** (preferably the Superintendent) shall be designated to review the latest drawings and establish contact with all utility companies. This person will also contact the local underground locating service two (2) working days prior to excavation and have all services marked.

Location markings by local underground locating services (Blue Stakes or independent companies) are usually good for fourteen (14) days, but may vary depending on the service company. These markings must be kept current and may need to be renewed several times during construction. Good recordkeeping of location requests is essential to verify underground lines. Always keep track of the job number given by Blue Stakes.

Representatives from utility companies should be invited to a pre-construction conference to review work schedules, plans, utility location and provide emergency contact in case of a mishap. Priority utilities such as gas, electric and telephone lines should be marked and color-coded on the construction drawing, then verified with the utility company representatives.

Colors and Symbols: Colors and symbols have been adopted by all utilities subscribing to Underground Service Alert (USA). Consult your local service for utility identification, and note that not all utility companies subscribe to locating services.

The following are color codes and symbols for marking underground facilities.

Color	Symbol	Facility
Blue	W	Water
Orange	FA	Fire Alarm
	TEL	Telephone
	R	Railroad
	TV	Television
	WU	Western Union
Green	S	Sewer
	D	Storm Drain
Red	L	Street Lighting
	E	Electric
	T	Traffic Signals
Yellow	G	Gas
	Co. Name	Oil & Chemical
Purple		Reclaimed Water
Pink		Survey Marking
White		Proposed Excavation



Before commencing actual excavation operations, verify the location and depth of the utility lines by potholing or by using hand labor.

If utility lines are discovered, mark them with stakes and ribbon. Make sure everyone on the project knows the location of utilities for the length of the project.

If any damage occurs to any line, contact the utility company, project Superintendent, and Safety Director immediately. Emergency telephone numbers for all utility companies shall be conspicuously posted.

Once underground lines have been located, mechanical detection should be used to verify the depth of the line in case there has been an elevation change. **DO NOT** assume the utility will continue on the same line and grade.

Never excavate where a pipeline is known to carry a hazardous substance until the pipeline has been located by potholing or other proven acceptable methods at intervals sufficient to determine its exact location. In no case shall the intervals between potholes or the location by proven acceptable methods exceed the suggested distance of these standards.

- ▶ A pothole every 25 feet for lines less than 8 inches in diameter.
- ▶ Every 50 feet for lines 8 inches through 24 inches in diameter.
- ▶ Every 100 feet for lines greater than 24 inches in diameter.

Open cut work must be braced, sheeted or shored to eliminate damage to underground utilities. Always support underground utilities in trenches to minimize strain to the system. (See the section on Excavation and Trenching.)

Backfill material must be free from contaminants and other materials that could damage the utility. If you damage a gas pipeline and detect escaping gas, extinguish all open flames in the area. Shut off all power equipment and motors, and divert all traffic from the area.

STAIRWAYS AND LADDERS

A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of 19 inches (48 cm) or more, and no ramp, runway, sloped embankment or personnel hoist is provided.

Employees shall not use any spiral stairways that will not be a permanent part of the structure on which construction work is being performed.

A double-cleated ladder or two (2) or more separate ladders shall be provided when ladders are the only mean of access or exit from a working area for 25 or more employees, or when a ladder is to serve two-way traffic simultaneous.

When a building or structure has only one point of access between levels, that point of access shall be kept clear to permit free passage of employees. When work must be performed or equipment must be used such that free passage at that point of access is restricted, a second point of access shall be provided and used.

When a building or structure has two or more points of access between levels, at least one point of access shall be kept clear to permit free passage of employees.

Employers shall provide and install all stairway and ladder fall protection systems required by CFR1926.1052 and 1926.1053 and shall comply with all other pertinent requirements before employees begin the work that necessitates the installation and use of stairways, ladders and their respective fall protection systems.

Stairways that will not be a permanent part of the structure on which construction work is being performed shall



have landings of not less than 30 inches (76 cm) in the direction of travel and extend at least 22 inches (56 cm) in width at every 12 feet (3.7 m) or less of vertical rise.

Stairs shall be installed between 30 degrees and 50 degrees from horizontal.

Riser height and tread depth shall be uniform within each flight of stairs, including any foundation structure used as one or more treads of the stairs. Variations in riser height or tread depth shall not be over 1/4-inch (0.6 cm) in any stairway system.

Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than 20 inches (51 cm).

Metal pan landings and metal pan treads, when used, shall be secured in place before filling with concrete or other material.

All parts of stairways shall be free of hazardous projections, such as protruding nails.

Slippery conditions on stairways shall be eliminated before the stairways are used to reach other levels.

The following requirements apply to all temporary stairways as indicated:

- ▶ Except during stairway construction, foot traffic is prohibited on stairways with pan stairs where the treads and/or landings are to be filled in with concrete or other material at a later date, unless the stairs are temporarily fitted with wood or other solid material at least to the top edge of each pan. Such temporary treads and landings shall be replaced when worn below the level of the top edge of the pan.
- ▶ Except during stairway construction, foot traffic is prohibited on skeleton metal stairs where permanent treads and/or landings are to be installed at a later date, unless the stairs are fitted with secured temporary treads and landings long enough to cover the entire tread and/or landing area.
- ▶ Treads for temporary service shall be made of wood or other solid material, and shall be installed the full width and depth of the stair.

Stair rails and Handrails: Stairways having four or more risers or rising more than 30 inches (76 cm), whichever is less, shall be equipped with at least one handrail; and one stair rail system along each unprotected side or edge.

Note: When the top edge of a stair rail system also serves as a handrail, paragraph (c)(7) of CFR 1926.1052 applies.

The height of stair rails shall be as follows:

- ▶ Stair rails installed after March 15, 1991, shall be not less than 36 inches (91.5 cm) from the upper surface of the stair rail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
- ▶ Stair rails installed before March 15, 1991, shall be not less than 30 inches (76 cm) nor more than 34 inches (86 cm) from the upper surface of the stair rail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

Mid rails, screens, mesh, intermediate vertical members or equivalent intermediate structural members, shall be provided between the top rail of the stair rail system and the stairway steps.

- ▶ Mid rails, when used, shall be located at a height midway between the top edge of the stair rail system and the stairway steps.
- ▶ Screens or mesh, when used, shall extend from the top rail to the stairway step, and along the entire opening between top rail supports.
- ▶ When intermediate vertical members, such as balusters, are used between posts, they shall be not more than 19 inches (48 cm) apart.
- ▶ Other structural members, when used, shall be installed so there are no openings in the stair rail system that are more than 19 inches (48 cm) wide.



Handrails and the top rails of stair rail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 n) applied within two (2) inches (5 cm) of the top edge, in any downward or outward direction, at any point along the top edge.

The height of handrails shall be not more than 37 inches (94 cm) nor less than 30 inches (76 cm) from the upper surface of the handrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

When the top edge of a stair rail system also serves as a handrail, the height of the top edge shall be not more than 37 inches (94 cm) nor less than 36 inches (91.5 cm) from the upper surface of the stair rail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

Stair rail systems and handrails shall be so surfaced as to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.

Handrails shall provide an adequate handhold for employees grasping them to avoid falling.

The ends of stair rail systems and handrails shall be constructed so as not to constitute a projection hazard. Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of three (3) inches (8 cm) between the handrail and walls, stair rail systems and other objects.

Unprotected sides and edges of stairway landings shall be provided with guardrail systems.

Ladders: Ladders shall be capable of supporting the following loads without failure:

- ▶ **Each self-supporting portable ladder:** At least four (4) times the maximum intended load, except each extra-heavy-duty type 1A metal or plastic ladder shall sustain at least 3.3 time the maximum intended load. The ability of a ladder to sustain the loads indicated in this paragraph shall be determined by applying or transmitting the requisite load to the ladder in a downward vertical direction.
- ▶ **Each portable ladder that is not self-supporting:** At least four (4) times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladders shall sustain at least 3.3 times the maximum intended load. The ability of a ladder to sustain the loads indicated in this paragraph shall be determined by applying or transmitting the requisite load to the ladder in a downward vertical direction when the ladder is placed at an angle of 75 ½ degrees from the horizontal. Ladders built and tested in conformance with the applicable provisions of appendix A will be deemed to meet this requirement.
- ▶ **Each Fixed ladder:** At least two (2) loads of 250 pounds (114 kg) each, concentrated between any two consecutive attachments (the number and position of additional concentrated loads of 250 pounds [114 kg] each, determined from anticipated usage of the ladder, shall also be included), plus anticipated loads caused by ice buildup, winds, rigging and impact loads resulting from the use of ladder safety devices.
- ▶ Each step or rung shall be capable of supporting a single concentrated load of at least 250 pounds (114 kg) applied in the middle of the step or rung.

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

- ▶ Rungs, cleats, and steps of portable ladders (except as provided below) and fixed ladders (including individual-rung/step ladders) shall be spaced not less than 10 inches (25 cm) apart, nor more than 14 inches (36 cm) apart, as measured between center lines of the rungs, cleats and steps.
- ▶ Rungs, cleats and steps of step stools shall be not less than 8 inches (20 cm) apart, nor more than 12 inches (31 cm) apart, as measured between center lines of the rungs, cleats, and steps.
- ▶ Rungs, cleats and steps of the base section of extension trestle ladders shall be not less than eight (8) inches (20 cm) nor more than 18 inches (46 cm) apart, as measured between center lines of the rungs, cleats, and steps. The rung spacing on the extension section of the extension trestle ladder shall be not less than six (6) inches (15 cm) nor more than 12 inches (31 cm), as measured between center lines of the rungs, cleats and



steps.

The minimum clear distance between the sides of individual-rung/step ladders and the minimum clear distance between the side rails of other fixed ladders shall be 16 inches (41 cm). The minimum clear distance between side rails for all portable ladders shall be 11 ½ inches (29 cm).

The rungs of individual-rung/step ladders shall be shaped such that employees' feet cannot slide off the end of the rungs.

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

Ladders shall not be tied or fastened together to provide longer sections unless they are specifically designed for such use.

A metal spreader or locking device shall be provided on each stepladder to hold the front and back sections in an open position when the ladder is being used.

When splicing is required to obtain a given length of side rail, the resulting side rail must be at least equivalent in strength to a one-piece side rail made of the same material.

Except when portable ladders are used to gain access to fixed ladders (such as those on utility towers, billboards and other structures where the bottom of the fixed ladder is elevated to limit access), when two or more separate ladders are used to reach an elevated work area, the ladders shall be offset with a platform or landing between the ladders.

Ladder components shall be surfaced so as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

Wood ladders shall not be coated with any opaque covering, except for identification or warning labels which may be placed on one face only of a side rail.

All clearances regarding ladders shall be in accordance with CRF 1926.1053(a)(10) through (27).

Use: When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least three (3) feet (.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab rail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

Ladders shall be maintained free of oil, grease and other slipping hazards.

Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.

Ladders shall be used only for the purpose for which they were designed.

Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).



Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.

Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing or holding a ladder that is used upon slippery surfaces including, but not limited to, flat metal or concrete surfaces constructed so they cannot be prevented from becoming slippery.

Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.

The area around the top and bottom of ladders shall be kept clear.

The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.

Ladders shall not be moved, shifted or extended while occupied.

Ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized electrical equipment, except as provided in 1926.951(c)(1).

The top or top step of a stepladder shall not be used as a step.

Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.

Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.

Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "**DO NOT USE**" or similar language, and shall be withdrawn from service until repaired.

Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails or corroded components, shall be withdrawn from service until repaired. The requirement to withdraw a defective ladder from service is satisfied if the ladder is either: Immediately tagged with "**DO NOT USE**" or similar language; Marked in a manner that readily identifies it as defective; Or blocked (such as with a plywood attachment that spans several rungs).

Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.

Single-rail ladders shall not be used.

When ascending or descending a ladder, the user shall face the ladder.

Each employee shall use at least one (1) hand to grasp the ladder when progressing up and/or down the ladder.

An employee shall not carry any object or load that could cause the employee to lose balance and fall.



MOTOR VEHICLES

The operation of motor vehicles is primarily a miscellaneous part of our business, however, along with the operation of these vehicles comes a tremendous amount of responsibility for the safety of the driver, passengers and the motoring public. Vehicle accidents account for needless injury and property damage. It is our intent to ensure only qualified, safe drivers operate company vehicles. Vehicle loss prevention is the responsibility of all management personnel, supervisors and drivers.

- ▶ All drivers of company vehicles must be 18 years of age.
- ▶ All drivers must possess a valid driver license.
- ▶ All drivers must have a good driving record based on their personal MVR (Motor Vehicle Record). MVR's will be checked on a regular basis by the corporate fleet department and/or insurance department.
- ▶ All drivers are required to wear seat belts while operating a company vehicle. Also, the driver is responsible to ensure passengers also wear their seat belts.
- ▶ Drivers shall obey all traffic rules, drive courteously and practice defensive driving techniques.
- ▶ Drivers shall maintain a valid driver license and shall not allow other employees to use their vehicle until they verify the employee has a valid driver license and meets all requirements outlined above.

Drivers shall notify management:

- ▶ Of any change in drivers license status including suspension, revocation or restrictions.
- ▶ Of any and all accidents that occur in a company vehicle.

No employee shall possess a firearm in a company vehicle.

Kier Construction believes very strongly that a safe, healthy and productive work environment is in the best interest of our employees, our customers and our communities. Consistent with this philosophy, Kier Construction is determined to provide a workplace free of alcohol and illegal drugs. The illegal use of drugs or alcoholic beverages in company vehicles is strictly prohibited.

Drivers will not operate a company vehicle after having consumed alcohol and/or drugs (including legal prescription drugs) which may impair their ability to operate the vehicle. (See Kier Construction Alcohol and Drug Policy.)

Reporting of accidents involving any company vehicle

- ▶ Stop immediately - if possible pull off the traveled portion of the roadway.
- ▶ Warn other motorists - set emergency flashers, flares, warning devices, etc.
- ▶ Check for injuries and render assistance only if immediate danger to life and health exists.
- ▶ Call the police and emergency medical personnel if needed.
- ▶ Get the name and address of witnesses.
- ▶ Exchange driver licenses, vehicle and insurance information with other parties involved, as well as pictures of both vehicles.
- ▶ Do not argue or make statements as to who is at fault.
- ▶ Notify management immediately.
- ▶ If an employee who is assigned a company vehicle or driving a pool vehicle and is involved in an accident where he/she is determined to be "at fault," the employee may lose the company vehicle and/or driving privileges for an undetermined amount of time. Depending on the citation and/or accident, the driver may have his/her privileges revoked.

General requirements



All vehicles shall have a service brake system, an emergency brake system and a parking brake system. These systems may use common components, and shall be maintained in operable condition.

Whenever visibility conditions warrant additional light, all vehicles, or combinations of vehicles, in use shall be equipped with at least two (2) headlights and two (2) taillights in operable condition.

All vehicles, or combination of vehicles, shall have brake lights in operable condition regardless of light conditions.

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

No employer shall use any motor vehicle equipment having an obstructed view to the rear unless: the vehicle has a reverse signal alarm audible above the surrounding noise level or: the vehicle is backed up only when an observer signals that it is safe to do so.

All vehicles with cabs shall be equipped with windshields and powered wipers. Cracked and broken glass shall be replaced. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields shall be equipped with operable defogging or defrosting devices.

All haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders or similar equipment, shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

Tools and material shall be secured to prevent movement when transported in the same compartment with employees.

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

Seat belts and anchorages meeting the requirements of 49 CFR Part 571 (Department of Transportation, Federal Motor Vehicle Safety Standards) shall be installed in all motor vehicles.

Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being done.

Operating levers controlling hoisting or dumping devices on haulage bodies shall be equipped with a latch or other device which will prevent accidental starting or tripping of the mechanism.

Trip handles for tailgates of dump trucks shall be arranged so while dumping, the operator will be in the clear.

All rubber-tired motor vehicles shall be equipped with fenders.

Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders.

All vehicles in use shall be checked at the beginning of each shift to ensure the following parts, equipment and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects shall be corrected before the vehicle is placed in service. These requirements also apply to equipment such as lights, reflectors, windshield wipers, defrosters, fire extinguishers, etc., where such equipment is necessary.



OFFICE SAFETY

Office environments are normally safe places to work. However, if housekeeping and maintenance are substandard and safety precautions are not considered, the probability of incidents and injuries increase dramatically.

Many of the injuries in offices are associated with slips, trips, falls, and lifting. Additional sources of injury are improper location of equipment, electrical cords and furniture. Some precautions for office safety include:

- ▶ Have a firm footing when climbing. Use a safe step ladder.
- ▶ Never use office furniture as steps to reach high objects.
- ▶ Walk, do not run, in corridors or on stairs. Use handrails.
- ▶ Do not stand in front of closed doors; they may open suddenly.
- ▶ Do not push or crowd at elevators, entrances or on stairways.
- ▶ Read mail and other materials at your desk - not while walking.
- ▶ Watch for telephone cords, office machine electrical cords, wastebaskets and other hazards underfoot which may cause tripping.
- ▶ Use handles when closing files and desk drawers.
- ▶ Keep file cabinet and desk drawers closed when not in use. Open only one file or desk drawer at a time.
- ▶ Check office furniture regularly for sharp edges or splinters and loose casters or bolts.
- ▶ Keep sharp objects in a safe place. Handle them carefully.
- ▶ Be sure typewriters, personal computers, phones and printers are solidly placed.
- ▶ Use properly grounded circuits for all electrical equipment.
- ▶ Never overload electrical outlets or run cords in walkways.
- ▶ Do not adjust or clean power-driven office machines while energized.
- ▶ Do not attempt to make repairs on equipment. Call a qualified technician.
- ▶ Get help when lifting heavy objects. Always use proper lifting techniques.
- ▶ Avoid placing cabinets or bookshelves where they can be easily toppled or cause injury.
- ▶ Be careful in swivel chairs. Do not slump back in them without first testing your weight gradually.
- ▶ Store flammables in proper storage cabinets, not in the office.
- ▶ Inspect fire extinguishers and assure employees are trained in their use.
- ▶ Have emergency phone numbers posted by each phone.
- ▶ Space heaters must be turned off at the end of the day or have an automatic shut-off.
- ▶ Conduct fire drills annually.
- ▶ Post evacuation and meeting locations in large buildings.

JOB HAZARD ANALYSIS

A job hazard analysis is a procedure used to review job methods and find hazards. These hazards may have been overlooked from the start or they may have developed after work started. Once the hazards are known, the best solution or control can be developed.

The person best suited to develop the analysis is the Superintendent. The first reason is the Superintendent has most likely put his time in at the “trench level.” He has probably spent five (5) to ten (10) years doing the job he is now supervising. He has made the mistakes, seen the hazards, and has the best suggestions on how to make the job safer. The second reason for this choice will be discussed in detail in Step 2 - Break Activity Down Into Successive Steps.

Once the analysis rough draft is done, we suggest it be reviewed by the Safety Director. The Safety Director will review the analysis on a technical level, check to see if any hazards were overlooked, and review the control measures to see if the best solutions were chosen.

The following shows the step-by-step procedure recommended to complete a Job Hazard Analysis.



Step 1 - Selecting an Activity to Analyze

An activity is a sequence of separate steps that together accomplish a work goal. Some activities can be broadly defined in general terms of what is accomplished. Pouring concrete, building a parking garage and erecting steel are examples. Such broadly defined activities are not suitable for a hazard analysis. Similarly, an activity can be narrowly defined in terms of a single action. Driving a nail, tying rebar and cutting plywood are examples. Such narrowly defined activities also are not suitable for a hazard analysis.

Activities suitable for a hazard analysis are those that relate to a particular phase of work. Setting gang forms, erecting scaffolding and pouring a wall with a crane and concrete bucket are good subjects for hazard analysis.

Once an activity or major phase has been selected, list the act on the Job Hazard Analysis form.

Step 2 - Break Activity Down into Successive Steps

Now, break the activity down into its principal steps. Usually, the Superintendent will rely on past experiences with the type of work being analyzed. He knows the work goal (end point), the beginning point, and what needs to be done to accomplish the work goal (steps). He should be able to visualize a logical progression step-by-step.

Record the steps in their natural order of occurrence. Describe what is done, not details of how it is done. Usually three or four words are sufficient. Number the steps consecutively.

Step 3 - Identify Hazards and Potential Mishaps

Once the principal steps have been established and listed on the form, identify the potential hazards encountered in each of the principal steps listed. Once again past experience will be relied upon heavily. Talking to the workers about past incidents or near misses will be of help as well. Checking with first aid logs or incident investigations will be helpful as well. At this point, evaluate hazards presented by other activities working adjacent to the activity being analyzed.

The following is a list of questions that will help identify most hazards:

Is there danger of striking against, being struck by or otherwise making injurious contact with an object or individual?

- ▶ Can an employee be caught in, on or between objects?
- ▶ Can an employee slip or trip? Can an employee fall on the same level or to another?
- ▶ Can an employee strain themselves by pushing, pulling or lifting?
- ▶ Is there a possibility of electrical, health or fire hazards associated with that principal step?

It is estimated that these questions should be able to uncover 90 percent of the potential hazards. What about the other 10 percent? The other 10 percent is probably what makes the activity hazard analysis so unique.

Factors which are unique to an activity (elevation, terrain, weather, etc.) may add to or change the potential hazards. All this must be taken into consideration when doing the analysis.

Step 4 - Develop a Control for Each Hazard Identified

The next step is to come up with solutions to the hazards presented in Step 3 of this procedure. Here is where the analyst can be creative. There may be several solutions to the hazard. What you are looking for in this step, however, is the best one (most beneficial) for the situation. You must ask, "What are the benefits to this solution?" Sometimes the solution will solve that particular problem but create a new hazard for that step or another step. Once again it is useful to ask the workers involved for suggestions.



The following are suggestions to help come up with ideas for the best solution to a particular hazard:

- ▶ Change the Physical Conditions that Create the Hazard. “What change in a physical condition(s) will eliminate the hazard or prevent the incident?” A good example of this would be changing the surface in a work area to a non-slip type surface. Installing scaffold brackets, planking and handrails on the forms before flying them into place.
- ▶ Change the Procedures of the Step. “What should the employee do or not do to eliminate the hazard or prevent this potential mishap?” Can the employee install the scaffold brackets on the form while on the ground before flying the form into place, instead of after the form is in place thus subjecting the employee to a potential fall. You should consider work saving tools or equipment. Say for example, a worker has to lift and carry heavy or awkward objects across the project to his work area. All you need to do is supply the workers with a truck or forklift to bring the material closer to them, or plan for the material to be delivered where it will be used. Also, if two workers were to lift the object to the work area, it would reduce the chances of back strain.
- ▶ Reduce the Frequency that a Task Must be Performed. “What can be done to reduce the amount of times an employee must perform this task?”
- ▶ Every task has some potential for an incident to occur. When you listed potential hazards in Step 3, you recognized the fact that these actions have a higher probability of causing an incident than normal tasks. Therefore, if you can find a way to reduce the amount of times an employee must perform a task, you reduce the probability of an incident happening during this task as well.
- ▶ Training. If none of the previous suggestions are applicable, then the answer may be training the employees to do the task safely. Quite often we hear of incidents caused by lack of knowledge of proper safe procedures. This could mean simple instruction, or it could involve specialized training from outside sources. The latter is usually needed for irregular work which may be unique.

Special attention should be given to newer (1½ year or less) employees. These employees have proven to be among the most likely to have an incident. This is why it is good practice for employers to give new employees good initial safety training.

Once a control has been decided on, it must be put into a positive statement. “Respirators will be supplied to the workmen.” “Electricity to the building will be locked out by a mechanical device.” In other words, you will be committing yourself to perform the action you chose as a control.

Update as Needed: It should be noted that the completed analysis is not set in stone. Field changes take place every day. With these changes a new hazard may be created. Also, for example, a delay in a different activity could have you working next to that operation. This could add a multitude of hazards to your job. We can now see that for the hazard analysis to be effective, it should be updated as the activity progresses.

Benefits: Incidents cost money. For every incident there are obvious costs (lost time, doctors, hospitals, etc.) as well as the hidden costs (training new employees to do the job, drop in morale, etc.). By reducing the incidents you can save money, thereby increasing your profit margins on each job.

Safety training benefits our organization. Establishing safety contacts between supervisors and workers (one-on-one) promotes good safety awareness and increases morale. This is very important for new employees.

Training on the proper methods of performing certain tasks will in most cases increase productivity as well. An increase in productivity always turns into an increase in profits.

WORKSITE ANALYSIS

A practical analysis of the work environment involves a variety of worksite examinations to identify existing hazards and conditions and operations in which changes might occur to create new hazards. Unawareness of a



hazard stemming from failure to examine the worksite is a sign that safety and health policies and/or practices are ineffective. Effective management actively analyzes the work and worksite to anticipate and prevent harmful occurrences. The following measures are recommended to identify all existing and potential hazards:

- ▶ Conduct comprehensive baseline worksite surveys for safety and health hazards and periodically perform a comprehensive update of surveys and involve employees in this effort.
- ▶ Analyze planned and new facilities, processes, materials and equipment.
- ▶ Perform routine job hazard analyses.
- ▶ Assess risk factors of ergonomics applications to workers' tasks.
- ▶ Conduct regular site safety and health inspections so new or previously missed hazards and failures in hazard controls are identified.
- ▶ Provide a reliable system for employees to notify management personnel about conditions that appear hazardous and to receive timely and appropriate responses and encourage employees to use the system without fear of reprisal. This system utilizes employee insight and experience in safety and health protection and allows employee concerns to be addressed.
- ▶ Investigate incidents and "near miss" incidents so their causes and means of prevention can be identified.
- ▶ Analyze injury and illness trends over time so patterns with common causes can be identified and prevented.

HAZARD PREVENTION AND CONTROL

Where feasible, work place hazards are prevented by effective design of the jobsite. Where it is not feasible to eliminate such hazards, they must be controlled to prevent unsafe and unhealthful exposure. Elimination or control must be accomplished in a timely manner once a hazard or potential hazards are recognized. Specifically, as part of the program, employers should establish procedures to correct or control present or potential hazards in a timely manner. These procedures should include measures such as the following:

- ▶ Use engineering techniques where feasible and appropriate.
- ▶ Establish, at the earliest time, safe work practices and procedures that are understood and followed by all affected parties. Understanding and compliance are a result of training, positive reinforcement, correction of unsafe performance and if necessary, enforcement through a clearly communicated disciplinary system.
- ▶ Provide personal protective equipment when engineering controls are infeasible.
- ▶ Use administrative controls, such as reducing the duration of exposure.
- ▶ Maintain the facility and equipment to prevent equipment breakdowns.
- ▶ Plan and prepare for emergencies, and conduct training and emergency drills, as needed, to ensure proper responses to emergencies will be "second nature" for all persons involved.
- ▶ Establish a medical program that includes first aid onsite as well as nearby physician and emergency medical care to reduce the risk of any injury or illness that occurs.

THEFT AND VANDALISM

Safeguard the jobsite from theft and vandalism. Kier Construction and its subcontractors, on open jobsites, are easy prey to vandals.

A plan should be implemented to protect the jobsite from:

- ▶ Theft by both employees and the public.
- ▶ Vandalism by employees, previous employees, local gangs or children.
- ▶ Fire by arson or accident.
- ▶ Attractive nuisance resulting in injury or death.

A jobsite security system should consider the implementation of at least the following:

- ▶ Careful scheduling of materials (keep excess materials off the jobsite).
- ▶ Organized receiving site that confines materials in a specific area.



- ▶ The entire area should be enclosed by a security fence (to be determined by the Project Manager and Superintendent during the pre-construction planning meeting).
- ▶ The area should be lighted at night and visible from adjacent streets where possible.
- ▶ Small high value items should be stored in locked enclosures.
- ▶ A separate parking area for employee vehicles will help control the disappearance of tools, equipment and materials.

ERGONOMICS and BACK SAFETY

Ergonomics is the scientific discipline that studies how work affects the body. It simply means fitting the workspace and the tools used to do the job to the person doing the work.

Following ergonomic principles helps reduce stress and eliminate many potential injuries and disorders associated with overuse of muscles, bad posture, forceful exertions, vibration, contact stress and repeated physical tasks.

The objective of ergonomics is to reduce worker stress and injury through design of tasks, workstations, controls, displays, safety devices, tools, lighting and equipment.

Musculoskeletal Disorders (MSDs), their signs and symptoms

A variety of disorders and illnesses related to muscles and bones are caused by ergonomic stressors. These disorders, called musculoskeletal disorders (MSDs), involve the muscles, tendons, ligaments, nerves, joints, bones or supporting body tissue. Injuries include disorders of the back, the neck, the upper or lower extremities, or the shoulders, and involve strains, sprains or tissue inflammation.

Cumulative Trauma Disorders (CTDs) are disorders of the musculoskeletal and nervous systems that may result from long-term repetitive motion, forceful exertions, and vibration contact stress or from continually working in awkward positions. Strains commonly occur in the wrists, arms, shoulders or back, affecting the body's joints and surrounding muscles, nerves, tissues and tendons.

Carpal Tunnel Syndrome: Carpal Tunnel Syndrome (CTS) is a specific CTD affecting the hands and wrists. Often an advanced stage of tenosynovitis, CTS is caused by compression of the median nerve that runs between the bones of the wrist. Repetitive motion and vibration are two causes of CTS.

The pressure of repetitive motion causes tingling, numbness or severe pain in the wrist and hand. The pressure also results in a lack of strength in the hand and an inability to make a fist, hold objects or perform other manual tasks.

Tendonitis: Tendonitis is an inflammation of the tendons that occurs when a muscle or tendon is repeatedly tensed from overuse or unaccustomed usage of the wrist and shoulder. This may result from prolonged tension while gripping a tool, vibration or repetitive and/or improper use of the same tool day after day.

Common sites of tendonitis include the rotator cuff of the shoulder, wrist, elbow (tennis elbow), knee and Achilles tendon. Tendonitis causes pain, tenderness and occasionally, restricted movement of the muscle attached to the affected tendon.

Tenosynovitis: Tenosynovitis is an inflammation of the lining of the synovial (tendon) sheath in the wrist or fingers caused by side-to-side movements of the hand. Repeated turning of knobs and screwdriver use are two of the culprits that can cause tenosynovitis.

The most common sites affected in tenosynovitis are the shoulder rotator cuff, wrist, fingers and thumb, hip, hamstrings and Achilles tendons. The involved tendons are usually painful on motion; their sheaths may accumulate fluid and be visibly swollen or may remain dry but cause friction, which is felt or heard with a



stethoscope when the tendon moves within its sheath. Along the tendon, localized tenderness of variable severity is present; it may be severe and associated with disabling pain on movement. Calcium deposition in the tendon and its sheath may be seen on x-ray.

Trigger Finger: Trigger Finger is a type of tendinitis which develops in the tendons that bend the fingers. It is a common problem because of the way the hand is made, which may be a little different than you would suspect. There are no muscles in the fingers themselves. We actually move our fingers by remote control. Muscles in the forearm are connected to the finger bones by smooth, flexible strings called tendons. The muscles pull on the tendons, which then bend the finger joints. The flexor tendons are smooth, flexible, thick strings - they look a bit like clothesline rope. They work like a bicycle brake cable to bend your fingers, sliding in and out of the finger as it straightens and bends.

Tendon swelling interferes with the normal movement of the tendons and can cause the finger to click, catch ("triggering") or lock in position. When the tendons that bend the fingers (the flexor tendons) become irritated, they may result in tenderness and swelling in the palm, and stiffness, pain and clicking in the finger joints.

Raynaud's Syndrome: When blood vessels in the hand constrict because of vibration, cold temperature or motion, it can cause the hands to become cold, pale and ashen, and numb with a pins-and-needles feeling. This condition is also called "white finger." This illness is associated with workers who use vibrating tools – such as pneumatic hammers and electric chain saws – over time.

Pain is uncommon, and spasms of the fingers may last from minutes to hours but is rarely severe enough to cause gross tissue loss.

Rewarming the hands restores normal color and sensation.

Tension Neck Syndrome: The tension neck syndrome is characterized as follows: A feeling of fatigue, tenderness, weakness or stiffness in the neck, shoulders, trapezius muscle, neck pain or headache radiating from the neck. Signs consist of at least two tender spots or palpable hardenings. Tension neck syndrome is usually a result of static or awkward postures or exertion of force while working in a non-optimal or immobile posture.

Low Back Pain: Pain in the low lumbar, lumbosacral, or sacroiliac region, possibly accompanied by pain radiating down one or both buttocks or legs in the distribution of the sciatic nerve (sciatica). Low back pain may be related to acute sprains or muscular strains or problems.

Low back pain usually occurs in persons without a history of chronic discomfort and is typically related to poor posture, poor physical condition, repetitive trauma, overexertion, strains, sprains, trauma and stress. Limited back motion caused by pain, tightness and tenderness of the muscles or restriction of other vertebrae-related structures is common in lumbar conditions.

Sciatica is pain that radiates along the course of the sciatic nerve, most often down the buttocks and the posterior aspect of the leg to below the knee. It may occur with or without low back pain.

MSDs associated risk factors

Repetition. Doing the same motions over and over again places stress on the muscles and tendons. The severity of risk depends on how often the action is repeated, the speed of the movement, the number of muscles involved and the required force.

Forceful Exertions. Force is the amount of physical effort required to perform a task (such as heavy lifting) or to maintain control of equipment or tools. The amount of force depends on the type of grip, the weight of an object, body posture, the type of activity and the duration of the task.



Awkward Postures. Posture is the position your body is in and affects muscle groups involved in physical activity. Awkward postures include repeated or prolonged reaching, twisting, bending, kneeling, squatting, working overhead with your hands or arms, or holding fixed positions.

Static Postures. Physical exertion to hold a posture throughout the task. Examples include gripping tools, holding arms out or up, and prolonged standing.

Contact Stress. Pressing the body against a hard or sharp edge can result in placing too much pressure on nerves, tendons and blood vessels. For example, using the palm of your hand as a hammer can increase your risk of suffering an MSD.

Vibration. Operating vibrating tools such as jack hammers, sanders, grinders, chippers, routers, drills and other saws can lead to nerve damage.

Reporting MSDs

Repetitive motion injuries are a growing concern and left untreated or diagnosed, can lead to permanent damage. Employees are encourage to report MSD symptoms early. Change in work stations and equipment can often alleviate these problems before they become chronic.

MSD symptoms are to be reported to the Safety Director. Once reported, the Safety Director will conduct the following evaluations to determine whether MSD or its signs or symptoms is an MSD incident.

Action Trigger. The employee’s job or tasks will be reviewed, using the “Basic Screening Tool,” to determine whether it routinely involves exposure to one or more of the fire ergonomic risk factors.

Job Hazard Analysis. The employee will be observed performing job/tasks using job hazard analysis tools, such as a VDT Workstation Checklist, to determine if an MSD exists.

If the Safety Director determines that an MSD exists, steps will be taken to control the hazards, reduce them in accordance with or to acceptable levels, or reduce the hazards to the extent feasible.

- ▶ For each job/task, feasible engineering, work practice or administrative controls, or any combination of them, will be used to reduce MSD hazards.
- ▶ Personal protective equipment (PPE) may be used to supplement engineering, work practice or administrative controls. PPE may be used alone only where other controls are not feasible.

Lifting and Carrying - Back Safety

The back is more prone to injuries than any other part of the body because it holds up the entire body, supports most of the body’s weight, and plays a leading role in almost every move we make. Your back helps you: stand up, bend over, lift loads, push or pull, sit down, reach and turn to one side.

You can prevent back injuries by improving your back’s fitness, and learning ways to move with your back, not against it.

Generally, back injuries come from a combination of lifestyle problems including:

- ▶ Tension and stress.
- ▶ Improper lifting and carrying.
- ▶ Poor sitting and standing posture.
- ▶ Poor flexibility.
- ▶ Lack of back and abdominal strength.



- ▶ Excess weight (especially “botbellies”).
- ▶ Poor overall physical fitness.

It’s important to build a strong, flexible and healthy back. Good back care is mostly a matter of common sense, knowing when to get help and when to use mechanical aids, and healthy lifestyle habits.

The Proper Lift - Using good body mechanics

- ▶ Wear supportive shoes with traction.
- ▶ Bend and gently stretch to get ready.
- ▶ Test the load to see if you can handle it safely – if not, get help from a co-worker or use mechanical aids.
- ▶ Keep a wide stance and solid footing.
- ▶ To improve balance, keep your heels down and turn feet slightly out.
- ▶ Tighten your stomach muscles.
- ▶ Do not hold your breath – exhale with the greatest exertion.
- ▶ Get a good grasp on the load.
- ▶ Keep the load close to your body to reduce strain.
- ▶ Keep your head up and trunk tall to maintain your natural curves.
- ▶ Lift steadily with your legs, not your back.
- ▶ Point feet in the direction of the move, don’t twist.
- ▶ Set the load down by squatting down and keeping the spine aligned.

Lifting from below the waist

- ▶ Be sure you can handle the load safely.
- ▶ Stand close to the object and keep a shoulder width stance – keep solid footing.
- ▶ Tighten stomach muscles.
- ▶ Bend at the hips and knees to a squatting position.
- ▶ Hug the load close to your body and grasp it firmly.
- ▶ Lift with your legs and whenever possible, shift the load to waist level.
- ▶ Move your feet to turn – don’t’ twist.

Lifting from above the shoulders

- ▶ Decide if you can handle the load safely.
- ▶ Designate a place to set the load down.
- ▶ Use a step stool or platform to reach areas above the shoulders.
- ▶ Slide the load close to your body, keep solid footing, and a firm grasp.
- ▶ Let your arms and legs do all the work.

Lifting and turning

- ▶ Hug the load.
- ▶ Move your body as a single unit.
- ▶ Take several steps to turn your body in the direction you want to move.
- ▶ Bend your knees to set the load down.

Pushing loads (try never to pull)

- ▶ Tighten stomach muscles (but don’t hold your breath).
- ▶ Keep elbows and the load or mechanical equipment close to your body.
- ▶ Put one foot forward to balance yourself.
- ▶ Bend your knees and elbows.
- ▶ Push off with your back leg, taking steady, short steps. Always push the load using your body weight – not your feet. If you must pull a jammed object or cart, follow the same steps, only push off backward with your forward leg. Get help if you can’t free the object.



Oversized or heavy loads

If a load is too heavy or bulky to lift alone, get help. Either use mechanical aids (e.g. handtruck or dolly), get assistance from a co-worker, or make multiple trips if the load can be split into smaller ones. Don't jeopardize your back for the sake of saving a little time.

The two person lift

- ▶ Designate one person to direct the lift.
- ▶ Try to lift with someone close to your own height.
- ▶ Lift (with your legs) and raise the load at the same time.
- ▶ Keep the load at the same level while carrying it.
- ▶ Move smoothly together.
- ▶ Put the load down together.

Guidelines for using mechanical aids

- ▶ Never pull – always push the load with the strength of your legs and upper body, never your feet.
- ▶ Let leverage do the work – leverage can increase your strength, without putting strain on your back.
- ▶ Have your legs and body weight do the work.
- ▶ Always maintain your back's natural curves and keep your knees bent.
- ▶ Clear your path of obstructions and debris before you begin.
- ▶ Keep a firm grip on the load or equipment.
- ▶ Stay close to the load.
- ▶ Use caution and plan ahead when moving loads up or down inclines.

COMPANY RULES

EMPLOYEES

The failure of any employee to abide by the following company rules will be cause for disciplinary action, which may include termination.

Minor Offenses

- ▶ Anyone committing or participating in any threat of violence, intimidation, coercing or interfering with fellow employees or passersby, at any time.
- ▶ Bringing unauthorized firearms or explosives on company property or jobsites without permission of the Superintendent.
- ▶ Excessive non-excused absenteeism, tardiness or no-shows. (Excessive is more than 15 days in a one year period.)
- ▶ Failure to call the Superintendent or Project Manager by 9:00 a.m. on the day of absence.
- ▶ Leaving work before authorized quitting time, lunch break or the end of the day without permission of the Superintendent.
- ▶ Engaging in horseplay, scuffling or throwing of objects.
- ▶ Failure to perform work as directed.
- ▶ Failure to follow Kier Construction's safety or company rules.
- ▶ Immoral conduct or indecency on company premises.
- ▶ Failure to bring the minimum number of required tools on the job each day.
- ▶ Playing of audio equipment is prohibited without the Superintendent's approval.
- ▶ Falsifying or an illegitimate reason for absence from work.
- ▶ Misrepresentation on job application.
- ▶ Unauthorized operation of cranes or other equipment by non-qualified operators.
- ▶ No personal vehicles will be allowed on jobsites other than in designated parking areas.
- ▶ Not wearing minimum required construction clothing:
 - Appropriate sturdy work boots (safety toed boots with nonslip soles are strongly recommended).



- Full length trousers.
- Shirts with a minimum of tee-shirt sleeves and length.
- Gloves are recommended.

(NOTE: Tank tops, shirts cut off at the midriff, moon boots, sandals, sneakers, jogging shoes, etc., are prohibited. Subcontractors and visitors are required to follow the same dress code.)

Major Offenses

- ▶ Anyone committing or participating in any act of violence on the project.
- ▶ Absent more than two days without calling the Superintendent.
- ▶ Contributing to unsanitary conditions or failing to use the toilet facilities provided.

Intolerable Offenses

- ▶ Deliberate destruction or abuse resulting in damage to company property, tools, equipment or property of other employees or the owner.
- ▶ Theft of company, employee or owner property.
- ▶ Use of firearms or unauthorized explosives on company projects or property.
- ▶ Being under the influence of intoxicants or drugs on the job or on company premises at any time.
- ▶ No minor under the age of 18 shall be employed on a jobsite by Kier Construction

ENFORCEMENT / DISCIPLINE

Minor Offenses

- ▶ First offense: Documented verbal warning
- ▶ Second offense: Documented written warning
- ▶ Third offense: Documented written warning and three-day suspension without pay
- ▶ Fourth offense: Termination of employment

Major Offenses

- ▶ First offense: Documented written warning and three-day suspension without pay
- ▶ Second offense: Termination of employment

Intolerable Offenses

- ▶ First offense: Termination of employment

An employee’s record will be cleared after six months, with no repeated violations.

Kier Construction reserves the right to report the illegal removal of company or employee property, possession or use of firearms and explosives, and/or use or trafficking of illegal drugs to law enforcement officials and to turn over to the custody of law enforcement officials any such stolen property, firearms, explosives, illegal drugs and/or person(s) involved with said property.

SUBCONTRACTORS

All subcontractors, their superintendents and employees are required to comply with Kier Construction’s safety and substance abuse policies, and all the Occupational Safety and Health Construction Standards along with other federal, state and local safety requirements while working on Kier Construction projects.

Kier Construction’s superintendents are responsible to ensure subcontractors comply with Kier’s and OSHA’s rules and regulations and are authorized to issue a Subcontractor Jobsite Non-Compliance Citation to subcontractors violating these safety standards.



- ▶ First Offense: Subcontractor (superintendent and owner) will receive a verbal notice.
- ▶ Second Offense: Subcontractor will receive a written notice with possible fine levied.
- ▶ Third Offense: Subcontractor will receive a written notice and a fine. A letter with a copy of the notice will be sent to the subcontractor's insurance carrier.

If a subcontractor repeatedly violates safety standards or his response for compliance is not accomplished within a reasonable period of time, a stop work action may be invoked by Kier's Superintendent until such violations are corrected. Chronic violators shall be recommended to Kier Construction management as undesirable subcontractors.

Minor Offenses

- ▶ No personal vehicles will be allowed on the jobsite other than in designated parking areas. Company vehicles must be identified with the name of the firm on at least two sides.
- ▶ Bringing unauthorized firearms or explosives on company projects or property without permission of the Superintendent.
- ▶ Immoral conduct or indecency on company projects or premises.
- ▶ Engaging in horseplay, scuffling or throwing of objects.
- ▶ Playing of audio equipment is prohibited without the Superintendent's approval.
- ▶ Not wearing minimum construction clothing:
 - Appropriate sturdy work boots (safety toed boots with nonslip soles are strongly recommended).
 - Full length trousers.
 - Shirts with a minimum of tee-shirt sleeves and length.
 - Gloves are recommended.

(NOTE: Tank tops, shirts cut off at the midriff, moon boots, sandals, sneakers, jogging shoes, etc., are prohibited. Subcontractors and visitors are required to follow the same dress code.)

Major Offenses

- ▶ Non-compliance with Kier and OSHA safety standards.
- ▶ Subcontractor's employees reasonably believed to be under the influence of alcohol or drugs, or having drugs on the work site, will be prevented from engaging in further work and will not be permitted to leave the work site, but will be escorted to their supervisor.
- ▶ Anyone committing or participating in any violence, threat of violence, intimidation, coercing or interfering with fellow employees at any time.
- ▶ Contributing to unsanitary conditions or failing to use the toilet facilities provided.

ALCOHOL AND DRUG POLICY

It is the policy of Kier Construction that alcohol and drug abuse will absolutely not be tolerated and will subject all employees to immediate termination.

Alcohol and drug abuse by employees has an adverse effect on job performance, creates hazards to safety, and serves to undermine our customers' and the community's confidence in Kier Construction. We are concerned with the well-being of our employees, our most valuable asset. We are equally concerned that Kier Construction's hard-earned, positive reputation and image in the community not be compromised. Accordingly, Kier Construction will not condone alcohol or drug abuse by our employees on or off the job, nor any behavior that may damage the company's reputation. Further, as a federal contract company, Kier Construction is committed to establishing a work place free of substance abuse and zero tolerance as required by federal laws.

DEFINITIONS: As used in this policy, the following definitions will apply:

- ▶ **Substance** - means alcohol or drugs.



- ▶ **Alcohol** - means ethyl alcohol or ethanol.
- ▶ **Drugs** - means any foreign substance taken into the body, other than alcohol, which may impair one's mental faculties and/or physical performance.
- ▶ **Employee** - means all persons who work full time, part time, or under contract to Kier Construction, including supervisory and management staff.
- ▶ **Under the influence** - means that the employee is affected in any detectable manner in his or her ability to perform assigned duties.
- ▶ **Disciplinary action** - means disciplinary action determined appropriate under Kier Construction's Policy on Discipline, including reprimand, suspension without pay, demotion, or immediate termination of employment, even for a first offense.
- ▶ **Adulterated sample** - a specimen sample that has had other ingredients added to it in an effort to disguise illicit or illegal substances.
- ▶ **Diluted sample** - is when a specimen sample's strength has been compromised by excessive amounts of fluid.

POLICY:

- ▶ Adherence to the Kier Construction substance use policy is a condition of employment.
- ▶ Kier Construction will not hire anyone who is known to currently abuse substances. Any pre-placement applicants determined by screening measures to be involved in substance abuse will not be hired. An adulterated finding will be considered the same as a positive finding.
- ▶ Employees must report to work in a condition fit to perform their assigned duties. Fit for duty is being able to perform assigned duties without the presence of foreign substances which may impair performance. Being in a condition unfit for work due to the effects, symptoms or side effects of alcohol or drugs is unacceptable and will be cause for disciplinary action.
- ▶ Any employee on company business, whether on or off Kier Companies' premises, or while traveling in Company provided or subcontracted transportation, who purchases, transfers, distributes, uses or possesses illicit or illegal drugs, or who uses prescription drugs in any way that is illegal, will be subject to disciplinary action.
- ▶ Any employee being under the influence of alcohol as determined by state and local law while performing company business, at social functions or business related entertainment, or while driving a Kier Construction motor vehicle will subject that employee to inspection and disciplinary action, which may include confiscation of the controlled substance, and termination.
- ▶ Any employee on physician prescribed medication must notify his or her supervisor immediately if there is a likelihood that such medication could affect job performance and/or safety. Failure to provide such timely notification may result in disciplinary action, which may include termination.
- ▶ Kier Construction has adopted a medically supervised chemical substance abuse screening program applicable to all its employees and to all pre-placement applicants for employment. A confirmed "positive" finding, or adulterated finding, or any willful failure to submit to substance abuse screening as required under this program will result in disciplinary action, which may include termination.
- ▶ An employee will not be disciplined for voluntarily seeking assistance (through the Amnesty Program) for a substance abuse problem; however, ongoing performance, attendance, or behavioral problems may result in disciplinary action, which may include termination.
- ▶ Where available evidence warrants, Kier Construction will employ every legal means available to remedy a situation and operate its business free from alcohol and drugs.
- ▶ Kier Construction reserves the right to search, without employee consent, all areas and property, including but not limited to employee lockers, desks, work stations, company vehicles, tool boxes and other locations where illegal drugs could be secreted, of which Kier Construction maintains either complete control or joint control with the employee. Kier Construction reserves the right to search personal property belonging to its employees, such as but not limited to, pockets, purses/wallets, briefcases, vehicles, lunch and shopping bags/boxes and removable clothing if such property is brought onto company premises or into Company vehicles.
- ▶ Any employee reasonably (as defined in the Employee Handbook) believed to be under the influence of



alcohol (.04 blood alcohol level per DOT guidelines) or drugs will be prevented from engaging in further work and will not be permitted to leave the work site in his/her vehicle, but will be escorted by a company representative, taxicab, law enforcement personnel or other appropriate means to the nearest Work Med facility for drug screening prior to being transported home.

- ▶ Any employee with a substance abuse problem may avoid disciplinary action by voluntarily coming forward in compliance with the established Amnesty Program.
- ▶ Any employee charged, released and awaiting trial on a substance related offense under any criminal code or law may be suspended without pay pending disposition of charges.
- ▶ Conviction of an employee, under any criminal code or law, or a drug related offense, or a charge of driving while under the influence of alcohol, may result in disciplinary action including termination.
- ▶ All violations of Kier Construction's substance use policy will be aggressively investigated. Appropriate disciplinary actions will be administered promptly, fairly and consistently.

AMNESTY PROGRAM:

- ▶ Any employee who has a substance abuse problem may request amnesty from the disciplinary provisions of this policy by voluntarily informing appropriate supervisory personnel that he or she has a substance abuse problem and needs assistance.
- ▶ Amnesty may be granted at the sole discretion of Kier Construction and, if granted, then to each employee only once.
- ▶ Amnesty may not be granted if an employee volunteers for assistance after any incident or circumstance that would precipitate disciplinary action or the requirement for testing.
- ▶ Employees granted amnesty from discipline must complete a company approved drug rehabilitation program, including all follow-up activities.
- ▶ An employee will be suspended from active work status until he or she is returned to work from the rehabilitation program.
- ▶ Amnesty is available only for a substance abuse problem. Amnesty will not be granted for attendance, misconduct, or substandard performance, whether or not related to substance abuse.
- ▶ Upon return to work under the amnesty program, an employee will be required to submit to periodic substance screening for a period of two years.

DRUG TESTING:

- ▶ Kier Construction requires medically supervised Work Med chemical screening tests of all employees and all pre-placement applicants for employment to detect drug abuse. These tests will be required under the following conditions:

I. Pre-placement Applicant Screening:

- A. All pre-placement applicants for employment, re-employment or transfer will be tested for evidence of substance abuse prior to being hired. A confirmed "positive" finding, adulterated finding of substance abuse, or refusal to submit to drug screening will result in mandatory rejection for employment, re-employment, or transfer.
- B. Employees eligible for re-reinstatement to full-time employment from lay-off or leave of absence will be tested for evidence of substance abuse. A confirmed "positive" finding, adulterated finding of substance abuse, or refusal to submit to drug screening will result in mandatory rejection of re-reinstatement.

II. Work-related Accidents/Incidents:

- A. Any employee involved in a work-related accident/incident (including accidents while driving company vehicles) will be escorted to a Work Med facility, or directed by his or her supervisor to submit to a chemical screening within two (2) hours of the accident/incident. A confirmed "positive" finding, adulterated finding of substance abuse, or refusal to submit to or failure to report for the substance screening when requested, will result in disciplinary action.

III. Random Screening:



- A. Twenty-five (25) percent of the Kier Construction employees will be tested annually. Employees will be notified by their supervisor the day they are to be tested and will be given an hour and a half to get to the nearest testing center. The employee will sign, date and record the current time on a form along with their supervisor. This is mandatory.
- B. When an employee returns to work following successful completion of a substance rehabilitation program, that employee, for a period of two years following reinstatement to full-time employment, will be required, at the discretion of his or her supervisor, to submit, without prior notice, to periodic chemical screening tests. A confirmed “positive” finding, adulterated finding of substance abuse, or refusal to submit to or failure to report for the substance screening when requested, will result in disciplinary action.
 1. Any employee with a confirmed “positive” finding, or adulterated finding, on a prior chemical screening test may be required, at the discretion of his or her supervisor, to submit, without prior notice, to additional periodic chemical screening tests. A second “positive” finding, or adulterated finding, will result in disciplinary action, which may include termination.

IV. For Cause or Reasonable Suspicion:

- A. A supervisor may, for cause or upon reasonable suspicion that an employee is involved in substance abuse, require an employee to submit to an immediate chemical screening test. The employee will be escorted by a company representative to the nearest Work Med facility. A confirmed “positive” finding, adulterated finding of substance abuse, or refusal to submit to or failure to report for the substance screening when requested, will result in disciplinary action.
- B. Circumstances which would constitute a basis of “for cause” may include, but are not limited to, the following:
 1. A near miss incident.
 2. An incident which causes more than \$250 damage to Kier Construction’s property and/or equipment, including company vehicles.
- C. Circumstances which would constitute a basis of reasonable suspicion may include, but are not limited to, the following:
 1. Information provided by a reliable and credible source.
 2. Observation of apparent alcohol or drug use.
 3. Presence of physical symptoms of substance abuse.
 4. A pattern of abnormal or erratic behavior, which may include:
 - a. Absenteeism.
 - b. Difficulty concentrating.
 - c. Confusion.
 - d. Spasmodic work performance.
 - e. Tardiness or leaving work early.
 - f. Lowered work efficiency and production.
 - g. Poor relationships with fellow employees.

PROCEDURE:

Drug testing will be done through Work Med locations in Ogden, Layton and Salt Lake City. Kier Construction employees in other states will be informed as to where to go for testing and the sample will be sent to a lab in Salt Lake City which is associated with Work Med. The test results will be relayed to Kier Construction’s Human Resource Manager who will be held responsible for maintaining the test results and any further action if necessary. All test results will be totally confidential except for the employee and the Human Resource Manager. The drug test consists of a urine sample that will be tested to detect the following and their metabolites:

- ▶ **Narcotics:** Opium (opium); Morphine (M, morpho, morph, tab, white, stuff, miss, Emma, monkey); Codeine (school boy); Heroin (horse, smack, H, stuff, junk); Hydromorphone (little D Lords); Methadone (dollies, dolls, amidone); other narcotics (designer drugs).
- ▶ **Depressants:** Barbiturates (yellows, yellow jackets, barbs, reds, redbirds, tooies, phennies); Methaqualone (lude, quay, quad, mandrex); Benzodiazepines (downers, goof balls, candy, sleeping pills); other depressants



(tranquilizers, muscle relaxants, sleeping pills).

- ▶ **Stimulants:** Cocaine (bump, toot, C, coke, flake, snow, candy); Amphetamines (pep pills, bennies, uppers, truck drivers, dexies, black beauties, speed); Phenmetrazine (uppers, peaches, hearts); Methamphetamine (speed, meth, crystal, crank, go fast).
- ▶ **Hallucinogens:** LSD (acid, microdot, cubes); Mescaline and Peyote (mesc buttons, cactus); Amphetamine variants (Ecstasy, designer drugs); Phencyclidine (PCP, angel dust, hog, peace pill); other hallucinogens (sacred mushrooms, magic mushrooms, mushrooms).
- ▶ **Cannabinoids:** Marijuana (pot, grass, reefer, roach, Maui Wowie, joint, weed, loco weed, Mary Jane); Tetrahydrocannabinol (THC); Hashish (hash); Hashish Oil (hash oil).
- ▶ **Solvents:** Inhalants (sniffing, glue sniffing and huffing)



EMERGENCY RESPONSE ACTION PLAN

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INTRODUCTION

This emergency response action plan is designed to protect employees during emergency situations, including fires, natural disasters, chemical spills and bomb threats.

Kier's Human Resource Director/Safety Director will serve as the facility's emergency response coordinator and has the primary responsibility for responding to and coordinating emergency situations. The emergency response team will consist of volunteer employees. (See "Emergency Response Team Responsibilities", Exhibit A)

All employees should review and follow these procedures. Supervisors must ensure their employees are familiar with these procedures.

REPORTING EMERGENCIES

When there is a fire or other emergency that poses immediate danger to people or property, call **9-1-1**. Follow emergency evacuation procedures. Remain calm, notify the emergency response coordinator and respond to the emergency as appropriate. Procedures for responding to specific types of emergencies are described herein. Do not attempt to handle emergency duties (e.g., fire fighting) for which you do not have training.

When you call **9-1-1** to report an emergency, provide the emergency dispatcher with the following information:

- ▶ Your name.
- ▶ Street address for your location.
- ▶ Building or area name where the emergency response is required.
- ▶ Location within the building or area.
- ▶ Brief description of the type of emergency.

Unless there is a risk to your safety, remain on the line until told by the emergency dispatcher to hang up.

The following numbers should be posted near telephones and in other conspicuous locations (see Exhibit B):

- ▶ Outside emergency services (police, FBI, fire department, ambulance service)
- ▶ Hospitals
- ▶ Emergency Response Coordinator and team members
- ▶ Poison and Disease Control Centers
- ▶ Security companies
- ▶ Utility providers
- ▶ National Response Center (1-800-424-8802)
- ▶ Regional Environmental Protection Agency (EPA) office (HAZMAT)
Lincoln Environmental Services 801-627-6275 or Wasatch Environmental 801-972-8400.
- ▶ Occupational Safety and Health Administration (OSHA) area office
- ▶ Kier Safety Department / Safety Director

EVACUATION PROCEDURES

Each building, property and jobsite of the Kier Companies shall have a written emergency evacuation procedure. Floor plans indicating exits and fire extinguishers shall accompany these procedures. The floor plans are kept on file in the Safety Department and posted in/on each building, property and jobsite.

Supervisors are responsible for ensuring employees know the location of fire extinguishers, fire exits and alarm systems in the areas in which they work. Kier's corporate office building is equipped with an automatic alarm system. Training and information is available from the Safety Department.



If a fire emergency exists, employees should evacuate all rooms, closing all doors to confine and reduce the fire and to reduce oxygen. **DO NOT LOCK ANY DOORS.**

When the building alarm sounds, or an announcement is made that an emergency exists, walk quickly to the nearest marked exit and alert others to do the same. Smoke is the greatest danger in a fire. If you must pass through a smoke-filled room, stay near the floor where the air may be less toxic.

Leave the building using the evacuation routes and nearest exit. Once you are outside the building, move to the assembly area across the street in the parking lot to the west of the building. Report to an emergency response team member or your supervisor.

Keep streets, fire lanes, hydrants and walkways clear for emergency vehicles and crews.

DO NOT RETURN TO AN EVACUATED BUILDING UNLESS TOLD TO DO SO.

NOTE: If you become trapped in a building during a fire and a window is available, place an article of clothing (shirt, coat, etc.) outside the window as a marker for rescue crews.

EVACUATION PROCEDURES FOR HANDICAPPED EMPLOYEES

Employees should tell their supervisor about disabilities that may require special accommodations when carrying out emergency evacuation plans. The supervisor is responsible for working with the employee and the Safety Director to develop accommodations that will allow the employee to evacuate safely. For instance, co-workers may be assigned to assist employees in wheelchairs.

ACCOUNTING FOR EMPLOYEES

After evacuation, report immediately to the designated assembly area in the parking lot across the street to the west. Emergency response team members and supervisors should determine if anyone is missing and report to the emergency response coordinator.

Once it is determined the building is safe to occupy, as ascertained by the appropriate authorities or the emergency response coordinator/team, employees may return to the building. If the building cannot be safely occupied, alternate locations will be specified by the emergency response coordinator/team.

Casualties

Emergency response team members and supervisors will need to provide for the treatment of casualties. Serious cases may have to be transported to a hospital. The following is a list of emergency medical facilities.

- IHC McKay Dee Hospital
4401 Harrison Blvd.
Ogden, Utah
- Davis Hospital & Medical Center
1600 West Antelope Drive
Layton, Utah
- Ogden Columbia Regional Medical Center
5475 South 500 East
Ogden, Utah

In the event of deceased employees, a designated nonessential area will be utilized as a temporary morgue. Identification of those employees and notification of their families should be made as soon as possible by the emergency response coordinator/team or company spokesperson. If necessary, a corpse may be removed to one of the mortuaries listed below (or a mortuary closest to your location).



- Lindquist & Sons Mortuary
3300 Washington Blvd.
Ogden, Utah
- Larkin & Sons Mortuary
496 24th Street
Ogden, Utah
- Leavitt's Chapel of Flowers
836 36th Street
Ogden, Utah

EMERGENCY MEDICAL TREATMENT

Emergency medical treatment or first aid may be required during or after an emergency. Employees trained to provide first aid must remember the following:

- ▶ Avoid panic,
- ▶ Inspire confidence, and
- ▶ Do only what is necessary to stabilize an injured employee's medical condition until professional help arrives.

First Aid Kits

A basic first aid kit should be available in each Kier building, department, jobsite, property and vehicle. All employees should be aware of the locations of first aid kits.

Initial First Aid

Employees who are first to arrive on the scene of a medical emergency should follow these guidelines. If an employee does not feel they are able to perform these functions, an emergency response team member should be located immediately.

- ▶ **Assess the situation.** Can you safely approach the victim? If not, what can you do to help without threatening your own safety? Determine what is wrong with the victim.
- ▶ **Set priorities and call for emergency.** Is the victim conscious? How serious is the victim's condition? Should you call for help immediately or do you need to attend to the victim? Can someone else call emergency medical services (EMS) so the victim is not left alone? If no one else is available, decide if it is more important to administer first aid immediately or to call emergency medical services and leave the victim unattended. Never leave a victim in a life-threatening situation without trying to first stabilize the victim's condition.
- ▶ **Check the "ABCs" (unconscious victims only).**
 - **"A" – Airway.** Make sure the victim has a clear airway. Place the victim on their back. Place one hand on the victim's forehead and one hand under the chin and tilt the head back. Open the victim's mouth and check for obstructions. If the victim is unconscious and an obstruction is visible, remove it with your fingers.
NOTE: If you suspect back or neck injury, do not move the victim or adjust the victim's neck. Simply open the victim's mouth to check for obstructions.
 - **"B" – Breathing.** Place your ear above the victim's mouth and look at the chest. Listen for breathing and look for the rise and fall of the chest. If the victim is not breathing, someone trained in mouth-to-mouth breathing should begin resuscitation.
 - **"C" – Circulation.** Using two fingers, gently feel for the carotid artery in the neck to check for a pulse.



To find the artery, place your fingers on the victim's Adam's apple and then slide them down the side of the neck until you feel the groove between the windpipe and neck muscles. If there is no pulse, someone trained in CPR should begin cardiopulmonary resuscitation.

- ▶ **Stay with the victim until emergency medical personnel arrive.**

SECURITY

The emergency response coordinator/team are responsible for security arrangements to prevent workers or members of the public from entering areas where emergency conditions exist. Only authorized rescue and emergency response personnel will be allowed into the area. The emergency response coordinator/team may decide to cordon off the area with ropes and signs. If necessary, the emergency response coordinator/team will notify the police or hire private security personnel to secure the area after the emergency.

SPECIFIC EMERGENCIES

The following sections describe the procedures employees should follow during specific emergencies that may arise at their facilities.

Fires / Explosions

During and immediately after a disaster, the first priorities of professional fire services are life safety and extinguishing major fires. They may be hampered by impassable roads, inadequate water supply, weather conditions, burning material and inadequate resources to deal with the number of existing major fires. At this time, individual company emergency response teams can play a very important role in firefighting and fire prevention by doing the following (however, only if they are trained in these specific functions).

- Putting out small fires before they become major fires.
- Preventing additional fires by removing fuel sources.
- Assisting with evacuations where necessary.

Portable fire extinguishers are an invaluable firefighting tool. They can be used to eliminate small fires that might otherwise grow into larger, more destructive fires and to prevent the loss of life and property. Potential fuel sources include natural gas and electrical utilities as well as hazardous materials.

Fires require three elements to exist:

- **Heat.** The temperature at which a material produces a vapor, and the temperature at which vapors will burn. (Vapors will self-ignite if the temperature is hot enough.)
- **Fuel.** The fuel for a fire may be a solid, liquid or gas. The type and quantity of the fuel will determine which method should be used to extinguish the fire.
- **Oxygen.** Fires will burn vigorously in any atmosphere of at least 20 percent oxygen. Without oxygen, fuel could be heated until entirely vaporized, and it would not burn.

Together, these three elements are called the fire triangle. The three elements in the proper proportions will produce fire. Extinguishment is possible when one of the three elements is missing.

Classes of fire are based on the type of fuel burning. There are four major classes of fire:

- ▶ **Class A.** Ordinary combustibles such as paper, cloth, wood, rubber and many plastics. (Think **ASHES** to remember.)
- ▶ **Class B.** Flammable liquids (e.g., oils, gasoline, kitchen grease, paints and solvents) and combustible liquids (e.g., charcoal lighter, kerosene and diesel fuel). These fuels burn only at the surface because oxygen cannot



- penetrate the depth of the fluid. If ignited, it is the vapor that burns. (Think BARREL to remember.)
- ▶ **Class C.** Electrical equipment (wiring, fuse boxes, motors, power tools and appliances). (Think CIRCUIT to remember.)
 - ▶ **Class D.** Combustible metals such as aluminum, magnesium and titanium.

It is extremely important to identify the type of fuel so the correct method and agent can be used to extinguish the fire.

The three main dangers a fire poses are:

- Asphyxiation, which is the leading cause of death in a fire, by a three (3) to one (1) ratio over burns.
- Heat. A fully developed room fire has temperatures over 1,100 degrees Fahrenheit.
- Smoke. Fire generates black, impenetrable smoke that blocks the vision, stings the eyes and clogs the lungs. It may be impossible to navigate through such smoke.

Fire/Explosion Hazards

Simple fire prevention practices go far in reducing the likelihood of fires. First, locate potential sources of ignition; then eliminate the fire hazard. Fire/explosion hazards may include electrical hazards, natural gas hazards and flammable or combustible liquids.

- ▶ Electrical Hazards:
 - Avoid the “electrical octopus.” Eliminate tangles of electrical cords and don’t overload electrical outlets.
 - Don’t run electrical cords under carpets.
 - Replace broken or frayed cords immediately.
 - Properly maintain electrical appliances. Remove or replace malfunctioning appliances.
 - Natural gas presents two kinds of hazards. It is an asphyxiant, meaning it robs the body of oxygen, and it is explosive, meaning leaking gas can easily be ignited, causing an explosion and subsequent fires. The natural gas shutoff valve is located in the boiler room at the south east corner of the building. It is to be shut off by emergency response personnel only, and will be turned back on by a trained utility technician.
 - To minimize hazards associated with flammable liquids: read the labels to identify flammable products and store them properly. Flammable liquids will be discussed further under chemical spills.
- ▶ What To Do During a Fire/Explosion
 - If you see a fire or smoke, or hear the alarm, and are not in immediate danger, call **9-1-1** to report the fire. Provide the operator with the building or area name, the approximate location of the fire, the size and type of fire, and your name.
 - If the fire alarm has not sounded, make an announcement that there is a fire and everyone needs to evacuate the building.
 - Exit the building by following posted evacuation routes. Proceed to the assembly area in the parking lot across the street to the west of the building.
 - If you are formally trained in fire fighting techniques and are not in imminent danger, you may attempt to fight a fire that is small and controllable. Do not place yourself or others in unnecessary danger.

Following is a decision making guide for using a portable fire extinguisher during a fire. Ask yourself each of the questions before attempting to extinguish a fire.

If you answer “**NO**” to any of these question: leave the building immediately and shut all doors as you leave to slow the spread of the fire.

If you answer “**YES**” to all of the questions, you may attempt to extinguish the fire. If you feel unable to extinguish the fire, however, leave immediately.



Can I escape quickly and safely from the area if I attempt to extinguish the fire?

✘ **If no, leave immediately. If yes, ask the following question:**

Do I have the right type of extinguisher?

✘ **If no, leave immediately. If yes, ask the following question:**

Is the extinguisher large enough for the fire?

✘ **If no, leave immediately. If yes, ask the following question:**

Is the area free from other dangers such as hazardous materials and falling debris?

✘ **If no, leave immediately. If yes, extinguisher the fire!**

As in all emergency operations, safety is key when fighting fires. Emergency response teams should use the following guidelines when approaching and suppressing a fire:

- Do not attempt to suppress a fire that is clearly too large for the equipment at hand.
- Use safety equipment (helmet, goggles, dust mask, all leather gloves, heavy shoes, etc.).
- Work in a buddy system.
- Have a backup team when possible.
- Always have two ways to exit the fire area.
- Maintain a safe distance. Remember the effective extinguisher range.
- Move around the perimeter of the fire to maximize coverage of the extinguisher agent.
- Never enter smoke filled areas. Leave this to the trained fire fighters who have the appropriate equipment.
- If escaping through smoke, crawl low, under the smoke.
- If escaping through a closed door, feel the door with the back of the hand, as well as the space between the door and its frame and the doorknob before opening the door. Never open a door that feels hot.
- If smoke, heat or flames block exit routes, stay in the room with the door closed. Open the window a few inches at the top and bottom for ventilation, and hang a sheet or piece of clothing outside the window so responders can see it when they arrive. If possible, seal around doors and vents with wet towels, sheets or clothes to help keep smoke from the room.

Earthquakes

An earthquake is a shaking of the ground caused by the sudden movement of blocks of rock along a break in the earth's crust (a fault). Earthquake epicenters are usually less than 25 miles below the earth's surface and are accompanied and followed by a series of vibrations. There is no seasonal or yearly cycle of earthquake occurrence; earthquakes can happen at any time. Major earthquakes appear to occur in cycles of between 50 and 275 years. An earthquake may last for seconds or minutes, while aftershocks may occur for months after the main earthquake. Hundreds of earthquakes occur throughout Utah each year, but only about two (2) percent are felt by humans.

Since 1850, there have been at least 35 earthquakes of magnitude 5.0 or greater in and around Utah. The largest historical earthquakes, since 1850, in Utah were the 1901 earthquake near the town of Richfield with an estimated magnitude of 6.5, and the 1934 Hansel Valley earthquake (at the northern end of the great Salt Lake) with a magnitude of 6.6.

The Richter Magnitude Scale is used to measure the size of an earthquake. Each whole number increase in magnitude represents a tenfold increase in recorded ground motion. A magnitude 7.0 earthquake is ten times larger than a magnitude 6.0 event and 100 times larger than a magnitude 5.0 event.



▶ Earthquake Hazards

The risk from earthquakes to people and property at a particular location is determined by the following:

- Size or magnitude of the earthquake and the distance from the earthquake.
- Local geology - underlying rock, soil cover, ground water conditions.
- Geologic hazards produced - rock falls, landslides, avalanches liquefaction, subsidence, floods, and tsunamis.
- Location, design and construction of man made structures.

A major earthquake can occur in Utah at any time. The following could result:

▶ Geologic Hazards

- Ground shaking is the one hazard that will occur, and it will affect a widespread area.
- The fault may rupture the surface causing displacement of up to 20 feet in limited areas.
- Rock falls and landslides could be triggered by shaking.
- Liquefaction may occur when loose, wet soils react to shaking and change into a thick liquid incapable of supporting buildings - buildings may tilt.
- Flooding of low-lying areas near lakes may occur due to subsidence and tilting of the valley floor.

▶ Property Damage

- Man made structures such as buildings, highways, bridges and dams could be damaged.
- Lifelines such as gas, electric, communication, water and sewer lines could be broken, disrupting service for days and causing fire hazards.
- Falling objects could cause injuries.

▶ What To Do During an Earthquake

- Stay calm and don't panic, take a few minutes to seek emotional stability.
- ***If inside***, take cover under a desk or table when the shaking starts, pull your chair toward you for additional protection (if there is no cover available for you, seek a door frame, stairway, an inner hallway or curl up against an inner wall and protect your head, neck and back).
- Avoid windows and glass areas.
- Stay clear of file cabinets, book shelves or large objects that could fall or move.
- Watch out for falling ceiling panels, lights and debris.
- Stay put until the emergency response coordinator/team instructs you to move.
- Do not attempt to exit the building during tremors.
- When directed by the emergency response coordinator/team, evacuate the building and go to the assembly area so all personnel can be accounted for.
- Follow all instructions given by the emergency response coordinator/team.
- Never re-enter a damaged building.
- **Never use elevators during or after an earthquake.** (If you're in an elevator at the time of the earthquake and can't get out . . . stay calm? Use the emergency phone number to notify management you are confined in the elevator. Never attempt to leave the elevator until the door opens. (During fire or earthquake emergencies, elevators are first priority to rescue personnel.)
- ***If outside***, move into the open away from buildings and electric wires. Park your car away from bridges and overpasses. Stay in the car until shaking stops.
- ***In the event of a fire*** caused by an earthquake, perform the following emergency actions:
 - ◆ Confine the fire by closing all doors, if possible.
 - ◆ Upon being notified or hearing the fire alarm, immediately prepare for an evacuation.
 - ◆ If you're on the fire floor, or detect smoke or fire on your floor, evacuate immediately. (Remember, emergency response team members will assist with the evacuation and may attempt to extinguish the fire. Emergency response team members will also conduct a primary search of the floors to ensure complete evacuation prior to leaving, making sure no one is left behind. Emergency response team



members will report the evacuation status to the command center.)

- Take extreme caution when evacuating through closed doors, as the fire may be on the other side. Feel the top of the door with the back of your hand. If the door is not hot, open the door slowly. Be prepared to close it immediately if necessary. If the door is hot, don't open it. Remain calm, don't panic, help is on the way.
- Never use elevators in the event of a fire anywhere in the building

▶ Emergency Response Team Responsibilities After an Earthquake

- **Administer first aid.** During emergencies, first aid or professional assistance may be required. In the event of an injury or illness, provide first aid. If professional help is required, dial **9-1-1**. The emergency response team members who have been trained in first aid and CPR and are able will help until professional help arrives.
- **Check for utility damage.** The emergency response team will check all utilities and the facility for structural damage. They will turn off the utilities if necessary, and advise all personnel about potential hazards.
- **Use the land line telephone only for medical emergencies.** Use cellular phones for all other calls if possible.
- **Be aware that aftershocks may cause further damage.** Realize the potential for aftershocks is high, stay alert and be ready to react accordingly. Once evacuated, never re-enter the building until you have been notified it is safe by proper authorities.

Weather Emergencies

Kier's facilities are occasionally subject to high winds, thunderstorms and lightning and severe winter weather emergencies.

▶ High Winds

High winds do not occur frequently in Utah. However, when they do they can cause major damage and shut down utilities for extended periods of time. During high wind warnings, employees should move to places of maximum protection, such as the interiors of buildings and the lowest floor possible. Keep away from windows. Assist disabled workers in moving to these locations. Await specific instructions from your supervisor or the emergency response coordinator/team. When advised, evacuate and immediately go home.

▶ Thunderstorms and Lightning

What is a Thunderstorm? A thunderstorm is formed from a combination of moisture, rapidly rising warm air and a force capable of lifting air such as a warm and cold front, a sea breeze or a mountain. All thunderstorms contain lightning.

Thunderstorms may occur singly, in clusters or in lines. Thus, it is possible for several thunderstorms to affect one location in the course of a few hours. Some of the most severe weather occurs when a single thunderstorm affects one location for an extended period of time.

Thunderstorms can bring heavy rains (which can cause flash flooding), strong winds, hail, lightning and tornadoes. In a severe thunderstorm get inside a sturdy building and stay tuned to a battery-operated radio for weather information.

A *severe thunderstorm watch* is issued by the National Weather Service when the weather conditions are such that a severe thunderstorm (damaging winds 58 miles per hour or more, or hail three-fourths of an inch in diameter or greater) is likely to develop. This is the time to locate to a safe place in the building and watch the sky and listen to the radio or television for more information.



A *severe thunderstorm warning* is issued when a severe thunderstorm has been sighted or indicated by weather radar. At this point, the danger is very serious and everyone should go to a safe place, turn on a battery-operated radio or television, and wait for the "all clear" by the authorities.

Tornadoes are spawned by thunderstorms and flash flooding can occur with thunderstorms. When a "severe thunderstorm warning" is issued, review what actions to take under a "tornado warning" or a "flash flood warning."

What is Lightning? Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches a temperature approaching 50,000 degrees Fahrenheit in a split second. The rapid heating and cooling of air near the lightning causes thunder.

Lightning is a major threat during a thunderstorm. In the United States, between 75 to 100 Americans are hit and killed each year by lightning. If you are caught outdoors, avoid natural lightning rods such as tall, isolated trees in an open area or the top of a hill and metal objects such as wire fences, golf clubs and metal tools.

It is a myth that lightning never strikes twice in the same place. In fact, lightning will strike several times in the same place in the course of one discharge.

You may be instructed to shut down your computer. Stay clear of metal objects, such as pipes and electrical appliances. Do not go outside. If you find yourself caught in a storm away from a protected building, stay in a closed automobile if possible. Stay away from tree lines, flag poles, towers and metal fences. If caught in the open, stay low.

◆ What To Do During Thunderstorms and Lightning

If indoors:

- Shutter windows securely and brace outside doors.
- Listen to a battery operated radio or television for the latest storm information. (Only turn the television on to get updates - don't leave it on continuously.)
- Do not handle any electrical equipment or telephones because lightning could follow the wire. Television sets are particularly dangerous at this time.
- Avoid water faucets and sinks because metal pipes can transmit electricity.

If outdoors:

- Attempt to get into a building or car.
- If no structure is available, get to an open space and squat low to the ground as quickly as possible.
- Crouch with hands on knees as low as possible, but minimize ground contact.
- Remove all jewelry, coins and metal objects from body and clothing.
- Avoid tall structures such as towers, tall trees, fences, telephone lines or power lines.
- Stay away from natural lightning rods such as golf clubs, tractors, fishing rods, bicycles or camping equipment.
- Stay away from rivers, lakes or other bodies of water.

If in a car:

- Pull safely onto the shoulder of the road away from any trees that could fall on the vehicle.
- Stay in the car and turn on the emergency flashers until the heavy rains subside.
- Avoid flooded roadways.



After the storm:

- Check for injuries.
- Remember to help others who may require special assistance.
- Report downed utility wires.
- Drive only if necessary. Debris and washed-out roads may make driving dangerous.

▶ Severe Winter Weather

Severe winter storms bring heavy snow, ice, strong winds and freezing rain. Heavy snow and ice can also cause structural damage, power outages, a temporary shutdown of roads, immobilize regions and paralyze cities, strand commuters, close airports and disrupt emergency and medical services.

A blizzard is when a considerable amount of falling or blowing snow is accompanied by winds of 35 miles per hour or more. Blizzards are also accompanied by frigid temperatures and extremely limited visibility to less than one-quarter mile for at least three (3) hours. When blizzards occur, much of the infrastructure in the affected area may be disrupted for several days.

Blowing snow is wind driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground that is picked up by the wind. Snow squalls are brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant. Snow showers are snow falling at varying intensities for short durations with little or no accumulation.

Heavy accumulations of ice can disrupt communications and power for days while utility companies repair extensive damage. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

◆ Different kinds of ice include:

- Sleet is raindrops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. Sleet, however, can accumulate like snow and cause a hazard to motorists.
- Freezing rain falls onto surfaces with temperatures below freezing – causing it to freeze to those surfaces. Even small accumulations of ice can cause a significant hazard.
- An ice storm occurs when freezing rain falls and freezes immediately on impact. Communications and power can be disrupted for days.

Winter storms are considered deceptive killers because most deaths are indirectly related to the storm.

- Automobile or other transportation accidents are the leading cause of death during winter storms.
- Exhaustion and heart attacks caused by overexertion are the two most likely causes of winter storm related deaths.
- Hypothermia and asphyxiation. Elderly people account for the largest percentage of hypothermia victims. Many older Americans literally freeze to death in their own homes after being exposed to dangerously cold indoor temperatures, or they are asphyxiated because of improper use of fuels such as charcoal briquettes, which produce carbon monoxide.
- House fires occur more frequently in the winter because of the lack of proper safety precautions when using alternate heating sources (unattended fires, disposal of ashes too soon, improperly placed space heaters, etc.). Fire during winter storms presents a great danger because water supplies may freeze, and it may be difficult for firefighting equipment to get to the fire.

A *Winter Storm Watch* is announced when severe winter weather is possible. A *Winter Storm Warning* is announced when severe winter weather is expected. A *Blizzard Warning* is announced when severe winter weather with sustained winds of at least 35 mph is expected. A *Traveler's Advisory* is announced when severe winter conditions may make driving difficult or dangerous.



▶ What To Do During Severe Winter Weather

- Stay inside and wait for instructions from emergency response team.
- Listen to a battery operated radio or television for the latest weather information.
- Do not drive unless absolutely necessary.

Except during extremely severe weather conditions, Kier will remain open for business and employees will be expected to report for work. You will be notified by management if conditions are too hazardous to report to work. If severe weather conditions occur during working hours, management will determine when it is appropriate to send employees home and close the building.

Floods

Although Utah is considered the second driest state in the country, flooding in the state has been significant. Utah's 1.7 million inhabitants are clustered in relatively small geographic areas at the base of steep mountain ranges, with 90 percent of the population concentrated in the Wasatch Front region. Flooding along the Wasatch Front thus impacts a relatively small area, but a comparatively large population.

Major floods in Utah are almost always the result of rapidly melting snow in late spring and early summer, often intensified by accompanying rain. Widespread flooding, landslides and debris flows may impact the state's major population areas and cause damage to roads and rail routes, private homes and businesses, agricultural lands and public facilities.

Floods are the most common and widespread of all natural disasters. Most floods develop slowly over a period of days. Flash floods, however, are like walls of water that develop in a matter of minutes. Flash floods can be caused by intense storms or dam failure.

Floods are measured according to the heights the waters reach. Their magnitude is based on the chances that water flow will equal or exceed a certain level on a recurring basis.

▶ What To Do During a Flood

If indoors:

- Listen to a battery-operated radio or television to get the latest emergency information.
- When told to evacuate, do so immediately.
- If you are in a building with rising waters, move to the highest floor. Take warm clothing, a flashlight, and a portable radio.
- **If, and only if, time permits . . .** Turn off all utilities at the main power switch, and close the gas valve. Do not touch electrical equipment.

If Outdoors:

- Remember, floods are deceptive. Do not attempt to walk across stretches of flood waters more than knee deep. Moving water just 6 inches deep can sweep you off your feet. Climb to high ground and stay there.
- Exercise caution while driving in flooded areas, there are several problems that can arise on a road if you are not aware of the potential hazards of large amounts of water on your vehicle and the road.
- Cars and small trucks can stall on flooded roads easily.
- Ground water often weakens roads and can cause road failure if subjected to heavy loads.
- Be aware that roads can be washed out during a flood. Use caution, such hazards may not be visible, especially at night.
- Stay off bridges over fast moving water. As moving water can wash bridges away without warning, especially if the water contains heavy debris.
- Heed barricades. Local responders place barricades to warn of flooding ahead or to direct traffic safely out



of the area. Never drive around barricades.

- Avoid storm drains and irrigation ditches. During a flood, storm drains and irrigation ditches fill quickly with fast moving water. Walking in or near storm drains or irrigation ditches is nearly a sure way to drown.

After the Flood:

- Stay tuned to the radio or television, and do not leave or return to work until authorities indicate it is safe to do so.
- Stay out of buildings with surrounding flood waters.
- Be cautious of electrical shorts or live wires before the main power switch is turned off. **Do not** turn on lights or appliances until an electrician has checked for short circuits.
- Be aware of potential fire hazards such as broken or leaking gas lines, flooded electrical circuits, submerged furnace or appliances.
- If water lines have been damaged, boil all drinking water and eating utensils before use.

Landslides and Mudflows

A landslide is a rapid shift in land mass that is typically associated with periods of heavy rainfall or rapid snow melt. Landslides tend to worsen the effects of flooding that often accompanies them. In areas that have been burned by forest and brush fires, a lower threshold of precipitation may initiate landslides.

While some landslides move slowly and cause damage gradually, others move so rapidly they can destroy property and take lives suddenly and unexpectedly. Areas prone to landslide hazards and need to be avoided include:

- Existing old landslides.
- The bases of steep slopes.
- The bases of drainage channels.
- Developed hillsides where leach-field septic systems are used.

Debris flows – sometimes referred to as mudslides, mudflows, lahars or debris avalanches – are common types of fast moving landslides. Flows usually start on steep hillsides as shallow landslides that accelerate to speeds that are typically about 10 miles per hour, but can exceed 35 miles per hour.

The consistency of debris flows range from watery mud to thick, rocky mud that can carry away items such as boulders, trees and cars. When the flows reach flatter ground, the debris spreads over a broad area. The most destructive types of debris flows are those that accompany volcanic eruptions.

Tornados

Tornadoes are incredibly violent local storms that extend to the ground with whirling winds that can reach 300 mph. Spawned from powerful thunderstorms, tornadoes can uproot trees and buildings and turn harmless objects into deadly missiles in a matter of seconds. Damage paths can be in excess of one mile wide and 50 miles long.

Tornadoes can occur in any state but occur more frequently in the Midwest, Southeast and Southwest. They occur with little or no warning.

Tornados are classified using the Fujita Wind Damage Scale. This scale correlates damage with wind speed, as shown in the following table.

Category	Wind Speed (MPH)	Damage
F0	Up to 72 mph	Light



F1	73 to 112 mph	Moderate
F2	113 to 157 mph	Considerable
F3	158 to 206 mph	Severe
F4	207 to 260 mph	Devastating
F5	More than 260 mph	Incredible

A *Tornado Watch* is announced when the occurrence of a tornado is possible. Be ready to take shelter. Stay tuned to radio and television stations for additional information. A *Tornado Warning* is announced when a tornado has been sighted in the area or is indicated by radar. Take shelter immediately.

▶ What To Do During a Tornado

The best protection in a tornado is usually an underground shelter. If an underground shelter is not available, then get to one of the following locations:

If indoors:

- Move to small interior rooms on the lowest floor and without windows.
- Move to hallways on the lowest floor away from doors and windows.
- If possible, move to rooms constructed with reinforced concrete, brick or block with no windows and a heavy concrete floor or roof system overhead.
- Kneel down in a fetal position facing a wall and cover your head with your arms.
- Never go to an inside corner area. Flying debris collects in corners when a structure is breached.
- Stay in protected areas away from doors and windows.
- Do not leave the office building or safe area until told to do so by the emergency response coordinator/team.

If outdoors:

- Get out of automobiles and head for shelter.
- If shelter is not nearby, lie flat in a ditch or low-lying area.
- Do not try to outrun a tornado in your car; instead, leave it immediately.

After the tornado passes:

- Watch out for fallen power lines and stay out of the damaged area.
- Listen to the radio for information and instructions.
- Shut off utilities if damage necessitates.
- Use a flashlight to inspect for damage.
- Do not use candles at any time.

Note: Auditoriums, cafeterias and gymnasiums covered with a flat, wide-span roof are not considered safe.

Terrorist Attacks

Terrorists choose their targets to meet their goals; to intimidate the government or the civilian population, further their objectives, create mass casualties, cause individual and mass panic, and disrupt critical resources, vital services and the economy. Terrorism may be perpetrated by foreign or domestic individuals or groups. Terrorists select “soft” or lightly protected targets over “hard” or very secure targets. They may also be drawn to major events such as parades or athletic events. Because of this, you may see increased security measures to help deter and prevent terrorism.

Experts generally agree that there are five (5) categories of possible terrorist weapons. The acronym B-NICE will



help to remember. The weapons thought to be available to at least some terrorist groups include:

- ◆ Biological weapons.
- ◆ Nuclear weapons.
- ◆ Radiological dispersal devices.
- ◆ Incendiary devices.
- ◆ Chemical weapons.
- ◆ Explosive devices

▶ Biological weapons. Biological agents are found in nature. Some countries, however, have devised ways to weaponize biological agents so they can be disseminated to affect broad segments of the population, animal populations or crops. Some biological agents are contagious, but many are not. Routes of exposure for biological weapons are:

- Inhalation.
- Ingestion.
- Absorption.

Many, but not all, biological agents take days or even weeks for their symptoms to appear. It is possible for a biological attack to occur and remain unnoticed for some time. It is also possible for some biological agents to spread far beyond their initial point of contamination as the daily routines of affected individuals broaden the reach of the agent.

Fortunately, most biological agents are very delicate and are easily destroyed by heat, light and other environmental factors. Additionally, the technical complexities of milling agents small enough for them to remain suspended in the air is beyond the capability of most terrorist groups.

▶ Nuclear Weapons. A terrorist attack with a nuclear weapon would be much different from an attack with a conventional explosive device. There would be potential for physical injury and death to persons who were not injured in the initial attack. The affected area would be much larger than in a conventional attack, and debris and other usually harmless items would be contaminated.

The long-term health effects would be more difficult to ascertain and manage. Fortunately, experts believe that the complexities of a terrorist group obtaining a nuclear weapon and maintaining the tolerances that are required for the weapon to function make the use of nuclear weapons by terrorist groups a low risk.

▶ Radiation dispersal devices (RDDs) are considered to be a much higher threat because radiological materials are much easier to obtain than enriched nuclear materials and the technology required to detonate an RDD is similar to that involved in detonating conventional explosives.

▶ Incendiary devices. Incendiary devices are mechanical, electrical or chemical devices used intentionally to initiate combustion and start a fire. Incendiary devices consist of three basic components:

- An igniter or fuse.
- A container or body.
- An incendiary material or filler.

Incendiary devices are relatively easy to make. A device containing a chemical incendiary would usually be metal or other non-breakable material (but not plastic because many chemicals are corrosive); a device containing a liquid incendiary material would usually be a breakable material such as glass.

▶ Chemical Weapons. Unlike biological agents or nuclear materials, which are difficult to produce or purchase, the ingredients used to produce chemical weapons are found in common products and petrochemicals. Terrorists can turn these common products into lethal weapons. There are five (5) categories of chemical weapons:



- Blister agents cause blisters, burns and other tissue damage. Exposure may be made through liquid or vapor contact with any exposed skin, inhalation or ingestion. Blister agents include several families of chemicals. The effects of blister agents do not clear upon movement into fresh air. In fact, the effects of most blister agents increase with time and may not reach their full impact for 12 to 18 hours.
 - Blood agents are absorbed into the bloodstream and deprive blood cells of oxygen. Exposure may be made through liquid or vapor contact with any exposed skin, inhalation or ingestion. Those affected by blood agents may appear “bluish” across the nose and cheeks and around the mouth. As the symptoms progress, the victim will convulse and lose consciousness.
 - Choking agents attack the lungs. Following exposure through inhalation, the lungs fill with fluid, which prevents oxygen from being absorbed by, and carbon dioxide from being removed from, the blood. Death results from lack of oxygen and is similar to drowning.
 - Nerve agents affect the central nervous system. These agents act most quickly and are the most lethal of all chemical agents, acting within seconds of exposure. Victims of nerve agents experience constricted pupils, runny nose, shortness of breath, convulsions and cessation of breathing.
 - Riot control agents cause respiratory distress and tearing and are designed to incapacitate rather than kill. Riot control agents cause intense pain, especially in the moist areas of the body.
- ▶ Conventional explosives have been the “weapon of choice” for most terrorists who have used them in more than 80 percent of attacks. While terrorists have used military munitions such as grenades, mortars and shoulder fired surface-to-air missiles, experts rate conventional explosives in the form of improvised explosive devices (IED) as a greater threat.

Should a terrorist attack take place along the Wasatch Front, Kier employees would be sent home since there is not safe place at the main office to house employees. Once home, establish a safe room and perform the following procedures.

- ▶ Shut off the ventilation system and latch all doors and windows to reduce airflow from the outside.
- ▶ Use plastic sheeting to cover openings where air can enter the room, including doors, windows, vents, electrical outlets and telephone outlets! When cut, the sheeting should extend several inches beyond the dimensions of the door or window to allow room to duct tape the sheeting to the walls and floor.
- ▶ Tape the plastic sheeting around all doors and windows using duct tape to ensure a good seal.
- ▶ Seal with duct tape other areas where air can come in, such as under doors and areas where pipes enter the home. Air can be blocked by placing towels or other soft objects in areas where air could enter, then securing them with duct tape.
- ▶ Be sure to take in enough food, water, clothing and blankets for each individual into the room.
- ▶ Listen to a battery powered radio for the all clear.

It is important to know what actions to take in a terrorist incident. There are three self-care factors that significantly affect safety at a terrorist incident:

- ▶ Limiting the amount of time in the area of an incident limits exposure.
- ▶ Evacuate the area. Professional responders suggest maintaining a distance of between 1,000 and 1,500 feet from the incident. Move upwind and uphill from the incident site.
- ▶ The shielding provided by a sturdy building or even a wall can increase protection from contamination, radiation or blast effects.

If you have reason to believe that chemical or radiological contamination has occurred in your area put distance between you and the agent. If exposed to a chemical agent or radiation, use basic decontamination procedures.

- ▶ Leave the contamination areas immediately to limit the time of exposure and reduce contamination levels.
- ▶ Take decontamination action – seconds count. The goal is to limit the time the agent is in contact with the skin.
 - Remove everything from the body, including jewelry. Cut off clothing that would normally be removed



over the head to reduce the probability of inhaling the agent.

- Wash hands before using them to shower.
- Flush the entire body, including the eyes, underarms, and groin area, with large amounts of **cool** water. Hot water opens the pores of the skin and can promote absorption of the contaminant. Using large amounts of water is important because some chemicals react to small amounts of water. If soap is immediately available, mix the soap with water for decontamination. Avoid scrubbing with soap because scrubbing can reduce the layer of protective skin, thus increasing absorption of the contaminant.
- Blot dry using an absorbent cloth. **Do not rub the skin!** Put on clean clothes.
- Report for decontamination as soon as possible. Professional responders will be setting up decontamination stations somewhere around the site.

Bomb Threats

If you receive a bomb threat over the telephone, remain calm, act courteous and take the threat serious. If possible, notify another person to listen on another extension. Take notes on the caller's threat, tone, voice characteristics and background noise.

If the caller seems willing to talk, try to find out as much as possible about the caller and the threat (See "Bomb Threat Checklist for Phone Threats", Exhibit C).

- ▶ Ask questions, such as:
 - ▶ When will the bomb go off?
 - ▶ Where is the bomb located?
 - ▶ What kind of bomb or device is it?
 - ▶ How many devices are there?
 - ▶ How do you know about this bomb?
 - ▶ What is your name?
 - ▶ Do you know there are people in the building who could be hurt or killed?

Take the following steps after the caller hangs up:

- ▶ Hang up the phone. Immediately, before the next call comes in, dial *57. Listen and write down what the recorded message says.
- ▶ Hang up the phone, pick up the phone and dial *69. Listen and write down what the recorded message says.
- ▶ Call the police department by dialing **9-1-1** and report the following information:
 - Your name.
 - The location and telephone number from which you are calling.
 - A description of the bomb threat.
 - The exact time you received the call.
 - The location of the device, if known.
 - The time the device is set to detonate, if known.
 - The type of device, if known.
 - The information you received after dialing *57 and *69.
 - Any other information from your notes.
 - Inform the Safety Director and your supervisor.
- ▶ The Safety Director, President or an officer of the company will announce that a bomb threat has been made and that everyone needs to evacuate the building. Do not re-enter the building until the proper authorities have verified it is safe.

Armed Robbery

Following are several precautions to prevent break-ins and robberies:



- ▶ Do not discuss cash levels and security procedures outside of work.
- ▶ Be alert for suspicious persons loitering in or near the workplace.
- ▶ Be alert for unfamiliar or suspicious vehicles near the workplace.
- ▶ Report all suspicious activity to the Safety Director or your supervisor.

If you encounter a robbery taking place, follow these procedures:

- ▶ Remain calm and avoid any action that might incite the robber to act violently. The robber may be nervous, and further excitement by the employee can cause the robber to panic and harm the employee or bystanders.
- ▶ Obey the robber's instructions, even if it appears employees cannot be harmed. Money and property are not worth the price of a life.
- ▶ Activate a holdup alarm at a safe time, when the robber is leaving. Do not let the robber see the alarm being activated; it may further incite the robber to violence.

Immediately after the robbery, ensure no employees have been injured then follow these steps:

- ▶ Call the local police department.
- ▶ Close and secure the office until the police arrive. This procedure will help preserve the scene of the crime for fingerprints and other physical evidence.
- ▶ Preserve any notes the robber may have written, such as a request for money/valuables.
- ▶ Each employee involved in the incident should write down their own description of the robber and events and should complete the "Physical Characteristics Form" (see Exhibit D) supplied. Employees should not confer with other witnesses or compare notes.

All employees are entitled to a safe and violence-free workplace. If you know of a potential concern or need to report an incident, contact the Emergency Response Coordinator/Safety Director immediately.

Property Damage / Vandalism

Call BRB Investigations and/or local police department.

Kidnapping / Extortion

Call the Federal Bureau of Investigation (FBI).

Harassment or Emergency Situation When Away from Office on Company Business

There may be a time when an employee is away from the office conducting business, such as showing a property or running an open house, and they are faced with a situation where someone is harassing or threatening them. The following should be performed:

Always let the receptionist know when you are leaving and where you are going. If you are going to be with a new client or an individual you don't know, filling out the "Employee Emergency Information Form" (see Exhibit E) could save your life. You may be in a situation where you are unable to give any information about your location and situation.

- ▶ If you are able to leave, do so as soon as possible.
- ▶ If you are not able to leave, stay calm and in control.
- ▶ If possible, and you are where the individual threatening you cannot hear, call the police and explain the situation and ask them to respond.
- ▶ If you can't get away from the individual threatening you, try to explain that you need to make a phone call. Then call the office and give the receptionist the following coded message: "**This is (your name), Dr. James (code word) asked me to meet him today. Would you call him and set a time.**"
(If you have told the receptionist where you were going, and you are unable to say where you are at, she will



know where to send the police.)

- ▶ Try to stall the situation until the police arrive.
- ▶ If possible, never leave with the individual or get in their vehicle.
- ▶ Try to remember as much as possible about the individual so you can help the police.

Violent Individuals

- ▶ Warning Signs of Potentially Violent Individuals:
 - A rise in petty arguments with co-workers or supervisors.
 - Extreme changes in behavior.
 - Statements indicating desperation over family problems, financial problems or other personal problems up to contemplating suicide.
 - Direct or veiled threats of harm. Inappropriate jokes.
 - Intimidating, bullying or harassing behavior.
 - Bringing, brandishing or a fascination with firearms.
 - Statements showing a fascination with media stories of workplace violence.
 - Meetings that deteriorate into name calling sessions.
- ▶ What To Do When Confronted With a Violent Individual:
 - Stay clam and under control.
 - Do not let the other person or persons take control of the situation.
 - Request the help of management or another staff member. Do not try to handle the person or situation alone.
 - Get them isolated in an office or a private corner away from others and try to get them to sit down.
 - If a weapon is present, call **9-1-1** and request immediate assistance (as soon as possible).
 - Never leave with the irate/violent individual. Always stay inside and attempt to help the situation. (Hostage situations may occur should you leave the building.)

Hazardous Material Emergencies

Chemicals are a natural and important part of our environment. Even though we often do not think about it, we use chemicals every day. Chemicals help us keep our food fresh and our bodies clean. They help our plants to grow and fuel our cars. And chemicals make it possible for us to live longer, healthier lives. Under certain conditions, chemicals can be poisonous or have a harmful effect on your health.

You may be exposed to a chemical in three ways: breathing, swallowing or absorption through the skin. Remember, you may be exposed to chemicals even though you may not be able to see or smell anything unusual.

The guidelines below should be followed in the event of a chemical incident in which there is potential for a significant release of hazardous materials.

Spill Classification. Spill response procedures vary depending on whether a spill is small, medium or large. The following are descriptions of each type of spill:

- ▶ **Small spills:** This category includes spills where the major dimension of the spill is less than 18 inches in diameter.
- ▶ **Medium spills:** These are spills where the major dimension exceeds 18 inches, but is less than six (6) feet.
- ▶ **Large spills:** This category includes:
 - Any spill involving a hazardous material where the major dimension exceeds six (6) feet in diameter; and
 - Any “running” spill, where the source of the spill has not been contained or the flow has not been stopped

Evacuation. Persons in the immediate vicinity of a spill should immediately evacuate the premises. If the spill is



“medium” or “large,” or if the spill seems hazardous, immediately notify emergency response personnel - **9-1-1**. (*Lincoln Environmental Services 801-627-6275 or Wasatch Environmental 801-972-8400.*)

General spill control techniques. Once a spill has occurred, the employees at the spill site must decide whether the spill is small enough to handle without outside assistance. Only employees with training in spill response should attempt to contain or clean up a medium or large spill.

Spill control equipment should be available wherever significant quantities of hazardous materials are received or stored. MSDS sheets, respiratory protection, absorbents, over-pack containers, container patch kits, spill dams, shovels, floor dry, acid/base neutralizers and “**Caution - Keep Out**” signs are common spill response items that should be stocked in such areas. Consult the Safety Director for more information on what to stock for your area.

Response and clean-up procedures for small spills. Small spills generally can be handled by internal personnel and usually do not require an emergency response by the fire department HAZMAT personnel. Spills of less than 18 inches normally are cleaned up by the spiller.

First, quickly contain the spill by stopping or securing the spill source. This could be as simple as up-righting a container and using absorbent pads to soak up spilled material. Wear appropriate personal protective equipment such as gloves, goggles and protective clothing. Put spill material and absorbents in secure containers. Do not wash the spill area until after reading the MSDS sheets and consulting with the Safety Director for spill and waste disposal procedures. Sometimes the area of the spill should not be washed with water.

The spilled material and the absorbent sometimes might be classified as hazardous waste and must be disposed of in compliance with state and federal environmental regulations.

Response and clean-up procedures for medium spills. Police and fire department HAZMAT teams’ response normally is required for medium spills. However, common sense also should be used when determining if outside help is necessary. Medium spills require the following actions:

- ▶ **First**, put on appropriate personal protective equipment and then try to contain the spill at its source. This might involve quickly up-righting a container or putting a lid on a container. Do not use absorbents unless they are immediately available. Once you have made a quick attempt to contain the spill, leave the area and alert emergency response personnel by calling **9-1-1**. Close, but do not lock, the doors as you leave. Give emergency response personnel accurate information as to the location, chemical and estimated amount of the spill.
- ▶ **Second**, evaluate the area outside of the spill. Engines and electrical equipment near the spill area must be turned off. This eliminates various sources of ignition in the area. Advise police or emergency responders on how to turn off engines or electrical sources. Do not go back into the spill area once you have left. Help emergency responders by trying to determine how to shut off heating, air conditioning equipment or air circulating equipment, if necessary.
- ▶ If emergency responders evacuate the spill area, follow their instructions in leaving the area.
- ▶ After emergency responders have contained the spill, be prepared to assist them with any other information that may be necessary, such as MSDS sheets and questions about the facility.
- ▶ Emergency responders or trained personnel with proper personal protective equipment should clean up the spill residue. Do not re-enter the area until the responder in charge gives the all clear. Be prepared to assist these persons from outside the spill area with MSDS sheets, absorbents, containers, etc.
- ▶ Reports must be filed with proper authorities. It is the responsibility of the spiller to inform the Safety Director, their supervisor and the emergency responders as to what caused the spill. The supervisor of the area in which the spill occurred is responsible for completing an incident report form and filing it with the Safety Director. The Safety Director and the responders will then finish notifying authorities, if necessary.

Response and clean-up procedures for large spills. The response for large spills is much the same as for medium



spills, except that the exposure danger is greater. The response for large spills is as follows:

- ▶ **First**, since spill control or containment by the spiller is not likely, the spiller should immediately leave the area and notify police (**9-1-1**). Again, give the operator the spill location, chemical spilled and approximate amount.
- ▶ **Second**, from a safe area, attempt to get MSDS information for the spilled chemical for the emergency responders to use. Also, be prepared to advise responders as to any ignition sources, engines, electrical power or air conditioning/ventilation systems that may need to be shut off. Advise responders of any absorbents, containers or spill control equipment that may be available. This may need to be done from a remote area, as an evacuation would place the spiller far from the scene. Use radio or phone to assist from a distance, if necessary.
- ▶ Spills greater than six (6) feet in any dimension or are continuous should be handled only by emergency response personnel, in accordance with their own established procedures. Remember, once the emergency responders or HAZMAT team is on the job cleaning up spills or putting out fires, the area is under their control and no one may re-enter the area until the responder in charge gives the all clear.
- ▶ Finally, the spiller will need to provide information for reports to the Safety Director and responders, just as in medium spills.

Technological Emergencies

Technological emergencies include any interruption or loss of a utility service, power source, life support system, information system or equipment needed to keep a business in operation.

Should an interruption of any such services take place during normal working hours, contact the appropriate company. Should an interruption take place as the result of a disaster, the emergency response coordinator should contact the appropriate companies.

Project Mangers and Jobsite Superintendents should complete the ‘Emergency Information and Numbers’ sheet (Exhibit B), as well as create a listing of other appropriate emergencies contacts for the jobsite area. These sheets should be posted near the jobsite phone and/or in other conspicuous locations.

The following is a listing of four such contacts:

Electric Power:	Rocky Mtn Power	1-888-221-7070
Natural Gas:	Questar	801-621-3262
HAZMAT:	9-1-1 first	911
	Lincoln Environmental	801-627-6275
	Wasatch Environmental	801-972-8400
Department of Environmental Quality		800-458-0145
P.O. Box 144850		801-536-4250
Salt Lake City, UT 84114-4850		

Emergency Shut-offs for Main Building

- ▶ Electrical switch box - located on the north wall in the mechanical room at the south east corner of the building (see map).
- ▶ Natural gas shut-off valve - located outside the building on the south wall east end (see map).
- ▶ Water supply shut-off - located on the south wall in the mechanical room at the south east corner of the building (see map).



BUSINESS RESUMPTION

Temporary Place of Business

The main office in which business shall be conducted for the Kier Companies is located at 3710 Quincy Avenue, Ogden, Utah 84403. In the event business cannot be conducted at our main office, business functions shall resume at a designated location.

Vital Records Protection

Vital records are those records which would enable Kier to resume operations after a disaster. From these, Kier should be able to fulfill its obligations to its clients and employees.

The Controllers for Kier Construction and Kier Management are the vital records officers and will be responsible for identification, off-site storage and maintenance of these records.



Exhibit A

EMERGENCY RESPONSE TEAM RESPONSIBILITIES

- ▶ Recognize and report emergencies.
- ▶ Include local fire department in annual drills.
- ▶ Conduct annual drills with employees. Review with those who were absent when drills were conducted.
- ▶ Conduct annual training on fire and life safety exposures and how to respond.
- ▶ Conduct annual training on how to respond to medical emergencies.
- ▶ Participate in special emergency training.
- ▶ Warn employees and visitors of emergency and action.
- ▶ Help employees and visitors evacuate, make sure employees in assigned areas are evacuated.
- ▶ Make sure all doors and windows in assigned areas are closed (not locked).
- ▶ Account for employees in assigned areas.
- ▶ Assist Emergency Response Coordinator(s) with:
 - Shutting off utilities.
 - Help assess situation.
 - Notification of emergency services and utility companies.
 - Perform emergency first aid.
 - Notification of employee family members.
 - Help document emergency.
 - Help with emergency drills.
 - Perform specific assignments.

Specific Assignments

- ▶ Shutting off utilities.
- ▶ Set up area for administering emergency first aid.
- ▶ Isolate incident area.
- ▶ Set up area for temporary morgue.
- ▶ Media liaison (On-site Superintendent or Building Supervisor)



Exhibit B

EMERGENCY INFORMATION AND NUMBERS

Project Name: _____

Project Address: _____

Cross Street: _____

Contact Name

Cell Phone

Jobsite Superintendent: _____

Project Manager: _____

Project Engineer: _____

EMERGENCY: 911

AREA POLICE/SHERIFF:

NEAREST FIRE STATION:

Name: _____

Name: _____

Station #: _____

Station #: _____

Non-Emergency #: _____

Non-Emergency #: _____

Address: _____

Address: _____

NEAREST PREFERRED PROVIDERS:

Type: **Clinic** **Urgent Care** **Industrial Med.** **Hospital**

Name: _____

Address: _____

Phone #: _____

Other Emergency Number:

Poison Control: 1 800 222-1222

National Response Center: 1 800 424-8802

Regional EPA/HAZMAT Office: _____

Area OSHA Office: _____

Jobstite Security Company: _____

Contact: _____

Gas Company: _____

Electrical Company: _____

Water Company: _____

Kier Safety Director: 801 648-9883

Contact: Dustin Chapman

Lincoln Environmental Services 801-627-6275 or Wasatch Environmental 801-972-8400.



Exhibit C

BOMB THREAT CHECKLIST FOR PHONE THREATS

Ask the following questions:

When will the bomb go off?

Where is the bomb located?

What kind of bomb or device is it?

How many devices are there?

How do you know about this bomb?

What is your name?

Do you know there are people in the building who could be hurt or killed?

Other comments: _____

Name of person receiving call: _____ **Time:** _____ **Date:** _____

Caller's identity:	Male	Adult	Approximate age:
	Female	Juvenile	
Origin of call (if you can tell or ask):	Local	Booth	Internal (from within building)
	Long distance		
Vocal characteristics:	Loud	High pitch	Intoxicated
	Soft	Deep	Other
	Pleasant	Raspy	
Speech:	Fast	Distorted	Stutter
	Slow	Nasal	Lisp
	Distinct	Slurred	Other
Language:	Excellent	Fair	Foul
	Good	Poor	Other
Accent:	Local	Regional	Other
	Not local	Foreign	
Manner:	Calm	Rational	Coherent
	Angry	Irrational	Incoherent
	Emotional	Belligerent	
	Laughing	Righteous	
Background noises:	Machinery	Quiet	Bedlam
	Trains	Music	Animals
	Street	Voices	Other
	Office machines	Party atmosphere	



Exhibit D

DESCRIPTION OF PHYSICAL CHARACTERISTICS FORM

	Perpetrator 1	Perpetrator 2
Male / Female		
Race / Nationality		
Height		
Weight		
Build		
Hair color / length		
Glasses		
Eye color		
Scars or distinguishing marks		
Weapon type		
Jewelry		
Clothing: Jacket		
Shirt		
Pants		
Hat		
Shoes		
Vehicle type		
Model / year		
Color		
License plate		
Additional information		

Do not discuss any details of the event until the police are through taking statements from you and your co-workers. Thank you for your cooperation.



Exhibit E

EMPLOYEE EMERGENCY INFORMATION FORM

Employee Name	
Cell phone no.	
Male / Female	
Race / Nationality	
Height	
Weight	
Build	
Hair color / length	
Glasses	
Eye color	
Scars or distinguishing marks	
Vehicle type	
Model / year	
Color	
License plate no.	
Emergency contact	
Emergency contact phone no.	
Additional information	

Since this form contains personal information, filling it out is optional, not mandatory. The above information is to be used for emergency purposes only and will be kept on file by the Receptionist and/or the Emergency Response Coordinator.

I voluntarily offer the above information: _____

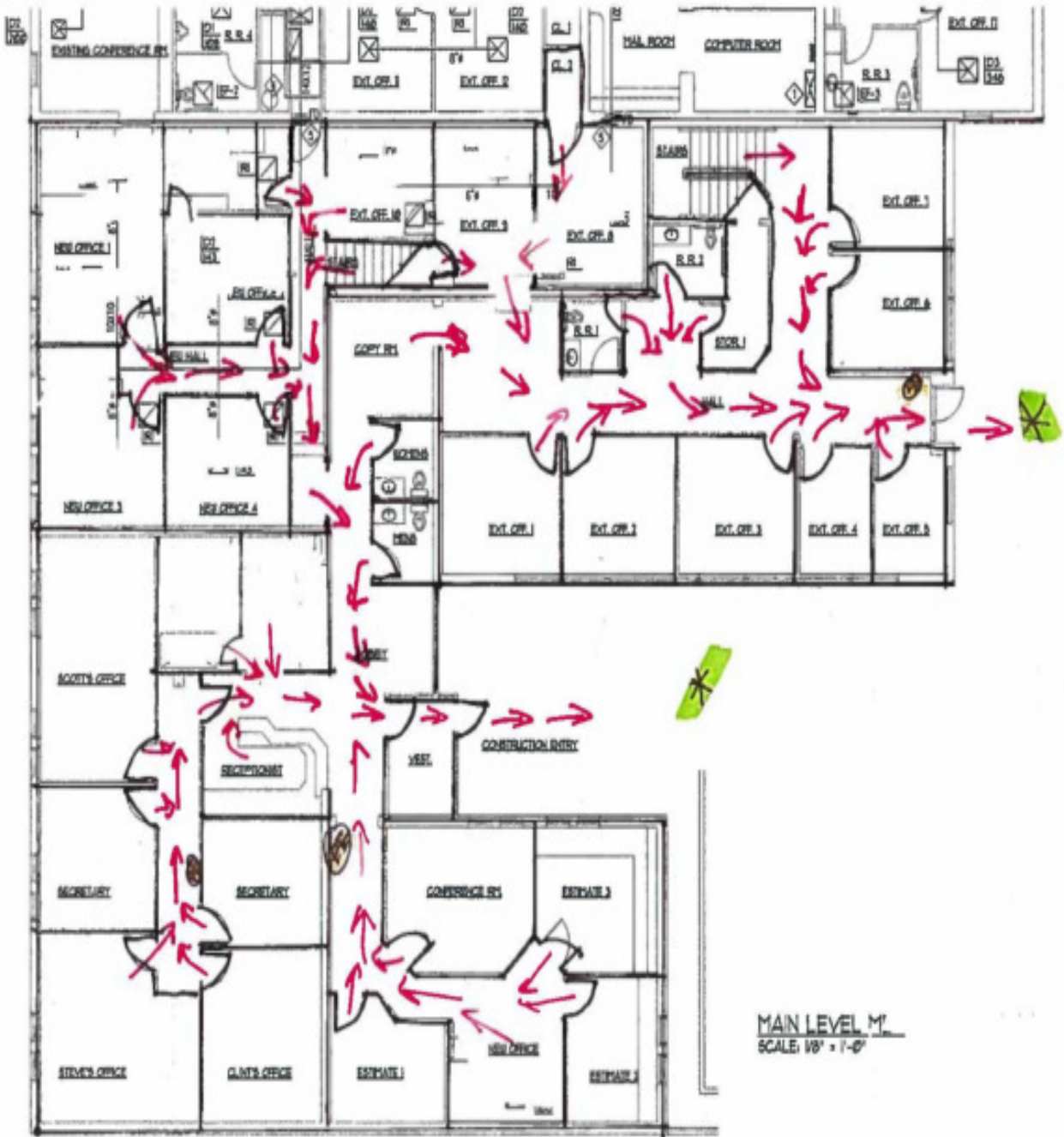
Print name

Signature



Map 2

NORTH SECTION OF BUILDING: FIRE EXTINGUISHERS AND EXIT ROUTES



* After Evacuation meet in
Parking Lot Across the Street

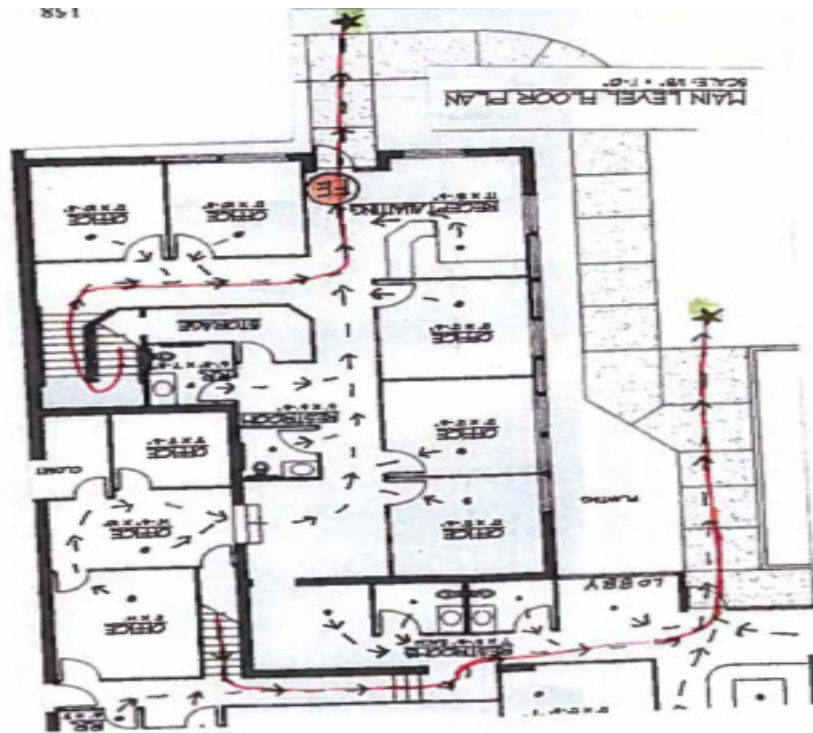
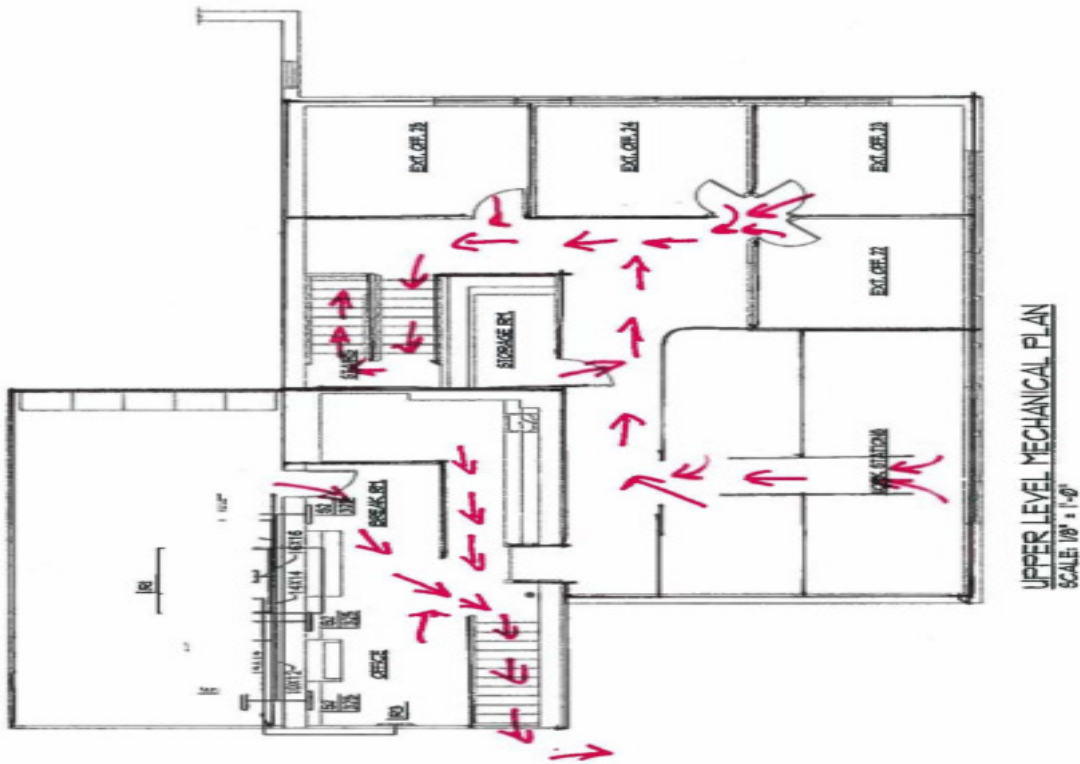
(FE) Fire Extinguisher

→→→→ Exit Routes



Map 3

UPPER LEVEL OF BUILDING: SHUT OFFS, FIRE EXTINGUISHERS, AND EXIT ROUTES



* After Evacuation meet in
Parking Lot Across the Street

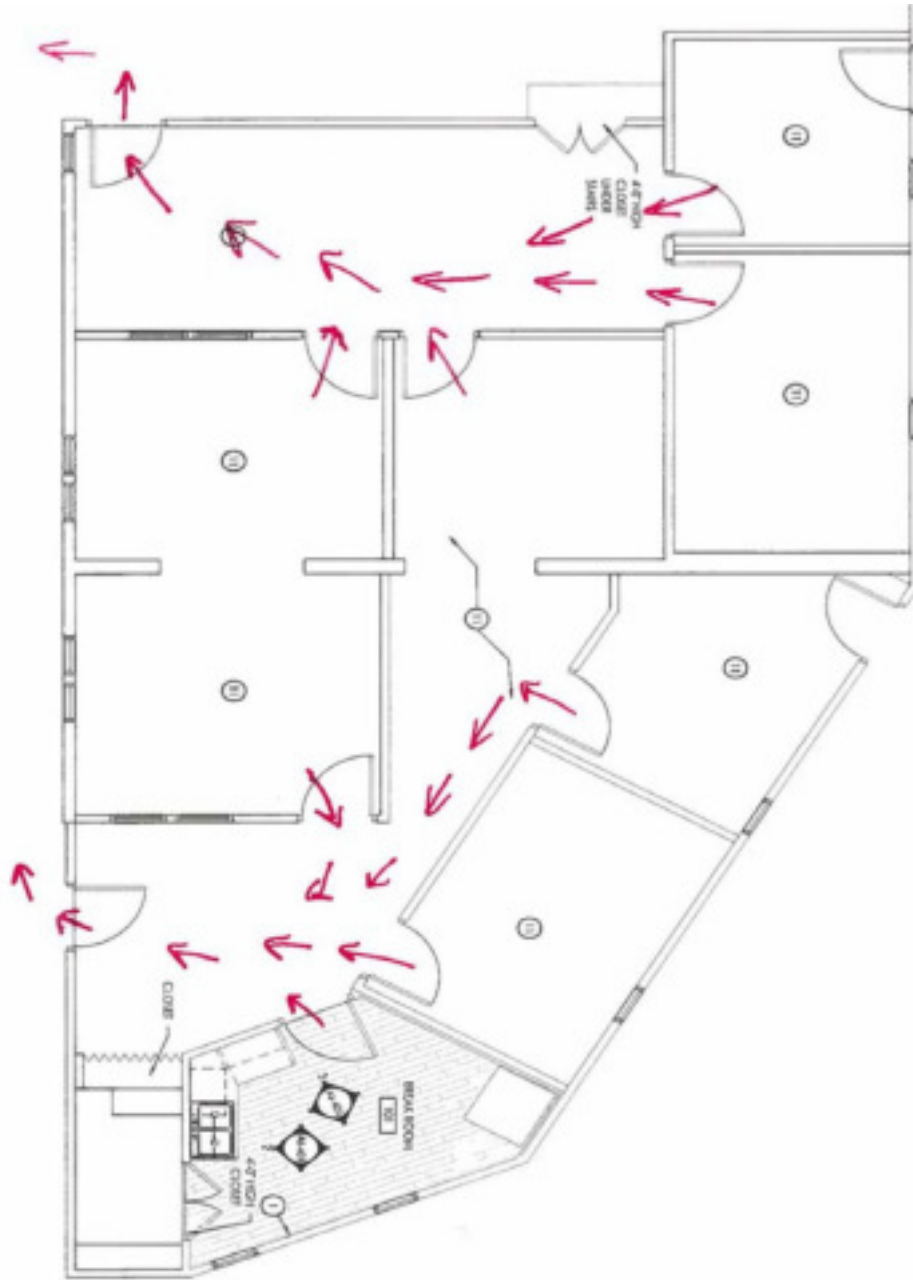
(FE) Fire Extinguisher

→→→→ Exit Routes



Map 4

ACCOUNTING OFFICE/ EXTENSION OFFICE: FIRE EXTINGUISHERS, AND EXIT ROUTES



* After Evacuation meet in
Parking Lot Across the Street