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ZURICH

Highway Worker Safety Program

HWSP

Introduction

Introduction Part 1

As a construction worker, you play a critical role in building and maintaining our country's transportation infrastructure:

- highways
- roads
- streets
- bridges
- tunnels
- utilities
- other systems that keep our nation operating safely and efficiently

Your work can be as hazardous as it is important. Not only are you exposed to risk of injury or fatality from general construction hazards, you are also subjected to dangers posed by high volume and speed of traffic passing by the work zone and vehicles and equipment moving within the work zone.

You may be working in less than ideal circumstances, for example:

- visibility issues
- constricted work space
- poor weather conditions

In other words, when you are working in and around street and/or highway construction, you are surrounded by potential hazards.

Today, we are going to discuss overall safe work practices that affect you on all road construction sites, no matter what your job, such as:

- planning
- communication
- maintenance of traffic
- visibility
- night work
- environmental hazards
- others

This information will give you a head start on hazard awareness for every job, on every work site, no matter when or where you are working.

An efficient, safe project starts with planning.

- supervisors must begin planning well before the project begins
- at each step, an effective plan includes a safety component
- project work crews must be included in the planning to identify the steps to safe completion
- risk control issues
  - the requirements for traffic control
  - specialized personnel and equipment
  - training for employees

You must be informed of the plan through a variety of communications systems, including:

- project orientation classes
- pre-task planning meetings
- daily crew meetings

At a minimum, the plan must include information on applicable national, state, and local safe work practices/regulations.

The plan will also include steps to take in the event of an emergency. Emergencies do occur, and you need to be prepared by knowing your employer's emergency action plan.

This communication process will give you an opportunity to recognize the hazards, understand how to protect yourself, ask questions, and make suggestions.

Remember, before every task, on every job site, ask yourself "How can I do this safely?"

With proper planning, communication, and training, you will have the knowledge you need to answer this question. The rest will be up to you.

Traffic control is critical to providing a safe work environment. The risks to both workers and the public make it essential that everyone involved with traffic control be properly trained.

Set-up of traffic control exposes workers to public traffic traveling at high speeds. These drivers may be sleepy, under the influence of drugs or alcohol, or distracted by music, kids or especially the cell phone. They may not even see the signs, flag persons, or barriers, let alone the workers.

Workers are part of the barrier and at a higher risk until the traffic control is in place.

These workers often have their bodies within feet – even inches – of moving vehicles.

Flag work is the first, most direct contact with the public, and is both physically and mentally challenging.

Visibility is a primary safety issue.

- more workers are killed or seriously injured by construction vehicles and equipment than by public vehicles
- the key to safety on all highway and street construction sites is SEE AND BE SEEN

Every year, there are an estimated 2,500 visibility-related injuries in road construction.[4]

Often, the work site itself contributes to visibility-related accidents, simply because there is so much going on:

- workers on foot (WOF)
- moving vehicles and equipment
- public vehicles driving around the work zone
- equipment may be blocking the vision of others
- equipment operators themselves may have "blind spots" that prevent them from seeing all of the activity around them

To control visibility hazards, workers must be visible to:

- public drivers who drive past
- equipment operators
- vehicles within the construction zone
- high-visibility clothing is an absolute must for all work zone environments, with Type III the best choice

In addition to general visibility hazards, workers in road construction must deal with nighttime and environmental issues. Highway construction is not easy work, and you need to be prepared for just about anything.

Night work poses many hazards, including:

- roadway visibility for motorists
- work zone visibility for workers
- impaired drivers
- the risk of drowsy motorists
- worker fatigue
- reduced driver visibility from glare of light plants in the work zone
- distracted drivers looking into the work zone, talking on cell phones, etc.

In fact, 25 percent of all fatal vehicle/worker accidents occur between 6 p.m. and 6 a.m., even though less than 9 percent of the full-time workforce is actually on duty.[8]

This means that crews working during these low-light hours are three times more likely to be struck by a motor vehicle than daytime workers are. This is partially because, during the night – and especially on weekends and after 10:00 p.m. – the traveling public has a higher incidence of driving under the influence.

To protect workers on the night shift, it is important to increase visibility by:

- providing adequate work area lighting
- installing retro-reflective tape on equipment
- wearing retro-reflective Type III clothing

Remember the mantra "SEE AND BE SEEN." This is especially critical at night.

Road construction workers often work in harsh environments:

- standing on hot asphalt
- working in the cold
- in the rain or snow
- in low visibility
- when there's a threat of lightning

To minimize risks during these conditions, contractors should plan systems for worker rotation and relief.

Contractors should also provide adequate shelter and equipment to protect workers from the elements, as well as a warning system and plan for worker protection, especially from lightning.

Additionally, contractors need to ensure that workers know to drink plenty of water and use sanitation facilities.

Highway and street construction sites pose unique dangers. Hazards are everywhere. If you are aware of these hazards and know how to control them, you will be a lot safer.

Remember, work safely for yourself and for your loved ones.

Introduction Part 2

Focus Four Plus One

Highway and street construction work is some of the most dangerous work in the construction industry. On any road construction site, you risk potential injury – or even death. Your safety will depend on your knowledge of the hazards and use of safe work practices.

Today, we're going to focus on the most common hazards found on highway construction sites, as well as proven strategies for hazard control.

With this information and your own commitment to safety, you will have many of the tools you need to keep yourself and your co-workers safe while on the job.

The majority of injuries and fatalities in highway construction are caused by four basic hazards:

- falls
- struck-bys
- caught-in-betweens
- electrocutions

We call these the Focus Four Hazards, because they account for approximately 90 percent of fatalities and serious injuries in the construction industry.[1] Let's take a closer look at these hazards.

The primary causes of fall-related accidents are:

- unprotected sides, edges, and holes
- improperly constructed walking/working surfaces
- improper use of access equipment
- failure to properly use personal fall arrest systems
- slips and trips due to poor housekeeping

Primary causes of struck-by accidents are:

- vehicle and equipment strikes
- falling or flying objects

Vehicle and equipment strikes often occur when drivers back up without adequate care or warning. Workers on foot are especially at risk on highway construction sites.

Falling object hazards can result from:

- rigging failure
- loose or shifting materials
- equipment tip-over or malfunction
- lack of overhead protection

Primary causes of caught-in-between accidents are:

- trench or excavation collapse
- rotating equipment
- unguarded parts
- equipment rollovers
- poor equipment maintenance

Primary causes of electrocution are:

- contact with overhead or underground utility lines
- contact with live circuits
- poorly maintained cords and tools
- lightning strikes

Besides the Focus Four Hazards, highway construction workers are exposed to yet another serious hazard that we do not hear as much about – the risk of soft tissue injuries (STIs).

Soft tissue injuries are injuries to the musculoskeletal structure – the joint tissues, ligaments, tendons, and muscles, better known as strains and sprains. Although most of these soft tissue injuries are not fatal, they can create years of pain and suffering for workers and their families.

Types of soft tissue injuries include, but are not limited, to these:

- sore muscles
- back pain
- strains
- sprains
- bruises
- inflammation
- pinched nerves
- numbness and tingling

Many activities – even normal activities – can lead to soft tissue injuries. These injuries are not fun: just ask anyone who has sprained an ankle or been laid up with a serious back injury.

By adding the risk of soft tissue injuries to our list of basic hazards, we now have the Focus Four Plus One Hazards.

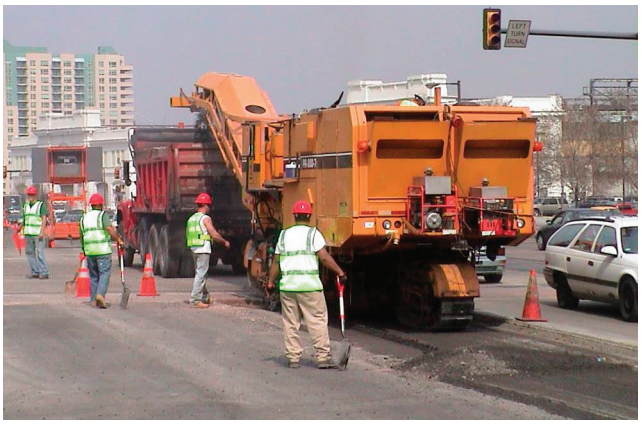
You will be learning more about the Focus Four Plus One Hazards throughout this program. You will also be learning about how to protect yourself and your co-workers from these hazards, so that you can do your part to help reduce accidents and save lives.

Protection against hazards has traditionally been performed following a **hierarchy of controls**, starting with the most effective methods and ending with the least effective.

The best controls are **engineering controls**. Engineering controls physically remove a hazard or place a barrier between the worker and the hazard.

Engineering controls may include:

- setting up traffic control barriers to separate workers from traffic
- using a forklift to move materials rather than carrying by hand
- using wet methods for concrete and asphalt cutting operations to minimize dust



The next method of control – **administrative controls** – involves changes in work procedures to reduce the duration, frequency, and severity of exposure to workplace hazards.

Administrative controls may include:

- developing and implementing housekeeping programs to reduce slips or trip hazards
- rotating workers through various job assignments to reduce exposures such as repetitive motion hazards
- education/training programs
- enforcement programs

A third and final method of hazard control is the use of **personal protective equipment**, or PPE.

PPE controls may include:

- hard hats
- safety glasses
- work boots
- hearing protection
- fall arrest systems
- full face shields
- respirators

PPE may be used to supplement engineering or administrative controls, or used alone where other controls are not feasible. PPE is the last means of defense between a worker and an injury-producing event.

Safety in highway work zones begins with identifying the Focus Four Plus One Hazards, and then selecting the most effective methods for hazard control.

This approach must be used to improve safety in specific areas of highway construction, including:

- traffic control
- asphalt paving and patching work
- concrete paving and patching work
- bridge construction work
- utility operations
- demolition operations

- grading operations
- short-term and mobile operations

Whatever your work area, whatever your task, you can be sure that you will be exposed to the Focus Four Plus One Hazards. It is your job to understand these hazards, know the controls, and take precautions accordingly.

There is no question about it – highway construction zones are dangerous work sites. On average, more than 100 workers are killed and 20,000 injured every year in the highway and street construction industry. The risk of death is two to four times greater than that in other areas of building and construction.[9]

These injuries and fatalities are preventable. If you know the hazards and use the appropriate method of protection for every task you perform, you can reduce accidents and save lives…maybe even your own.

Notes:

Introduction quiz

NAME: _____

1. The Focus Four includes cuts and lacerations.
   ○ True ○ False

2. The number one exposure leading to highway work zone fatalities is being struck by public vehicles.
   ○ True ○ False

3. SEE AND BE SEEN means workers in highway work zones must see all moving vehicles and equipment in their vicinity and be seen by the driver/operator.
   ○ True ○ False

4. Every worker is responsible for knowing and following safe work practices.
   ○ True ○ False

5. Exposures are situations in the workplace that always cause injury no matter what the worker does.
   ○ True ○ False

6. STI means soft tissue Injury.
   ○ True ○ False

7. Focus Four means workers should keep their focus on exposures for four minutes hoping they will go away.
   ○ True ○ False

8. For workers on foot, the SEE AND BE SEEN principle is very important in injury prevention.
   ○ True ○ False

9. Falls, struck-bys, caught-in-or-betweens, and electrocutions are the accident types that are most frequently involved in construction worker fatalities.
   ○ True ○ False

10. Someone wants me to come home uninjured at the end of my shift.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

HWSP

Traffic Control

Traffic Control

This discussion is about safe work procedures during traffic control operations. Whatever your job, you will be exposed to many hazards, including vehicular traffic, heavy, moving equipment, and manual material handling.

Work zone traffic control is one of the most critical functions in providing a safe work environment for workers in street and highway construction. With workers on foot, moving equipment, and public vehicles all operating in close proximity, control systems are essential. Remember that your own safety is important, and so is the safety of workers who follow and depend on you.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck-By, Caught In/Between, and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STIs). STIs are rarely fatal but are a great contributor to painful and potentially disabling injuries that may require time away from work and may result in a serious impact on physical ability. These injuries often show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely means of a construction worker sustaining a potentially crippling injury or dying while on the job.

In the traffic control section, controls will follow exposures immediately.

The hazards we have just discussed – falls, struck-bys, caught-in-or-betweens, electrocutions, and soft tissue injuries – can be prevented in traffic control work.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those physical acts that, when implemented, positively eliminate the exposure.

Administrative controls focus on implementing safe work policies and procedures such as planning and communicating, hazard communication programs, separation between workers and equipment, and worker rotation. Also emphasized is using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and use PPE automatically and effectively. Many do not, allowing injuries to occur.

Exposures

Exposures are the situations and/or conditions workers find themselves in and around that may lead to an accident and injury.

Exposures – Falls

Traffic control workers are often exposed to falls from:

- Elevations
  - bridges
  - ramps
  - unguarded elevated surfaces
  - into trenches or excavations
  - from vehicles, trucks, and flatbed semi-trailers
  - avoiding an oncoming vehicle

Falls can occur at any level. All falls, even falls on level ground, may result in abrasions, contusions, fractures, and even death.

Controls – Falls

Engineering controls:

- proper lighting to improve visibility on the worksite
- warning devices or barricades around open excavations
- vehicles designed specifically for cone placement and removal
- good housekeeping practices to keep the worksite clear of slipping and tripping hazards

Administrative controls:

- policies and procedures that educate workers to use safe work practices
- maintaining constant vigilance
- housekeeping policies and procedures
- watching where you step, especially around slick or uneven surfaces

PPE controls:

- always wear fall protection
- wear boots with slip-resistant soles

Exposures – Struck By

Workers on highway construction sites may be struck by:

- debris
- cans, bottles, other materials thrown from passing vehicles
- vehicles or equipment
  - that do not stop for the flag person
  - public vehicles that intrude into the work zone accidentally because the drivers are physically or mentally impaired
  - contractor equipment, accounting for over 40 percent of the fatalities on highway construction site.[10]

The accidents often occur because:

- workers on foot (WOF) are working in close proximity to moving equipment/vehicles
- the WOF may be in a blind spot
- the WOF may inadvertently step into the vehicle's path

Controls – Struck By

Engineering controls:

- protect the flag person
  - keep debris away from the flag station
  - provide adequate lighting to ensure visibility
- back-up alarms
- proximity warning devices

Administrative controls:

- use state-approved vehicle diversion plans
- use a qualified traffic control supervisor to implement and supervise lane closures
- design the work area layout with safety in mind
- specify vehicle traffic flow paths and others for foot traffic flow

- educate workers to know where equipment blind spots are and avoid them
- use law enforcement personnel in work zones
- enforce use of safe work practices

In general, the best protection for traffic control workers is the most basic protection:

- see and be seen
- maintain constant vigilance
  - internal traffic such as company vehicles, equipment, and trucks
  - external traffic – those vehicles that may intrude into the work zone
  - never turn your back to traffic

- no darting or sudden movements
  - do not surprise anyone
- be prepared for an emergency
  - know which way you will run when a vehicle is coming toward you, especially if there is traffic on all sides
  - always know where you are going to run or jump to get out of the way – have an escape plan in mind at all times
  - stay alert for construction equipment, especially when backing
  - watch approaching vehicles for loose articles

PPE controls:

- your best protection is high-visibility, reflective work wear
- remember – SEE AND BE SEEN by:
  - other workers
  - passing traffic
- high-visibility clothing is divided into classes, depending on environmental conditions and speed of the traffic
- class one clothing:
  - not designed or legal for workers who install or maintain traffic control systems
- class two clothing is required for workers who:
  - are working in traffic speeds up to 50 miles per hour
  - need visibility in inclement weather
- class three clothing provides the highest level of visibility and is advised for workers who:
  - may be distracted by their work
  - are exposed to a wide range of weather conditions
  - work where traffic speeds may exceed 50 miles per hour
  - are directly exposed to traffic installing or removing traffic control systems
- personal flashing lights:
  - while setting out or taking up cones, barrels, or signs
  - make yourself more visible to traffic within and outside the work zone
- hard hats
- safety glasses

Exposures – Caught In / Between

An estimated 10 percent of construction worker fatalities involve being caught in or between objects such as:

- backing vehicles
- vehicles intruding into the work space

In some cases, workers may be pinned and/or crushed to the extent that they die before they can be freed from the accident scene.

Controls – Caught In / Between

Engineering controls:

- use attenuator trucks in work zones to prevent accidental intrusion by private vehicles and site equipment
- install rear-view cameras in trucks that must back within the work zone
- back-up alarms

Administrative controls:

- educate to create worker awareness to the hazards of being caught-in or between objects
- when on foot on a road construction site, always be alert for moving vehicles – face oncoming traffic/equipment
- move out the way when vehicles are backing up nearby
- make sure that you don't move into the path of another vehicle
- don't forget about equipment operator blind spots

PPE controls:

- wear standard personal protective equipment:
- high-visibility work wear – remember, SEE AND BE SEEN
- sturdy work boots with slip-resistant soles

Exposures – Electrical

Approximately 17 percent of construction worker fatalities involve an electrical current.[1]

Injuries resulting from electrical contact include severe burns, loss of mental and/or physical ability for the remainder of the worker's life, and a prolonged period of suffering, even death.

Traffic control workers are mostly at risk of electrical shock from contact with:

- a piece of electrical equipment that is not grounded
- a piece of electrical equipment such as a hand tool, generator, or light plant that has faulty wiring
- lightning
- lightning can strike miles ahead of a storm

Controls – Electrical

Engineering controls:

- proper grounding
- use ground fault circuit interrupters on all portable electrical tools and equipment

Administrative controls:

- increasing awareness of electrical hazards
- identifying and marking potentially live electrical circuits and installations
- training workers to avoid contact with overhead power lines, lightning, and other electrical hazards

PPE controls:

- hard hats
- safety glasses
- non-conductive boot soles
- non-conductive gloves

Exposures – Soft Tissue Injury

Soft tissue injuries – primarily strains and strains – are the number one type of injury in highway and street construction.

These injuries occur:

- when moving or maintaining traffic control devices
- handling objects or materials
- slipping or tripping
- overexerting yourself
- working in prolonged or awkward positions

Controls – Soft Tissue Injury

Engineering controls:

- using mechanical equipment
- storing materials or equipment at waist level, so that you do not have to strain your body to access them

Administrative controls:

- adapting work procedures to reduce exposure to STIs
- for example, using proper lifting techniques
  - bending at the knees
  - carrying the load close to your body
- rotating workers to different tasks
- changing positions frequently
- starting a personal wellness program
- exercising to improve body strength and flexibility
- stretching before and after tasks

Remember, most mobile operations are physically demanding – stretching prepares the muscles for exertion and improves flexibility, balance, and coordination.

PPE controls:

- when lifting and carrying, wear gloves and shoulder pads
- when kneeling on the ground, use knee pads

Conclusion

When you are working in traffic control, you are on the front lines. But no matter what your job, you risk exposure to the hazards we have discussed today. These apply to everyone in highway and street construction.

Road construction accidents are preventable. Your knowledge of the hazards – and your commitment to safe work procedures – can help ensure a safer jobsite for everyone – you, your co-workers, and the traveling public.

By paying attention to controls for traffic and using the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your workplace.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Traffic Control quiz

NAME: _____

1. Passing traffic must be a primary concern to traffic control workers.
   ○ True ○ False

2. Slick surfaces from rain, snow, ice, or the water truck can lead to slip-type falls.
   ○ True ○ False

3. Maintaining good training covering exposures and controls helps workers know how to take care of themselves.
   ○ True ○ False

4. Personal protective equipment use, such as safety glasses and a hard hat, is not important for traffic control workers.
   ○ True ○ False

5. Maintaining personal safety in traffic control work requires every worker to maintain constant vigilance, follow 'SEE AND BE SEEN' practices, and always know where to run.
   ○ True ○ False

6. Traffic control workers do not have to worry about backing trucks or equipment because the back-up alarm will always warn them.
   ○ True ○ False

7. Flag stations should be lighted in dark conditions.
   ○ True ○ False

8. Public drivers are always courteous, drive within posted speed limits, and remain constantly vigilant for the unexpected when driving through work zones.
   ○ True ○ False

9. Flashing lights worn by traffic control workers make them more visible, even in daylight hours.
   ○ True ○ False

10. Lightning can strike miles in front of a storm, but being inside the pickup truck is good protection.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

HWSP

Asphalt Paving and Patching Operations

Asphalt Paving and Patching Operations

Asphalt paving and patching work involves exposures to several hazards that all employees must learn to recognize and control for their own safety and the safety of others. Failure to recognize and control these hazards can lead to heat stress, fractures, crushing injuries – even death.

The techniques you learn today will help you prevent injury to yourself and others. Asphalt paving and patching operations require advance planning, establishment of a safe work zone, constant vigilance, and adherence to strict safety procedures.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck By, Caught In/Between, and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STIs). STIs are rarely fatal but are a great contributor to disabling injuries that require time away from work and have a serious impact on physical ability. These soft tissue injuries may show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely means by which a construction worker can be killed or sustain a crippling injury.

Successful completion of the day's paving or patching tasks means 'injury free' and provides a smooth riding surface that you, your family, and the entire community can enjoy for years to come.

Exposures

Exposures are the situations workers find themselves in and around that are likely to lead to an accident and injury.

Exposures – Falls

All falls, even falls from level ground, can be serious. Slips and trips may result in burns from hot asphalt, abrasions, contusions, or fractures.

- slipping or tripping while working on uneven surfaces
- tripping or slipping over materials, stakes, or debris
- falling from vehicles or equipment, especially while mounting and dismounting

Exposures – Struck By

- One of the most serious struck-by hazards in asphalt paving is the risk of a worker on foot being struck by another vehicle, especially a dump truck backing up to the hopper of a paving machine.
- Workers may also be struck by falling or flying debris from passing vehicles or from the asphalt paving process.

Exposures – Caught In / Between

- Caught-in-between hazards include exposure to rotating or moving parts.
- A crusher plant may be set up adjacent to the asphalt paving process, creating exposures to belts, milling equipment, trucks, and loaders.

Exposures – Electrical

- The primary electrical hazard is contact with overhead power lines, especially dump trucks with raised beds.

Exposures – Soft Tissue Injury

Soft tissue injuries – strains and sprains primarily - are the number one injury type in highway/street/road work.

- handling materials
- raking, shoveling, or placing
- positioning truck tarps
- cleaning truck beds
- climbing on equipment
- jumping off equipment

The hot asphalt work environment can also be a factor.

Controls

The hazards we have just discussed – falls, struck-bys, caught-in-betweens, electrocutions, and soft tissue injuries – can be prevented in asphalt paving operations.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those that require action to positively eliminate, or substitute for, the exposure.

Administrative controls focus on implementing safe work procedures such as planning and communicating separation between workers and equipment and worker rotation.

Administrative controls also emphasize using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and use PPE automatically. Many do not, allowing injuries to occur.

Engineering Controls

- Falls:
  - ensuring that steps and handrails on trucks are in place and adequately maintained
  - using steps with non-skid surfaces
- Struck-bys:
  - provide proper systems of traffic control
  - ensure the use of back-up alarms or Proximity Warning Devices
- Caught-in-betweens
  - using machine guards to help eliminate pinch points
- Electrical:
  - contacting utilities to de-energize or mark overhead power lines for increased visibility

Administrative Controls

Falls:

- walk with care on muddy, wet, or uneven surfaces
- climbing on or off a truck or construction equipment, use the steps and hand holds

Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- use a spotter for backing and dumping operations. This is one of the key administrative controls for the reduction of struck-by, caught-in-between, and electrical hazards.

Caught-in-between:

- keep safety guards on tools and equipment in place.
- avoid pinch points when opening and closing tailgates, inspection doors, etc.

Electrical:

- develop a plan and train field supervision and workers to react safely to lightening in the area

STI:

- prepare for work by stretching to help protect yourself from soft tissue injuries
- avoid poor posture and using awkward positions for any length of time
- change positions frequently
- use proper lifting techniques
- use mechanical assistance for handling materials

Personal protective equipment:

When you are working on a road construction site, always wear basic protection:

- sturdy boots
- hard hat
- safety glasses
- high-visibility clothing
- long sleeves and pants or coveralls to protect your skin
- safety glasses
  - a face shield to protect your eyes and face when cutting or grinding

Conclusion

Asphalt paving is one of the higher risk occupations in the construction industry. Heavy equipment and machinery, hot asphalt, and vehicular traffic can expose unwary workers to serious injury and possibly death.

By paying attention to controls for traffic, as well as the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your workplace.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Asphalt Paving and Patching Operations quiz NAME: _____

1. A slip, trip, or fall on the same level can be just as deadly as a fall from height.
   ○ True ○ False

2. A worker on foot being struck by a backing dump truck is a rare type of accident in asphalt work.
   ○ True ○ False

3. It is the responsibility of everyone on the job to watch for overhead power lines and make sure equipment stays a safe distance away.
   ○ True ○ False

4. Soft tissue injuries, like strains and sprains, happen frequently in asphalt work and can have a lifelong impact on the injured worker.
   ○ True ○ False

5. Jumping off equipment leads to many serious soft tissue injuries and may be avoided by using the provided hand holds and rungs.
   ○ True ○ False

6. Making sure the guards are installed on all equipment is a good way to prevent caught-in type accidents.
   ○ True ○ False

7. Workers should stand between the backing dump truck and the hopper to make sure they know exactly how close the truck is.
   ○ True ○ False

8. Stretching helps prevent soft tissue injuries.
   ○ True ○ False

9. Long-sleeved clothing will help protect asphalt workers' skin from the sun as well as burns from contact with hot material or equipment.
   ○ True ○ False

10. Workers on foot should NEVER stand between anything and a backing truck.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

HWSP

Concrete Paving and Patching Work

Concrete Paving and Patching Work

This discussion is about safe work procedures during concrete paving and patching operations. Whatever your job is, you will be exposed to many hazards, including vehicular traffic, moving heavy equipment, and manual material handling.

Public traffic may be confined to one or two lanes, putting the vehicles, construction workers, and equipment in close proximity to one another.

Concrete paving and patching work is also very labor intensive, involving lifting, pushing, pulling, stooping, bending, and material handling.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck By, Caught In/Between, and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STIs). STIs are rarely fatal but are a great contributor to painful, disabling injuries that may require time away from work and can result in a serious impact on physical ability. These injuries often show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely source for sustaining a crippling injury or dying while on the job as a construction worker.

Successful completion of the day's tasks means 'injury free' and provides a smooth riding surface that you, your family, and the entire community can enjoy for years to come.

Exposures

Exposures are the situations workers find themselves in and around that are likely to lead to an accident and injury.

Exposures – Falls

All falls, even falls from level ground, can be serious. Falls from elevations in concrete operations are likely to occur:

- from trucks, truck beds, and trailers
- from equipment
- at the batch plant
- during bad weather, especially if ice and snow cover surfaces

Same-level falls may occur if a worker:

- slips or trips over materials or debris
- loses traction on slippery surfaces
- moves quickly to avoid an oncoming truck or equipment
- slips during bad weather, especially if ice and snow cover surfaces

Falls can occur at any level. All falls, even falls from level ground, may result in abrasions, contusions, fractures, or death.

Exposures – Struck By

Concrete paving workers may be struck by:

- public vehicles intruding into the work zone
- construction equipment, including loaders and backhoes
- construction vehicles – pickups, delivery, and dump trucks
- falling objects – materials and equipment from passing vehicles
- suspended or moving loads
- light tower set-up or take-down
- bridge operations located overhead
- flying particles, splashes of aggregate material, slurry water, and concrete
- material during loading and unloading operations, including unexpected shifting

Exposures – Caught In / Between

Caught-in-between hazards include:

- moving and rotating parts on heavy machinery and equipment
- backing dump truck and a paving machine
- other equipment and stationary objects
- loading or unloading materials creating pinch points

Any of these caught-in exposures can lead to serious injuries, including amputations, severe crushing injuries, or even death.

Exposures – Electrical

Workers in concrete paving operations are at risk from electrical shock when:

- a truck or loader comes in contact with overhead power lines
- using damaged cords
- using damaged power tools
- using damaged or ungrounded generators
- lightning strikes

Exposures – Soft Tissue Injury

Soft tissue injuries – strains and sprains primarily – are the number one injury type in highway/street/road work, including concrete paving and patching.

Concrete paving and patching exposures include:

- lifting
- awkward and/or fixed postures, such as tying rebar at ground level
- frequent, heavy lifting
- overreaching and accessing equipment
- carrying
- bending

- pushing
- pulling
- setting/stripping forms
- excessive vibration, such as a concrete vibrator

Controls

The hazards we have just discussed – falls, struck-bys, caught-in-betweens, electrocutions, and soft tissue injuries – can be prevented in concrete paving and patching operations.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those physical acts that are required to positively eliminate, or substitute for, the exposure.

Administrative controls focus on implementing safe work procedures such as planning and communicating for separation between workers and equipment, worker rotation, etc.

Administrative controls also emphasize using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and they use PPE automatically and effectively. Many do not, allowing injuries to occur.

Engineering Controls

- Falls:
  - ladders and steps are in place and in good repair
  - use steps with non-skid surfaces
  - use scissors and aerial lifts in place of ladders where possible
- Struck-bys:
  - proper systems of traffic control
  - ensure the use of back-up alarms or Proximity Warning Devices
  - good housekeeping to minimize dangerous flying or falling objects
- Caught-in-betweens:
  - use machine guards to eliminate pinch points
  - require spotters to guide vehicles when backing
- Electrical:
  - contact utilities to de-energize or mark or insulate overhead and underground utilities
  - mark power lines for increased visibility
  - proper maintenance of tools and equipment
  - proper grounding of tools and equipment

Administrative Controls

Falls:

- walk with care on muddy, wet, or uneven surfaces
- climbing on or off a truck or construction equipment, use the steps and hand holds
- plan and communicate separation between workers and equipment
- required regular and documented inspections of electrical equipment

Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- use a spotter for equipment operations

(This is one of the key administrative controls for the reduction of struck-by, caught-in, and electrical hazards.)

- warn workers when loads may pass overhead
- plan ahead when unloading materials so they will not strike you if they fall unexpectedly

Caught-in-between:

- keep safety guards on tools
- avoid pinch points
  - when opening and closing tailgates
  - when unloading materials and moving forms that may shift unexpectedly, especially off trucks
  - by maintaining awareness of moving equipment – do not stand between it and another object

STI:

Remember, concrete is heavy and you must be careful to avoid back, shoulder, or other muscle strains.

- prepare for work by stretching to help protect yourself from soft tissue injuries
- take advantage of mechanized equipment such as power screeds to avoid repetitive motion injuries and stress and strain on your hands and arms
- avoid poor posture and using awkward positions for any length of time
- set up storage and work at waist height to prevent excessive bending
- change positions frequently
- use proper lifting technique
- use mechanical assistance for handling materials
- worker rotation for repetitive tasks, stooping and bending over more than a few hours

Personal protective equipment:

When you are working on a concrete highway construction site, always wear basic protection:

- sturdy boots
- hard hat
- high-visibility clothing
- long sleeves and pants or coveralls to protect your skin
- safety glasses
- a face shield to protect your eyes and face when cutting or grinding or when concrete may splash into your eyes
- when lifting and carrying, wear gloves and shoulder pads
- when working low or at ground level, use knee pads

Conclusion

Concrete paving operations can expose workers to many hazards: traffic, heavy equipment, manual material handling, and varying environmental conditions.

Other safety issues, such as safety in crane operations, rigging, fall protection, and trenching, pose additional hazards, and require further, and more task-specific, training.

By paying attention to controls for traffic and using the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your workplace.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Concrete Paving and Patching Work quiz NAME: _____

1. Falls are not a danger to the workers at the concrete plant.
   ○ True ○ False

2. Being struck by something is one of the greatest hazards in concrete work.
   ○ True ○ False

3. Keeping the truck ladders clear of concrete, mud, etc., helps prevent falls from the truck.
   ○ True ○ False

4. Good communication between operators and concrete workers has no impact on avoiding accidents.
   ○ True ○ False

5. Spotters do not help avoid accidents when concrete trucks or pumpers are backing up.
   ○ True ○ False

6. Stretching may help prevent injuries to the back and other joints.
   ○ True ○ False

7. Jumping off structures, equipment, etc., will not help cause soft tissue injuries.
   ○ True ○ False

8. Concrete workers always have to be aware of moving equipment around them to avoid being struck by it.
   ○ True ○ False

9. Good housekeeping such as maintaining clear walkways will help prevent injuries in concrete work.
   ○ True ○ False

10. Using personal fall protection when working on forms is not important because there is usually something nearby to grab if you slip.
   ○ True ○ False

* Answers located in the Appendixes at the end of the book.

HWSP

Bridge Construction Work

Bridge Construction Work

Bridge construction workers share many of the hazards associated with highway and street construction, including exposure to slips, trips, falls, vehicular traffic, construction equipment, falling or flying objects, and material handling.

In bridge work, these hazards are magnified, because the work may be at heights, over water, or in a constricted work environment.

Public traffic may be confined to one or two lanes, putting the vehicles and construction workers and equipment in close proximity to one another.

Bridge construction work is also very labor intensive, involving lifting, pushing, pulling, stooping, bending, and material handling. In addition, materials and objects may fall and become potentially fatal projectiles. Bridge work holds the added possibility that any accident occurring at height could be compounded by a deadly fall.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck By, Caught In/Between, and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STI). STIs are rarely fatal but are a great contributor to painful and sometimes disabling injuries that often require time away from work and may result in a serious impact on physical ability. These injuries often show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely means of sustaining a potentially crippling injury or dying while on the job as a construction worker.

Successful completion of the day's tasks means 'injury free' and provides a smooth riding surface over ground features that you, your family, and the entire community can enjoy for years to come.

Exposures

Exposures are the situations workers find themselves in and around that may lead to an accident and injury.

Exposures – Falls

All falls, even falls from level ground, can be serious. Falls from elevations are a major contributor to injuries on bridge projects. A fall into water could be fatal due to impact or drowning.

Tasks that put workers at risk of falls include:

- abutment construction
- column or cap forming
- stripping formwork
- girder installation
- deck placement
- forming barrier rail
- placement of concrete
- paving

Falls also may occur during bad weather, especially if ice and snow cover bridge surfaces.

Falls can occur at any level. Even seemingly minor slips and trips can cause major injuries, such as contusions, fractures, and even death.

Exposures – Struck By

Bridge construction workers may be struck by:

- passing vehicles
- construction equipment
- falling objects
- suspended or moving loads
- concrete buckets
- concrete during column pours
- flying objects from impact tools like grinders, chippers, and jackhammers

When moving materials, the unexpected can easily happen.

Installing pans, railings, and other items presents the opportunity for dropped items striking workers.

A sudden gust of wind, too, may blow materials and strike a worker. Even a small piece of material can cause injury.

Exposures – Caught In / Between

Bridge construction work involves cranes and other heavy equipment. Being pinned and crushed between that equipment and a stationary object such as a parked truck or bridge pier is, unfortunately, all too common in bridge work.

Workers loading or unloading materials may be exposed to pinch points.

Additionally, workers may be at risk of an excavation cave-in when working around abutments and forming footers.

Any of these caught-in exposures can lead to serious injuries, including amputations, severe crushing injuries, or even death.

Exposures – Electrical

Workers in bridge construction face many of the electrical hazards associated with road work sites, including these exposures:

- faulty electrical equipment
- underground and overhead power lines
- lightning strikes
- damaged or ungrounded generators
- faulty temporary electrical cords

Exposures - Soft Tissue Injury

Soft tissue injuries, including strains and sprains, are the number one injury type in highway/street/road work.

Bridge construction exposures include:

- climbing
- lifting
- carrying
- bending
- pushing
- pulling
- repetitive motions like wire twisting for tying rebar
- setting/stripping forms
- using tools, including shovels, hammers, wrenches, and wire tools

Excessive vibration can cause soft tissue injuries as well.

Controls

The hazards we have just discussed – falls, struck-bys, caught-in-betweens, electrocutions, and soft tissue injuries – can be prevented in bridge work.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those physical acts that are required to positively eliminate, or substitute for, the exposure.

Administrative controls focus on implementing safe work procedures such as planning and communicating separation between workers and equipment and worker rotation.

Administrative controls also emphasize using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and use PPE automatically and effectively. Many do not, allowing injuries to occur.

Engineering Controls

Falls:

- maintaining guardrails or safety netting at all elevated work areas
- keeping walking and working surfaces free of mud and other slippery materials
- ensuring that ladders, scaffolds, and steps are in place and in good repair
- using steps with non-skid surfaces
- using aerial and scissors lifts in place of ladder where possible

Struck-bys:

- proper systems of traffic control
- ensure the use of back-up alarms or Proximity Warning Devices
- tag lines to control suspended loads
- good housekeeping to minimize the dangerous flying or falling objects

Caught-in-betweens:

- use sloping, trench boxes, or shoring to prevent soils collapse
- use machine guards to eliminate pinch points
- require spotters to guide vehicles backing within the work zone

Electrical:

- contact utility companies to de-energize or mark overhead and underground utilities
- mark and insulate power lines for increased visibility

- proper maintenance of tools and equipment
- proper grounding of tools and equipment

Administrative Controls

Falls:

- walk with care on muddy, wet, or uneven surfaces
- climbing on or off a truck or construction equipment, use the steps and hand holds
- plan and communicate separation between workers and equipment

Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- use a spotter for equipment operations

(This is one of the key administrative controls for the reduction of struck-by, caught-in-between, and electrical hazards.)

- warn workers when loads may pass overhead
- plan ahead when unloading materials so they will not strike you if they fall unexpectedly

Caught-in-betweens:

- keep safety guards on tools
- keep tools and equipment secured in place when stored on the bridge deck
- avoid pinch points when
  - opening and closing tailgates
  - unloading materials and moving forms that may shift unexpectedly, especially off trucks
- maintain awareness of moving equipment – do not stand between it and another object or piece of equipment

STI:

- prepare for work by stretching to help protect yourself from soft tissue injuries
- avoid poor posture and using awkward positions for any length of time
- set up storage and work at waist height to prevent bending
- change positions frequently
- use proper lifting techniques
- use mechanical assistance for handling materials
- worker rotation for repetitive tasks, stooping and bending over more than a few hours

Personal protective equipment:

When you are working on a bridge construction site, always wear basic protection:

- sturdy boots
- hard hat
- high-visibility clothing
- long sleeves and pants or coveralls to protect your skin
- safety glasses
- a face shield to protect your eyes and face when cutting or grinding
- when lifting and carrying, wear gloves and shoulder pads
- when working low or at ground level, use knee pads
- when working over or near water, wear a life vest

Conclusion

Bridge construction exposes workers to many hazards: working at heights, handling heavy materials, equipment, traffic, and varying environmental conditions.

Other safety issues, such as safe work practices in crane operations, rigging, fall protection, and trenching, pose additional hazards, and require further, and more task-specific, training.

By paying attention to controls for traffic and using the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your workplace.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Bridge Construction Work quiz NAME: _____

1. Passing traffic, either on or below the bridge under construction, is of no concern to bridge workers.
   ○ True ○ False

2. It is OK to work under suspended loads as long as you know they are up there.
   ○ True ○ False

3. Maintaining and using good guardrails, net systems, or anchorage points with personal fall arrest systems can help prevent injuries should a fall occur.
   ○ True ○ False

4. Good housekeeping will not help prevent struck-by accidents.
   ○ True ○ False

5. Overhead power lines that are de-energized or moved out of the work zone are the safest to work around.
   ○ True ○ False

6. If workers request a Lull or forklift to move a pallet of material, it shows management they are lazy.
   ○ True ○ False

7. Planning work daily, even task by task, is the foundation for working safely.
   ○ True ○ False

8. When in a work zone with signs, barrels, and cones, workers near traffic do not have to be aware of their surroundings and know an escape path to be safe.
   ○ True ○ False

9. Using a spotter for all backing operations and all work near power lines is a good safe work practice.
   ○ True ○ False

10. Storing tools and materials securely so they will not fall or be blown off the structure is a good safety practice for bridge workers.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

Utility Operations

Utility Operations

This discussion relates to safe work practices during utility operations. Whatever your job, you will be exposed to many hazards, including vehicular traffic, collapse of soils or adjacent utility structures, manual material handling, electrical, and other utility-related hazards.

While all highway and street construction work can be dangerous, utility work poses unique hazards to workers. These include exposure to oncoming traffic and construction vehicles, limited notice, and often a short turn-around time.

Utility workers are exposed to more than just electrical hazards. Gas and water are also exposures.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck By, Caught In/Between, and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STIs). STIs are rarely fatal but are a great contributor to painful disabling injuries that often require time away from work and can result in a serious impact on physical ability.

These injuries often show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely source for sustaining a crippling injury or dying while on the job as a construction worker.

Successful completion of the day's tasks means 'injury free.' The job is not done right if someone is hurt doing it. Participate and learn so you will be prepared to do your job safely, and help eliminate risks to you and to your co-workers.

Exposures

Exposures are the situations workers find themselves in and around that are likely to lead to an accident and injury.

Exposures – Falls

Falls in utility work may occur from elevations such as:

- bucket trucks
- poles
- tower structures
- truck beds
- ladders

Falls may occur at any level. In utility operations, workers are exposed to:

- uneven terrain
- sharp changes in elevations
- slick and muddy surfaces
- open excavations
- ice- and snow-covered surfaces

Even minor slips and trips may cause major injuries, such as contusions, fractures, and even death.

Exposures – Struck By

- utility work involves moving equipment and materials as well as vehicles
- workers on foot are in close proximity to moving heavy equipment, therefore often exposed to struck-by injuries

Utility workers may also be struck by:

- falling poles or structures
- buckets and arms of excavation equipment
- movement of steel road plates
- debris falling or flying from passing vehicles
- objects blown by the wind

Even a small piece of material can cause injury if it hits someone in the eye.

Exposures – Caught In / Between

While the most common and serious caught-in-between hazard may be trench or excavation collapse, utility work also involves rotating or moving equipment.

Workers may be crushed between backing equipment or vehicles and other equipment or stationary objects.

Injuries also occur when workers are:

- pinned by shifting loads
- crushed or pinned when loading and unloading equipment on trailers

Any of these caught-in exposures can lead to serious injuries, including amputations, severe crushing injuries, or even death.

Exposures – Electrical

Electrical exposures in utility work include:

- using portable tools and equipment
- equipment that is not grounded properly
- faulty equipment due to poor maintenance
- the drastically increased potential for electrical shock
- equipment striking an overhead power line or underground line

Exposures – Soft Tissue Injury

Soft tissue injuries – strains and sprains – are the number one injury type in highway/street/road work, including utility work.

Utility work exposures include:

- moving heavy materials
- pick-and-shovel work where equipment can't reach

- walking on uneven ground
- operators jumping off equipment and landing in uneven dirt
- awkward postures
- bending for extended periods

All of these actions may strain or sprain shoulders, elbows, knees, ankles, and backs.

Controls

The hazards we have just discussed – falls, struck-bys, caught-in-betweens, electrocutions, and soft tissue injuries – can be prevented in utility work.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those physical acts that are required to positively eliminate, or substitute for, the exposure.

Administrative controls focus on implementing safe work procedures such as planning and communicating, separation between workers and equipment, and worker rotation.

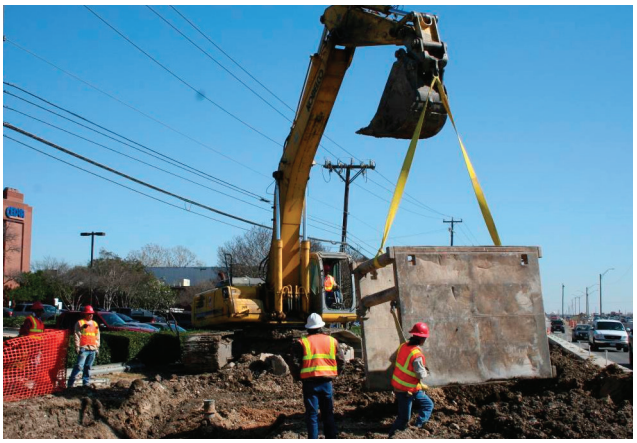
Administrative controls also emphasize using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and use PPE automatically and effectively. Many do not, allowing injuries to occur.

Engineering Controls

Falls:

- provide adequate lighting
- ensure that truck and equipment steps are in place and in good condition
- use steps with non-skid surfaces



- maintain truck and equipment steps in good condition
- maintain good housekeeping
- inspect ladders to ensure they are in good condition

Struck-bys:

- proper systems of traffic control implemented
- ensure the use of back-up alarms or Proximity Warning Devices
- good housekeeping to minimize dangerous flying or falling objects
- effective use of a traffic control truck

Caught-in-betweens:

- use machine guards to eliminate pinch points
- properly guard rotating equipment
- require personnel to guide vehicles when backing

Safe excavations:

- sloping
- shoring
- trench boxes
- the edge of the spoil pile must be kept a minimum of two feet from the edge of the excavation

Electrical:

- use "One-Call"
- contact utility company to mark, de-energize, and/or insulate overhead and underground utilities

- use spotters when working around backing equipment or overhead power lines
- proper grounding of tools and equipment
- proper maintenance of tools and equipment

STI:

- use mechanical assistance
- stretch/change positions at every opportunity
- store materials within the body's "strike zone" – approximately waist high

Administrative Controls

Administrative controls also emphasize safe work practices to avoid potentially hazardous exposures.

General:

- traffic control plans to separate workers on foot from vehicular traffic and moving equipment
- training emphasizes using safe work practices to avoid potentially hazardous exposures

Falls:

- walk with care on muddy, wet, slick, or uneven, irregular surfaces
- while climbing on or off a truck or construction equipment, use the steps and hand holds

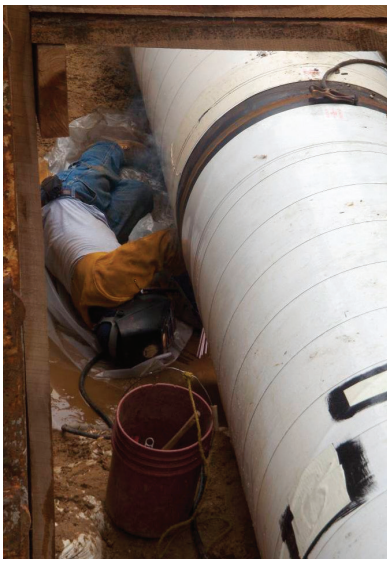
Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- use a spotter for equipment operations

(This is one of the key administrative controls for the reduction of struck-by, caught-in-between, and electrical hazards).

- educate to observe approaching vehicles for thrown items
- plan ahead when unloading materials so they will not strike you if they fall unexpectedly

Caught-in-between:



- do not remove or alter safety guards on any machinery or equipment
- keep your hands and fingers away from pinch points on machines and equipment
  - when opening and closing tailgates
  - unloading materials and moving forms that may shift unexpectedly, especially off trucks
- maintain awareness of moving equipment – do not stand between equipment and another piece of equipment or object

Electrical:

- educate to be aware of electrical hazards
- maintain a safe distance from energized lines
- require regular and documented inspections of electrical cords and equipment
- follow NFPA 70E requirements when performing utility work near energized electrical hazards

STI:

- educate workers to:
  - know and use stretching exercises to 'warm up'
  - avoid poor posture and awkward positions
  - change positions frequently
  - know and use proper lifting techniques
  - rotate workers in repetitive assignments

Personal protective equipment:

When performing utility work, wear basic protection:

- sturdy boots
- hard hat
- safety glasses
- high-visibility clothing
- long sleeves and pants or coveralls to protect your skin
- when lifting and carrying, wear gloves and shoulder pads
- use knee pads when kneeling
- wear additional foot protection (metatarsal protection) when operating jackhammers, jumping jacks, or walk-behind vibrator/rollers
- a face shield to protect your eyes and face when cutting or grinding

Conclusion

Utility work can expose workers to many hazards: traffic, heavy equipment, manual material handling, and varying environmental conditions.

Other safety issues, such as safety in crane operations, rigging, fall protection, and trenching, pose additional hazards, and require further, and more task-specific, training.

By paying attention to controls for traffic and using the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your workplace.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Utility Operations quiz

NAME: _____

1. Limited prior notice may limit planning time and compounds utility work hazards.
   ○ True ○ False

2. Utility workers are accustomed to working near live utility lines and do not have to use the "One-Call" process.
   ○ True ○ False

3. Rotating backhoes do not pose a hazard to utility workers.
   ○ True ○ False

4. Vehicles intruding into work zones are an exposure to utility workers best controlled by depending on others nearby to provide a warning.
   ○ True ○ False

5. Spotters help avoid accidents when equipment such as backhoes is operating near overhead power lines.
   ○ True ○ False

6. When digging a trench to access underground utilities, the spoil pile centerline has to be at least two feet from the edge of the trench.
   ○ True ○ False

7. Only the superintendent and crew leader of workers exposed to electrical arcs must have NFPA 70E training.
   ○ True ○ False

8. For utility workers, the 'SEE AND BE SEEN' principle is very important.
   ○ True ○ False

9. Electrical, gas, and water utilities are all exposures in this line of work.
   ○ True ○ False

10. A traffic control plan is a key to protecting utility workers in work zone situations.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

HWSP

Demolition Operations

Demolition Operations

This discussion is about safe work procedures during demolition operations. Whatever your job, you will be exposed to many hazards, including vehicular traffic, heavy moving equipment, and manual material handling.

Public traffic may be confined to one or two lanes, putting the vehicles and construction workers and equipment in close proximity to one another.

Demolition work is also very labor intensive, involving lifting, pushing, pulling, stooping, bending, and material handling.

Compounding these hazards is the fact that there is pressure to complete demolition of bridges and structures on road projects so that traffic can re-open. This can cause everyone to hurry, creating even more opportunity for accidents.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck By, Caught In/Between and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STIs). STIs are rarely fatal but are a great contributor to painful disabling injuries that often require time away from work and result in a serious impact on physical ability. These injuries often show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely source for sustaining a crippling injury or dying while on the job as a construction worker.

Successful completion of the day's tasks means 'injury free.' The job is not done right if someone gets hurt doing it.

Exposures

Exposures are the situations workers find themselves in and around that are likely to lead to an accident and injury.

Exposures – Falls

All falls, even falls from level ground, can be serious.

Same-level falls may occur if a worker:

- slips or trips on uneven/partially removed surfaces
- slips or trips over materials or debris
- loses traction on slippery surfaces
- moves quickly while avoiding an oncoming truck or equipment
- slips during bad weather, especially if ice and snow cover surfaces

Often, workers performing demolition work tear down the very place where they are standing, increasing the risk of falls.

Falls from elevations in demolition operations are likely to occur:

- from trucks, truck beds, and trailers
- from equipment
- due to the structure being demolished
- during bad weather, especially if ice and snow cover surfaces

Falls can occur at any level. All falls, even falls from level ground, may result in abrasions, contusions, fractures, or even death.

Exposures – Struck By

Demolition workers may be struck by:

- construction vehicles – pickups, delivery, and dump trucks
- construction equipment, including loaders and backhoes used for demolition
- operators who do not see workers on foot
- workers stepping in the path of moving equipment
- falling/flying objects - materials and equipment from operations
- suspended or moving loads
- light tower set-up or take-down
- public vehicles intruding into the work zone
- moving materials due to unexpected shifting

Exposures – Caught In / Between

Caught-in-between hazards include:

- moving and rotating parts on heavy machinery and equipment
- backing dump trucks
- other equipment and stationary objects
- loading or unloading materials creating pinch points
- rubble piles and shifting/unstable demolished materials

A crusher plant may be set up adjacent to the demolition process, creating an additional exposure to belts, crushing equipment, trucks, and loaders.

Any of these caught-in exposures can lead to serious injuries, including amputations, severe crushing injuries, or even death.

Exposures – Electrical

Workers in concrete paving operations are at risk from electrical shock when:

- a truck or crane comes in contact with overhead power lines
- striking underground power lines during jackhammer/ excavation work
- using damaged electrical cords
- using damaged power tools
- using damaged or ungrounded generators
- lightning strikes

Exposures – Soft Tissue Injury

Soft tissue injuries – strains and sprains primarily – are the number one injury type in highway/street/road work, including demolition work.

Demolition exposures include:

- frequent, heavy lifting
- jackhammer/pick-and-shovel work
- awkward and/or fixed postures
- walking on uneven surfaces
- jumping from elevated position to ground or lower level
- hurrying – not thinking ahead
- overreaching
- carrying
- bending
- pushing
- pulling
- excessive vibration

Controls

The hazards we have just discussed – falls, struck-bys, caught-in-betweens, electrocutions, and soft tissue injuries – can be prevented in demolition work.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those physical acts that are required to positively eliminate, or substitute for, the exposure.

Administrative controls focus on implementing safe work procedures such as planning and communicating separation between workers and equipment and worker rotation.

Administrative controls also emphasize using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and use PPE both automatically and effectively. Many do not, allowing injuries to occur.

Engineering Controls

Falls:

- be careful when walking on muddy, wet, or icy surfaces
- watch your step when walking on irregular ground
- maintain truck and equipment steps in good condition
- use the steps and hand holds
- use steps with non-skid surfaces
- provide adequate lighting
- use scissors and aerial lifts in place of ladders where possible

Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- observe approaching vehicles, especially pickups, for loose articles that may become dangerous projectiles
- proper systems of traffic control implemented
- ensure the use of back-up alarms or Proximity Warning Devices
- good housekeeping to minimize the dangerous flying or falling objects

Caught-in-betweens:

- use machine guards to eliminate pinch points
- do not remove or alter safety guards on any machinery or equipment
- keep your hands and fingers away from pinch points on machines and equipment
- require spotters to guide vehicles when backing

Electrical:

- require spotters when working around backing equipment or overhead power lines
- mark power lines for increased visibility
- proper grounding of tools and equipment
- proper maintenance of tools and equipment

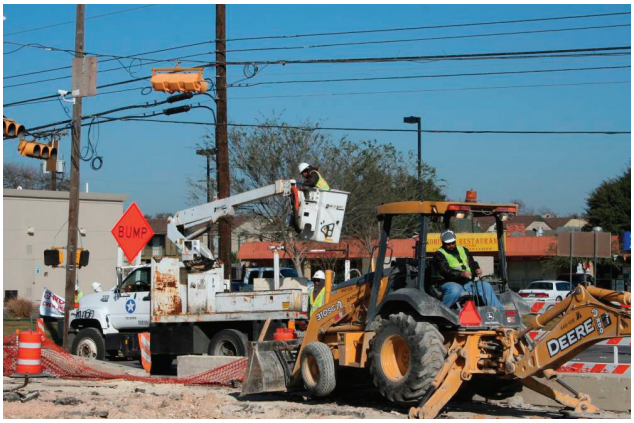
STI:

- change positions frequently
- use proper lifting techniques
- take advantage of mechanical equipment to move heavy objects

Administrative Controls

General:

- traffic control plans to separate workers on foot from workers on equipment
- worker rotation
- training emphasizes using safe work practices to avoid potentially hazardous exposures



Falls:

- climbing on or off a truck or construction equipment, use the steps and hand holds
- walk with care on muddy, wet, or uneven surfaces
- planning and communicating separation between workers and equipment

Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- use a spotter for equipment operations (This is one of the key administrative controls for the reduction of struck-by, caught-in-between, and electrical hazards.)
- observe approaching vehicles, especially pickups, for loose articles that may become dangerous projectiles
- warn workers when loads may pass overhead
- plan ahead when unloading materials so they will not strike you if they fall unexpectedly

Caught-in-betweens:

- keep safety guards on tools
- avoid pinch points
  - when opening and closing tailgates
  - unloading materials and moving forms that may shift unexpectedly, especially off trucks
- maintain awareness of moving equipment – do not stand between it and another object

STI:

Remember, construction materials are heavy and you must be careful to avoid back, shoulder, or other muscle strains.

- make an effort to stay physically fit
- use skid loaders to avoid repetitive motion injuries and stress and strain on your hands and arms
- avoid poor posture and using awkward positions for any length of time
- set up storage and work at waist height to prevent bending – keep materials in the "strike zone" whenever possible
- change positions frequently
- use proper lifting technique
- use mechanical assistance for handling materials
- use worker rotation for repetitive tasks, and to avoid stooping and bending for long periods of time

Personal protective equipment:

When you are working demolition, always wear basic protection:

- sturdy boots
- hard hat
- safety glasses
- high-visibility clothing
- long sleeves and pants or coveralls to protect your skin

- a face shield to protect your eyes and face when cutting or grinding
- when lifting and carrying, wear gloves and shoulder pads
- when working low or at ground level, use knee pads
- wear metatarsal protection when operating a jackhammer
- when at elevations, always wear a personal fall arrest system (PFAS)
  - inspect the equipment before use
  - be sure that you're properly trained to use a PFAS
- wear a life vest when working over or near water

Conclusion

Demolition operations can expose workers to many hazards: traffic, heavy equipment, manual material handling, and varying environmental conditions.

Other safety issues, such as safety in crane operations, rigging, fall protection, and trenching, pose additional hazards, and require further, and more task-specific, training.

By paying attention to controls for traffic, and using the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your work place.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Demolition Operations quiz

NAME: _____

1. Demolition workers have to be aware that what they are cutting down may be what they are standing on or under.
   ○ True ○ False

2. Rapid movement of equipment on demo jobs requires workers be constantly vigilant of blind spots.
   ○ True ○ False

3. PPE is especially important to demolition workers as material may easily be knocked through the air.
   ○ True ○ False

4. Leaving the guards off equipment that is only used a short time is OK as it speeds up the job.
   ○ True ○ False

5. Electrical shock in demolition work can only come from overhead power lines.
   ○ True ○ False

6. Stretching may help prevent injuries to the back and other joints.
   ○ True ○ False

7. Jumping off structures, equipment, etc., is not a factor leading to soft tissue injuries.
   ○ True ○ False

8. Fall protection systems are not important to demolition workers because they take too much time to set up.
   ○ True ○ False

9. Good housekeeping such as maintaining clear walkways will help prevent injuries in demolition work.
   ○ True ○ False

10. Wearing metal covers (metatarsal guards) over your boots is not required when operating a jackhammer.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

HWSP

Grading and Earthmoving Operations

Grading and Earthmoving Operations

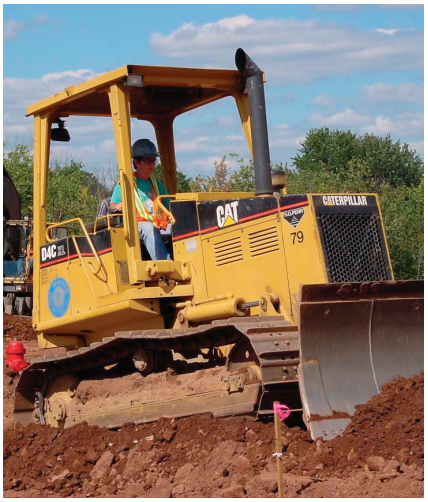
This discussion is about safe work procedures during grading and earthmoving operations. Whatever your job, you will be exposed to many hazards, including vehicular traffic, heavy, moving equipment, and manual material handling.

Dirt work is also very labor intensive, causing stress and strain on the joints and muscles. Soft tissues injuries are very common.

Public traffic may be confined to one or two lanes, putting the vehicles and construction workers and equipment in close proximity to one another.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck By, Caught In/Between and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STIs). STIs are rarely fatal but are a great contributor to painful disabling injuries that often require time away from work and can have a serious impact on physical ability. These injuries often show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely source for sustaining a crippling injury or even dying while on the job as a construction worker.

Successful completion of the day's tasks means 'injury free.' The job is not done right if someone gets hurt doing it.



Exposures

Exposures are the situations workers find themselves in and around that are likely to lead to an accident and injury.

Exposures – Falls

Falls in dirt work are most likely to occur as a result of a slip or trip while working on uneven ground or while getting on and off equipment. All falls – even same-level falls – can be serious.

Same level falls may occur if a worker:

- slips or trips on uneven surfaces
- loses traction on slippery surfaces
- moves quickly while avoiding an oncoming truck or equipment
- slips during bad weather, especially if ice and snow cover surfaces

Falls from elevations in grading operations are likely to occur:

- from equipment
- from truck beds and elevated truck trailers while loading or unloading materials/equipment
- during bad weather, especially if ice and snow cover surfaces

Falls can occur at any level. All falls, even falls from level ground, may result in abrasions, contusions, fractures, or death.

Exposures – Struck By

One of the greatest struck-by hazards in dirt work is the risk of being struck by:

- construction vehicles – pickups, delivery trucks
- construction equipment, including loaders and backhoes
- operators who may not see a worker on foot:
  - if the worker steps into an equipment blind spot
  - the larger the equipment, the larger the blind spots
- moving equipment if the worker steps in its path
- rotating equipment such as a backhoe
- falling/flying objects – materials and equipment from operations
- suspended or moving loads
- light tower set-up or take-down
- public vehicles intruding into the work zone
- moving materials, if unexpected shifting occurs

Exposures – Caught In / Between

Caught-in-between hazards include:

- moving and rotating parts on heavy machinery and equipment
- backing dump trucks
- moving heavy equipment and stationary equipment/objects
- excavation/trench wall collapse
- loading or unloading materials creating pinch points

Any of these caught-in exposures can lead to serious injuries, including amputations, severe crushing injuries, or even death.

Exposures – Electrical

Workers in grading operations are at risk from electrical shock when:

- a truck or crane comes in contact with overhead power lines
- striking underground power lines during excavation work
- lightning strikes
- using damaged or ungrounded generators

Exposures – Soft Tissue Injury

Soft tissue injuries – strains and sprains – are the number one injury type in highway/street/road work, including grading work.

Grading exposures include:

- frequent, heavy lifting
- pick-and-shovel work
- jumping from elevated position (off equipment) to ground or lower level
- walking on uneven surfaces
- awkward and/or fixed postures
- carrying
- bending
- pushing
- pulling
- excessive vibration
- repetitive motions

Controls

The hazards we have just discussed – falls, struck-bys, caught-in-betweens, electrocutions, and soft tissue injuries – can be prevented in grading work.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those physical acts that are required to positively eliminate, or substitute for, the exposure.

Administrative controls focus on implementing safe work procedures such as planning and communicating separation between workers and equipment and worker rotation.

Administrative controls also emphasize using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and use PPE automatically and effectively. Many do not, allowing injuries to occur.

Engineering Controls

Falls:

- provide adequate lighting
- warn of open excavations
- ensure that truck and equipment handrails are in place and in good condition
- use steps with non-skid surfaces
- maintain truck and equipment steps in good condition

Struck-bys:

- proper systems of traffic control implemented
- ensure the use of back-up alarms or Proximity Warning Devices
- good housekeeping to minimize dangerous flying or falling objects

Caught-in-betweens:

- proper guarding of rotating equipment
- securing open excavations with shoring, sloping, or trench boxes
- using machine guards to eliminate pinch points

Electrical:

- contact utility companies to mark, de-energize, and/or insulate overhead and underground utilities
- mark power lines for increased visibility
- use spotters when working around backing equipment or overhead power lines

- proper inspection and grounding of tools and equipment
- proper maintenance of tools and equipment

STI:

- stretch at every opportunity
- change positions frequently

Administrative Controls

General:

- traffic control plans to separate workers on foot from vehicular traffic and workers on equipment
- worker rotation
- training emphasizes using safe work practices to avoid potentially hazardous exposures

Falls:

- train workers to walk with care on muddy, wet, slick, or uneven, irregular surfaces
- climbing on or off a truck or construction equipment, use the steps and hand holds

Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- use a spotter for equipment operations (This is one of the key administrative controls for the reduction of struck-by, caught-in-between, and electrical hazards.)
- warn workers when loads may pass overhead
- planning and communicating separation between workers and equipment

- plan ahead when unloading materials so they will not strike you if they fall unexpectedly

Caught-in-betweens:

- do not remove or alter safety guards on any machinery or equipment
- keep your hands and fingers away from pinch points on machines and equipment
  - when opening and closing tailgates
  - while unloading materials and moving forms that may shift unexpectedly, especially off trucks
- maintain awareness of moving equipment – do not stand between equipment and another object

Electrical:

- develop a plan and train field supervision and workers to react safely to lightening in the area

STI:

- know and use stretching exercises to 'warm up'
- avoid poor posture and awkward positions
- change positions frequently
- know and use proper lifting techniques
- store materials in the body's "strike zone" – approximately waist high

Personal protective equipment:

When you are working demolition, always wear basic protection:

- sturdy boots
- hard hat
- safety glasses
- high-visibility clothing
- long sleeves and pants or coveralls to protect your skin
- wear additional foot protection (metatarsal protection) when operating jackhammers, jumping jacks, or walk-behind rollers
- a face shield to protect your eyes and face when cutting or grinding

- when lifting and carrying, wear gloves and shoulder pads
- when working low or at ground level, use knee pads

Conclusion

Grading and earthmoving operations can expose workers to many hazards: traffic, heavy equipment, manual material handling, and varying environmental conditions.

Other safety issues, such as safety in crane operations, rigging, fall protection, and trenching, pose additional hazards, and require further, and more task-specific, training.

By paying attention to controls for traffic and using the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your work-place.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Grading and Earthmoving Operations quiz NAME: _____

1. The Focus Four includes cuts and lacerations.
   ○ True ○ False

2. Grader operators can see you anywhere you stand around them.
   ○ True ○ False

3. Mud and poor housekeeping are two exposures that may lead to workers falling from equipment.
   ○ True ○ False

4. Vehicles intruding into work zones are an exposure to grading and earthmoving workers best controlled by depending on others nearby to provide a warning.
   ○ True ○ False

5. Spotters help avoid accidents when dump trucks or other vehicles or equipment are backing up.
   ○ True ○ False

6. Equipment operators should stand and stretch at every opportunity to help prevent soft tissue injuries.
   ○ True ○ False

7. Backhoes are a type of rotating equipment that present an exposure to nearby workers on foot of being 'struck-by.'
   ○ True ○ False

8. For workers on foot, the 'SEE AND BE SEEN' principle is very important.
   ○ True ○ False

9. Lightning is a controllable form of electrical exposure for grading workers in the field.
   ○ True ○ False

10. Something as simple as walking with care on wet, muddy, slick surfaces can help prevent injuries.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

Short-Term and Mobile Operations

Short-Term and Mobile Operations

This discussion is about safe work procedures during short-term and mobile operations. Whatever your job is, you will be exposed to many hazards, including vehicular traffic, heavy, moving equipment, and manual material handling.

While all highway and street construction work can be dangerous, mobile and short-term work poses unique hazards to workers. These include exposure to oncoming traffic, multiple construction vehicles, limited notice for preparation, and short turn-around time.

Work in these operations is fast-paced, as traffic can only be impacted or detoured for a minimal amount of time. State and federal Departments of Transportation may require specific traffic control measures for short-term and mobile operations.

Our discussion will follow the 'Focus Four + One' format. The Focus Four are Falls, Struck By, Caught In/Between, and Electrical related injuries. These four exposures contribute to approximately 90 percent of the fatalities and serious injuries in the construction industry.[1] The '+ One' is soft tissue injuries (STIs). STIs are rarely fatal but are a great contributor to painful disabling injuries that often require time away from work and result in a serious impact on physical ability. These injuries often show up as back, knee, shoulder, etc., strains and sprains. In all, these five exposures are by far the most likely source for sustaining a crippling injury or dying while on the job as a construction worker.

Successful completion of the day's tasks means 'injury free.' The job is not done right if someone gets hurt doing it.

Exposures

Exposures are the situations workers find themselves in and around that are likely to lead to an accident and injury.

Exposures – Falls

Same level falls during short-term operations may occur if a worker:

- slips or trips on uneven surfaces
- loses traction on slippery surfaces
- moves quickly while avoiding oncoming traffic, trucks, or equipment
- slips during bad weather, especially if ice and snow cover surfaces

Falls from elevations in short-term and mobile operations are likely to occur:

- from trucks, truck beds, and trailers
- from equipment
- during bad weather, especially if ice and snow cover surfaces

Falls can occur at any level. All falls, even falls from level ground, may result in abrasions, contusions, fractures – even death.

Exposures – Struck By

One of the greatest struck-by hazards in short-term and mobile operations is the risk of being struck by vehicles:

- construction vehicles – pickups, delivery trucks
- construction equipment, including loaders and backhoes
- operators who do not see workers on foot
- if a worker steps into a blind spot
- if a worker steps into the path of moving equipment
- if a worker steps into or stands in the path of rotating equipment such as a backhoe
- if a worker walks too closely behind or in front of equipment moving material
- if public vehicles intrude into the work zone
- falling/flying objects – materials and equipment from operations
- suspended or moving loads
- moving materials, if unexpected shifting occurs

Rarely are there barriers to protect workers from passing traffic. Often, the only protections for workers on foot are signs, traffic control devices, arrow board trucks, and a crash attenuator.

Equipment operators and vehicle drivers moving in and out of traffic are also at risk.

Blinds spots, glare, low visibility, complacency, intoxication, and inattention can all contribute to collisions between equipment, public traffic, and workers on foot.

Exposures – Caught In / Between

Caught-in-between hazards include:

- moving and rotating parts on heavy machinery and equipment
- backing dump trucks
- heavy equipment and stationary objects
- loading or unloading materials creating pinch points

Any of these caught-in exposures can lead to serious injuries, including amputations, severe crushing injuries, even death.

Exposures – Electrical

Workers in short-term and mobile operations are at risk from electrical shock when:

- a truck crane or other equipment comes in contact with overhead power lines
- striking underground power lines
- lightning strikes
- using damaged or ungrounded generators

Exposures – Soft Tissue Injury

Soft tissue injuries – strains and sprains are the **number one** injury type for severity in highway/street/road work, including short-term and mobile operations work.[6-1]

Short-term and mobile operations exposures include:

- frequent, heavy lifting
- pick-and-shovel work
- jumping from elevated position (off equipment) to ground or lower level
- walking on uneven surfaces
- awkward and/or fixed postures
- carrying
- bending
- pushing
- pulling
- excessive vibration

The risk of soft tissue injuries is increased because workers are focused on finishing quickly, and may hurt themselves 'overdoing' or from lack of focus.

Controls

The hazards we have just discussed – falls, struck-bys, caught-in-betweens, electrocutions and soft-tissue injuries – can be prevented in short term and mobile operations work.

The key to protecting yourself includes your knowledge and use of three types of controls:

- engineering controls
- administrative controls
- personal protective equipment (PPE)

These are known as the Hierarchy of Controls and are listed in that order – most effective to least effective.

Engineering controls are those physical acts that are required to positively eliminate, or substitute for, the exposure.

Administrative controls focus on implementing safe work procedures such as planning and communicating separation between workers and equipment and worker rotation.

Administrative controls also emphasize using safe work practices to avoid potentially hazardous exposures.

PPE is listed last because it is the last means of defense from injury. PPE use unfortunately varies by individual. Some workers are more concerned with preventing injury to themselves and use PPE both automatically and effectively. Many do not, allowing injuries to occur.

Engineering Controls

Falls:

- provide adequate lighting
- ensure that truck and equipment steps are in place and in good condition
- use steps with non-skid surfaces
- maintain truck and equipment steps in good condition
- use scissors and aerial lifts in place of ladders where possible

Struck-bys:

- proper systems of traffic control implemented
- effective use of a traffic control truck and crash attenuators
- ensure the use of back-up alarms or Proximity Warning Devices
- good housekeeping to minimize the dangerous flying or falling objects

Proper positioning of the arrow board and attenuator truck is important. Often this is the only physical barrier between traffic and workers on foot. Improper positioning can endanger everyone on the crew.

Caught-in-betweens:

- use machine guards to eliminate pinch points
- properly guard rotating equipment
- require spotters to guide vehicles when backing

Electrical:

- contact utility companies to de-energize, mark or insulate overhead and underground utilities
- mark power lines for increased visibility

- spotters when working around backing equipment or overhead power lines
- proper grounding of tools and equipment
- proper maintenance of tools and equipment

STI:

- operators stretch at every opportunity
- change positions frequently

Administrative Controls

Administrative controls also emphasize safe work practices to avoid potentially hazardous exposures.

General:

- traffic control plans to separate workers on foot from workers on equipment
- worker rotation
- training emphasizes using safe work practices to avoid potentially hazardous exposures

Falls:

- walk with care on muddy, wet, slick, or uneven, irregular surfaces
- climbing on or off a truck or construction equipment, use the steps and hand holds

Struck-bys:

- always be aware of your surroundings – and watch for moving equipment
- use a spotter for equipment operations (This is one of the key administrative controls for the reduction of struck-by, caught-in-between, and electrical hazards.)
- warn workers to move when loads may pass overhead
- plan and communicate separation between workers and equipment
- plan ahead when unloading materials so they will not strike you if they fall unexpectedly

Caught-in-betweens:

- keep your hands and fingers away from pinch points on machines and equipment
  - when opening and closing tailgates
  - unloading materials and moving forms that may shift unexpectedly, especially off trucks
- do not remove or alter safety guards on any machinery or equipment
- maintain awareness of moving equipment – do not stand between equipment and another object

STI:

- know and use stretching exercises to 'warm up'
- avoid poor posture and awkward positions – keep materials in the "strike zone" whenever possible
- change positions frequently
- know and use proper lifting techniques

Personal protective equipment:

When you are working demolition, always wear basic protection, such as:

- sturdy boots
- hard hat
- safety glasses
- high-visibility clothing – See and Be Seen!
- long sleeves and pants or coveralls to protect your skin
- wear additional foot protection (metatarsal protection) when operating jackhammers, jumping jacks, or walk-behind rollers
- a face shield to protect your eyes and face when cutting or grinding
- when lifting and carrying, wear gloves and shoulder pads
- when working low or at ground level, use knee pads

Conclusion

Short-term and mobile operations can expose workers to many hazards: traffic, heavy equipment, manual material handling, and varying environmental conditions.

Other safety issues, such as safety in crane operations, rigging, fall protection, and trenching, pose additional hazards, and require further, and more task-specific, training.

By paying attention to controls for traffic and using the safe work practices discussed in this program, you can help avoid injury and improve safety and productivity in your work-place.

Remember, wherever and whenever you are working, do your best to stay safe. It is part of your job – and you owe it to yourself and your family.

Notes:

Short-Term and Mobile Operations quiz NAME: _____

1. The time constraints and fast pace of short-term work have no possible impact on worker safety.
   ○ True ○ False

2. Arrow board trucks and crash attenuators are very important to worker safety when performing short-term work.
   ○ True ○ False

3. Working in equipment blind spots is not important to worker safety.
   ○ True ○ False

4. Workers need to stay clear of rotating equipment such as backhoes and truck crane booms.
   ○ True ○ False

5. Maintaining personal safety in traffic control work requires every worker maintain constant vigilance, follow 'See and Be Seen' practices and always know where to run.
   ○ True ○ False

6. Workers performing short-term operations never have to be concerned about locating overhead power lines.
   ○ True ○ False

7. Proper lifting, carrying, and holding of materials is especially important because workers are usually hurrying and not thinking about their backs.
   ○ True ○ False

8. Using a trench box is a good engineering control.
   ○ True ○ False

9. Underground utility locates are not necessary for short-term work.
   ○ True ○ False

10. Workers should keep their hands and bodies clear of rotating parts such as drive shafts or equipment such as backhoes.
    ○ True ○ False

* Answers located in the Appendixes at the end of the book.

HWSP

Appendixes

Participant Guide Test Answers

	Intro	Traffic Control	Asphalt	Concrete	Bridge	Utility	Demo	Grading	Short Term
1	F	T	T	F	F	T	T	F	F
2	F	T	F	T	F	F	T	F	T
3	T	T	T	T	T	F	T	T	F
4	T	F	T	F	T	F	F	F	T
5	F	T	T	F	T	T	F	T	T
6	T	F	T	T	F	F	T	T	F
7	F	T	F	F	T	F	F	T	T
8	T	F	T	T	F	T	F	T	T
9	T	T	T	T	T	T	T	T	F
10	T	T	T	F	T	T	F	T	T

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R3: "The Lincoln Highway." FWHA, Richard F. Weingroff. http://www.fhwa.dot.gov/infrastructure/lincoln.cfm

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R6: Intertraffic – Connecting Innovation to Infrastructure. Ft. Lauderdale, FL. October 9-12, 2007.

R6-1: Opening Session – Government Perspective on the Needs and Opportunities to Improve Work Zone Safety.

R6-2: Preventing Runovers and Backovers

R6-3: Safe Practices for Deploying and Retrieving Temporary Traffic Control Devices

R7: United States Department of Labor. Bureau of Labor Statistics, Washington, D.C. August 10, 2006. http://www.bls.gov/iif/oshwc/cfoi/cfnr0012.pdf

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R15: Transportation Institute releases findings on driver behavior and crash factors. Virginia Tech News. Box, Sherry. April 20, 2006. http://www.vtnews.vt.edu/story.php?relyear=2006&itemno=237

AGC/Zurich Workzone Product Resource Guide

Name of Resource	Description	Organization	URL
MUTCD home page	Home page of the MUTCD web site	US DOT - FHA	http://mutcd.fhwa.dot.gov/index.htm
Report-Work Zone Safety Issues	Discussion report on workzone construction impact on fatalities	NHTSA	http://www.nhtsa.dot.gov/people/injury/aggressive/aggressive%20capital%20beltway/workzone_safety.html
Research Paper	"Use of FARS to answer question ""Do older drivers have more crashes in construction work zones?"	Fatality Analysis Reporting System	http://filebox.vt.edu/users/eolsen/files/papers/olsen_2000_older_workzone.pdf
Asphalt workzone safety guide	Comprehensive WorkZoneSafetyGuide	The Colorado Asphalt Pavement Association - Work Zone Safety Committee	http://www.co-asphalt.com/documents/WorkZoneSafetyGuide.pdf
Article from "Government Engineering"	Informative article - explaining 'Intelligent Transportation System' in Work Zones	"Government Engineering"	http://www.govengr.com/ArticlesSep05/workzone.pdf
NC-DOT script of speech	Speech - 2005 Work Zone Safety Awareness Month Kick-off Event - general interest information, most state specific	NC-DOT	http://www.ncdot.org/doh/safety/workzone/Awareness/2006/DeVanesRemarks.pdf
Oregon DOT fact & tip sheet	Work Zone Safety Fact Sheet & Safety Tips - hits high points	Oregon DOT	http://www.oregon.gov/ODOT/TS/docs/Workzone/WZ_Facts_2007.pdf
Oregon DOT article	Article - A dangerous occupation - good safety meeting material	Oregon DOT	http://www.oregon.gov/ODOT/TS/docs/Workzone/WZjob2006.pdf
Safe Roads.org paper on workzone intersections safety	Brief - Intersection Safety	Safe Roads.org	http://www.saferoads.org/Intersection-RLR/ITE%20factsheets%20Intersection%20RLR/workzones.pdf
Iowa Workzone safety resource page	Information sources - work zone safety	Iowa DOT	http://www.iowadot.gov/workzone/index.htm
Laborers H & S Fund Comprehensive Workzone Safety resources	External resources page with links to workzone programs and other information.	Laborers H & S Fund of North America	http://www.lhsfna.org/index.cfm?objectID=98C69A27-D56F-E6FA-98B79A404AA09856
South Dakota State University - Video Recommendations	Listing of video resource recommendations with description	South Dakota State/ Engineering	http://www.engineering.sdstate.edu/~sdltap/frames/LiabilityPage.htm
Safety & Work Zone Education/Training guidelines	Safety & Work Zone Competency Matrices	US DOT/FHA - NHI	http://www.nhi.fhwa.dot.gov/tccc/matrix05.htm
US DOT - FHA NIGHT Work Zone Safety	Improving Traffic Control for Night Work Zones	US DOT/FHA	http://safety.fhwa.dot.gov/wz/wzn2.htm

Name of Resource	Description	Organization	URL
US DOT - FHA Work Zone Safety	Worker Safety and Visibility	US DOT/FHA	http://safety.fhwa.dot.gov/wz/wzw5.htm
Workzonesafety.org home page	Home Page - links to more information than any other web site on this topic.	The National Work Zone Safety Information Clearing House	http://www.workzonesafety.org/
NIOSH Highway Workzone Safety book-downloadable	Booklet - Building Safer Highway Work Zones: Measures to Prevent Worker Injuries From Vehicles and Equipment	NIOSH	http://www.cdc.gov/niosh/docs/2001-128/
GHSA - State Highway Safety Laws	State laws, other useful information	Governors Highway Safety Association	http://www.ghsa.org/html/stateinfo/index.html
Maryland DOT-Work Zone Safety and Mobility	Work Zone safety information	Maryland DOT	http://marylandroads.com/safety/workzone.asp
workzonesafety.org	By state listing of Flagger training/certification requirements	The National Work Zone Safety Information Clearing House	http://www.workzonesafety.org/training/flagger_training
workzonesafety.org	Tool box talk information and links	The National Work Zone Safety Information Clearing House	http://www.workzonesafety.org/training/toolbox_talks
Florida DOT Safety	Worker safety information	Florida DOT	http://www.dot.state.fl.us/safety/
NIOSH Safety and Health Topic:	Highway Work Zone Safety information & resources	NIOSH	http://www.cdc.gov/niosh/topics/highwayworkzones/
Electronic Library of Construction Safety & Health	Use search feature to locate information on any construction topic, such as workzones.eLCOSH	eLCOSH	http://www.elcosh.org/
Zurich Services Corporation			www.zurichservices.com
AGC Online Bookstore			www.agc.org/bookstore

AGC Products Reference:

Supervisory Training Program: Unit 7 (Accident Prevent & Loss Control)

The AGC Supervisory Training Program (STP) is designed to meet the specific needs of the construction professional. There are 12 courses in the entire STP curriculum – information about all 12 can be found on the STP web site (www.agc.org/stp). Seventh Edition, 2008.

Sessions include:

- An introduction to site safety and health management
- Safety leadership, communication and expectations
- Planning for site safety
- Site safety management
- Site security and projection
- Multi-employer jobsite safety
- Construction risk management
- Safety and human resources
- Regulatory procedures, record keeping and documentation
- Safety reference material and other resources

Supervisory Training Program: Unit Heavy/Highway (Construction Supervisor Overview)

The AGC Supervisory Training Program (STP) is designed to meet the specific needs of the construction professional. Topics covered in this session include: Leadership, Motivation, Problem Solving, Cost Awareness, Planning and Organizing, Production Control, Accident Prevention and Loss Control, and Project Documents. Third Edition.

Construction Tool Box Safety Talks Manual Vol. III

This manual has been written to assist supervisors on training workers in the class and on the jobsite. It includes 10 chapters and 150 new safety talks. Topics include: Caught in Between, Electrical, Environmental, Excavations, Falls, Health Hazards, Highway Hazards, Scaffolds & Ladders, Steel and Struck By. Includes the full version on CD-ROM. 2007

Soft Tissue Injury Prevention Program

This material, co-developed by AGC of America and Zurich, focuses on why soft tissue injuries occur and high-lights effective methods to reduce the number of soft-tissue injuries, such as back injuries, sprains and strains and pinched nerves - and most importantly, how you can reduce them (Includes PowerPoint presentation). 2005.

Load Securement: Know Before You Go

This DVD video reviews applicable requirements for transporting equipment and materials over the road. Unsecured cargo can injure workers or worse. Make sure you have a plan for safety. 2009

MUTCD (Parts 1, 5 & 6)

This book is a must-have for contractors involved in highway construction. The Federal Highway Administration has totally revised the Manual of Uniform Traffic Control Devices (MUTCD) Parts 1, 5 and 6 Temporary Traffic Control and you are required to know about these new specifications and meet them. This manual will help you meet those requirements. Perfect bound, 7" x 9", over 285 pages, 2003 Edition.

Work Zone Traffic Control Supervisors

This guide is designed to be used as part of a training session that gives participants state-of-the-art knowledge of the entire process of planning, designing, installing, maintaining, and monitoring traffic control for work zones. This short course is a basic requirement essential to all persons involved in street and/or highway work. Includes MUCTD Part VI. 2002.

www.agc.org/bookstore

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While certain practices appear to be desirable, none can guarantee that highway worker injuries will not occur. This program does not create any obligations, or establish any specific standards or guidelines, for managing the risk of such injuries. It is not an exhaustive or complete treatment of its subject matter.

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