

## Safety Around Heavy Equipment and Hand Tools



Richard Domonkos  
Indiana Local Technical Assistance Program




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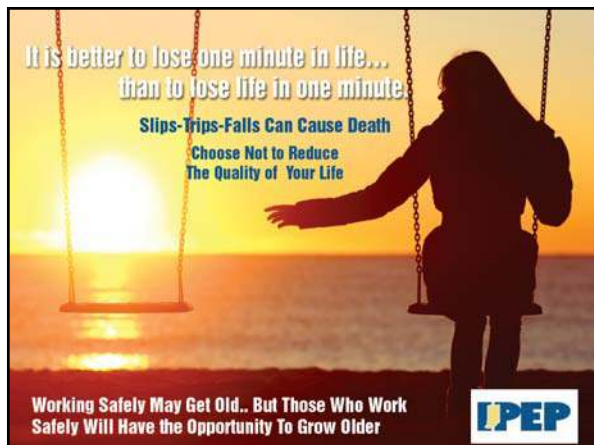
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## Developing A Culture Of Safety

Tools to develop a culture of safety in your agency.

- Tailgate talks.
- Jobsite briefings.
- Jobsite planning, design safety into the job.
- Everyone is responsible, someone is in charge!
- Safety training on safety labels & devices.
- Training on proper use of tools and equipment.
- Accountability & discipline– put some teeth in it.




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## Slip, Trip, and Fall Injuries

- Back and spine
- Head
- Muscle strains
- Sprains
- Broken bones
- Death




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## Developing A Culture Of Safety

### Departmental Comparison (listed highest to lowest)

#### Number of Claims

1. Street / Highway
2. Police
3. Firefighters
4. Wastewater
5. Ambulance
6. Water
7. Custodians

#### Cost of Claims

1. Street / Highway
2. Police
3. Wastewater
4. Water
5. Firefighters
6. Ambulance
7. Custodians




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## Developing A Culture Of Safety

### Same Level Slip and Fall Statistics

- 85% of workers' compensation claims are attributed to employees slipping on slick surfaces.
- 22% of slip and fall accidents resulted in more than 31 days away from work

(Bureau of Labor Statistics 2006)




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## Working Around Heavy Equipment



**Course 814 - Equipment Operator Safety**  
General Safety Measures When Working With Heavy Equipment.

<http://www.oshatrain.org/courses/mods/814m4.html>




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## Working Around Heavy Equipment

### Operators Proper Training

- Only authorized persons should operate the heavy equipment
- Operators should know and understand the limitations of the machinery
- Operators should follow safe operating procedures, utilize safety features, and heed the manufacturer's warnings.




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## Working Around Heavy Equipment

### Operator Equipment Safety Checks

- Approach equipment, walk fully around it and look for hazards
- Perform required pre-start checks
- Inside the cab, remove trash, adjust mirrors, and make sure seatbelt is ready to use
- Before moving, warn people in the area. Test your equipment's movements and make sure the backup alarms can be heard
- Exercise attachments in cold weather




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## Working Around Heavy Equipment

### General Safety Measures

- Wear high visibility clothing
- Do not assume operators can see you
- Keep back up alarms working properly at all times
- Make sure heavy equipment is equipped with rollover protective measures (e.g., outriggers)
- Use a seat belt and required PPE when operating your equipment (e.g., hard hats, gloves, steel toe shoes, reflective clothing, etc.)




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## Working Around Heavy Equipment

### General Safety Measures

- Use appropriate hearing protection when working on or around loud equipment
- Do not wear loose fitting clothes
- Never jump onto or off the equipment
- Never operate any of the controls from any position except the operator's seat
- Never permit anyone to ride on the equipment




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## Working Around Heavy Equipment




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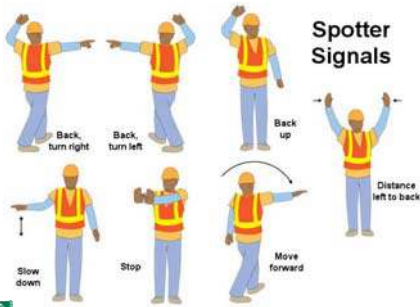
## Working Around Heavy Equipment

### Signal Persons/Spotters

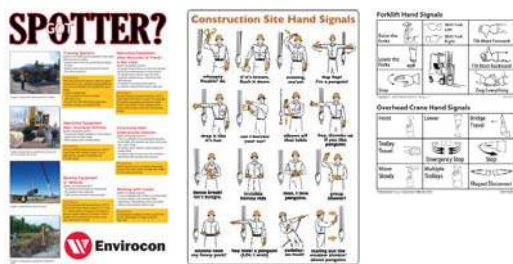
- Everyone should agree on hand signals before backing
- Always maintain visual contact
- Stop backing immediately if they lose sight of the spotter
- No have additional duties while acting as spotter
- Only approved communication equipment between spotter and operator – no mobile phones, headphones
- High-visibility clothing, especially during night operations



## Signal Persons/Spotters



## Signal Persons/Spotters



Backhoe hand signals  
<https://www.youtube.com/watch?v=i1YP0tAaHI0>



## Signal Persons/Spotters



Haven't seen this one in West Lafayette for a few years!




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## Working Around Heavy Equipment

### Safety Quiz

1. When operating heavy equipment, operators and the signal person should use
  - a) Specialized set of hand signals
  - b) Standardized set of hand signals
  - c) Flags to convey direction of motion
  - d) Common sense when signaling




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## Working Around Heavy Equipment

### Safety Quiz

2. Which of the following is true regarding safe practices for spotters?
  - a) Drivers should back up slowly if they lose sight of the spotter
  - b) Spotters may also act as drivers while spotting
  - c) Spotter may not be used during nighttime hours
  - d) Spotters and drivers should use the same hand signals




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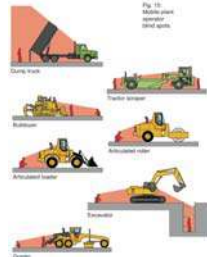
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## Equipment Hazards – Blind Spots



<http://www.cdc.gov/niosh/topics/highwayworkzones/bad/imagelookup.html>



## Equipment Hazards – Blind Spots

### Know Your Equipment – Manage Your Jobsite!

- Tailgate talks on blind spots with your equ
- Teach making eye contact with operator.
- Talk about jobsite rules and management.
  - Where to park.
  - Equipment work area.
  - Workzone setup.
  - Traffic Flow.
  - Spoil area.
  - Strobe lighting.
  - Reduce distractions.
- cell phones, iPod, newspaper.



## Equipment Hazards – Blind Spots

Fatality Assessment and Control Evaluation, FACE, is a program of the *National Institute for Occupational Safety and Health (NIOSH)*

In the summer of 2002, a 21-year-old male road construction worker was crushed while making adjustments to a roadway resurfacing machine on a straight and level portion of street. While the equipment was in operation, the side-gate operator (victim) got off the rock-chip spreading machine and went into an adjacent wooded area. He returned to his work station at the front right of the chip spreader and began adjusting the gate levers. Subsequently, he fell in front of the chip spreading machine and was run over first by the chip spreader and then by the left rear axle of the dump truck, at which time the dump truck became uncoupled from the chip spreader's hitch. The driver got out of his truck to investigate. He found the victim lying between the first and second sets of duals on the driver's side rear axles and moved the truck forward (Photo 2). The victim died at the scene from severe head and neck injuries.





## Working Around Heavy Equipment



Alberta Construction  
Safety Association  
MAKING SAFETY A WAY OF LIFE




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## Working Around Heavy Equipment

### Safety Measures for Asphalt Paving Operations

- General prevention measures for heavy equipment are applicable for paving and surface equipment
- Asphalt paving operations involve exposure to bituminous materials that pose several hazards to workers
- Asphalt fumes are produced during the manufacture and heating of asphalt, which is used for road building




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## Working Around Heavy Equipment

### Safety Measures for Asphalt Paving Operations

- Make sure fire-extinguishing equipment is present
- Asphalt distributor or asphalt kettle are located at a safe distance from buildings and other flammable materials
- Avoid exposure to fumes from hot material
- Wear gloves and full body clothing to avoid prolonged skin contact or burns from hot material
- Goggles and a safety hard hat should be worn to prevent burns from splashing asphalt.




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## Equipment Hazards - Backhoe

Dangers unique to combination loader/backhoe.

- Blind Spots – operator distracted - multitasking.
- Boom swing radius.
- Pinch points – boom to tractor – loader to tractor.
- Lifting hazards – cylinder failure, tipping danger.
- Roll over hazard – poor footings – uneven terrain.
- Overhead power lines




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## Equipment Hazards - Backhoe

Make sure your machine is blocked or chocked before leaving it on a slope  
By Amy Materson

The accident: A backhoe operator was working on covering a pipe in a drainage ditch next to a retaining wall. He parked the machine on a slope and exited the backhoe while leaving the bucket, which was full of rocks and gravel, elevated. While using a shovel to scoop and place the material, the operator bent over directly in front of the bucket. The backhoe rolled forward and pinned the operator against the retaining wall. A coworker who witnessed the incident moved the backhoe and called paramedics to the scene. The operator was transported to a local hospital where he died from multiple traumatic injuries.

### Safe steps:

Be familiar with the proper procedures for parking and exiting a machine. If parking on an incline is a necessity, there are several steps you should take to prevent downward motion:

- Always lower the bucket.
- Shut off the machine.
- Block and/or chock the wheels.




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## Equipment Hazards – Skid steers,

Dangers unique to tracked or wheeled skid loaders.

- Blind Spots – poor visibility – obstructed views.
- Poor communication.
- Can move unexpectedly or violently.
- Pinch points – front loader arms – operator hazard.
- Lifting hazards – cylinder failure, tipping danger.
- Roll over hazard – poor footing – uneven terrain .
- Overhead power lines.




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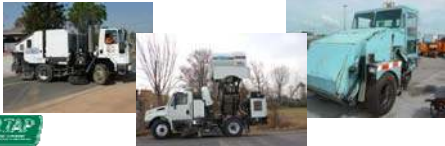
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### Equipment Hazards – Sweepers,

Dangers unique to street sweepers.

- Blind Spots – poor visibility – obstructed views.
- Poor communication, noise hazard.
- Dust respirator hazard.
- Pinch points – broom lift mechanisms, gutter brooms.
- Collision and work zone awareness.
- Overhead power lines, tipping hazard when dumping.




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### Equipment Hazards – Mowers

Dangers unique to roadside boom, flail & deck mowers.

- Blind Spots – poor visibility – obstructed views.
- Pinch points, boom lift swing, deck lift.
- Flying debris from mower deck, eye protection required.
- Falling debris from limb & trees.
- Poor communication, hearing protection required.
- Roll over hazard – poor footing – uneven terrain.
- Overhead power lines.
- Collision and work zone awareness.




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### Equipment Hazards – Overhead Power lines

- Identify all overhead lines in jobsite planning and design.
- Take every precaution before beginning work.
- Not allowed within 10' feet of ANY overhead lines without proper training and certification!
- Electricity is searching for ground to complete circuit, if equipment comes in contact with wires,
  - stay in machine
  - keep everyone away
  - call for help!




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## Equipment Hazards – Overhead Power lines



[https://www.youtube.com/watch?feature=player\\_embedded&v=QYuoRRGH24](https://www.youtube.com/watch?feature=player_embedded&v=QYuoRRGH24)




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## Equipment Hazards - Snowplowing

Right equipment for the right job.

- Use what's needed - not just what's available.
- Training on machine and capabilities.
- Travel at safe plowing speeds.




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## Equipment Hazards - Snowplowing

- Know Your Equipment; Horsepower,
- Weight, Stopping Distance and Turning Radius w / Plow.
- Don't Overload
- Don't modify equipment without approval first
- Keep your winter gear with you always
- Keep Debris Out of Cab Area




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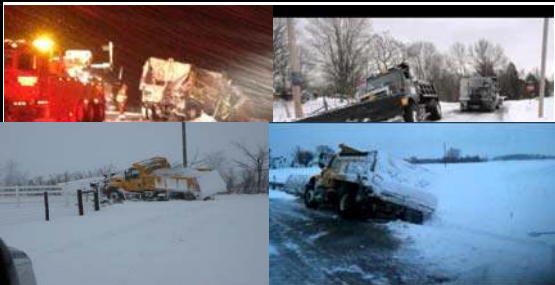
## Equipment Hazards - Snowplowing

- Check lugs, tires & rims at each refuel
- Keep Windshield Clean And Clear.
- Keep steps clear of built up snow & ice
- Keep unit as full of fuel as possible
- Check tires & rims often
- ALWAYS CHECK EQUIPMENT!



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## Equipment Hazards - Recovery



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## Equipment Hazards - Recovery

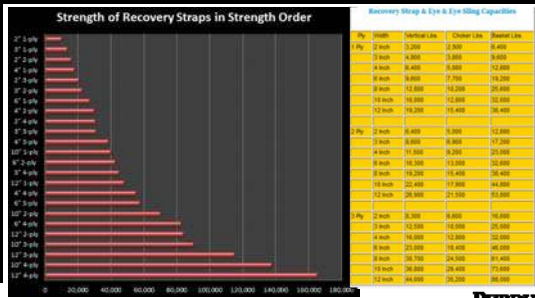
CHAIN GRADES & PROPERTIES					
GRADE	DESCRIPTION	PART #	SIZE	WORKING LOAD LIMIT	WEIGHT PER FOOT
GRADE 28 Proofcoil	A general utility chain used commonly in car towing assemblies. Low carbon steel, zinc plated. Not For Lifting, Hoisting or Recovery Applications.	010101012	1/2" x 120' Pad	800 lbs.	0.25 lbs.
		010101012	1/2" x 140' Pad	1,200 lbs.	0.25 lbs.
		010101012	1/2" x 160' Pad	1,600 lbs.	0.25 lbs.
		010101012	1/2" x 180' Pad	2,000 lbs.	0.25 lbs.
GRADE 70 Transport	Better transport used makes this chain exceptionally built. Used in medium to heavy duty tow assemblies. Not for Lifting, Hoisting or Recovery Applications.	010101018	1/2" x 120' Pad	1,100 lbs.	0.25 lbs.
		010101018	1/2" x 140' Pad	1,500 lbs.	0.25 lbs.
		010101018	1/2" x 160' Pad	1,900 lbs.	0.25 lbs.
		010101018	1/2" x 180' Pad	2,300 lbs.	0.25 lbs.
GRADE 80 Alloy	Low alloy steel makes this chain one of the strongest in the industry for heavy duty tow and recovery assemblies. Not for Lifting, Hoisting or Recovery Applications.	010101019	1/2" x 120' Pad	1,100 lbs.	0.25 lbs.
		010101019	1/2" x 140' Pad	1,500 lbs.	0.25 lbs.
		010101019	1/2" x 160' Pad	1,900 lbs.	0.25 lbs.
		010101019	1/2" x 180' Pad	2,300 lbs.	0.25 lbs.
GRADE 100 Alloy	Special alloy steel makes this chain one of the strongest in the industry for heavy duty tow and recovery assemblies. Not for Lifting, Hoisting or Recovery Applications.	010101020	1/2" x 120' Pad	1,100 lbs.	0.25 lbs.
		010101020	1/2" x 140' Pad	1,500 lbs.	0.25 lbs.
		010101020	1/2" x 160' Pad	1,900 lbs.	0.25 lbs.
		010101020	1/2" x 180' Pad	2,300 lbs.	0.25 lbs.

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## Equipment Hazards - Recovery



## Equipment Hazards - Recovery



## Equipment Hazards - Recovery



### Equipment Hazards - Recovery



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### Equipment Hazards - Recovery



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### Equipment Hazards - Recovery



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## Equipment Hazards - Recovery




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## Equipment Hazards - Recovery




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## Equipment Hazards – Maintenance

When performing routine or heavy maintenance be aware of unique features of different types of equipment.

- Use proper jacks and jackstands for the equipment being lifted. Remove damaged or incorrectly repaired equipment.
- When raising equipment with jacks take in account the type of repair.
- Some equipment maintenance requires climbing on or using ladders.
- Use only approved dump bed supports or attachment supports when performing hydraulics system repairs.
- Be cautious when working around electrical, hydraulic or systems, only trained qualified technicians should perform complex repairs.




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## Equipment Hazards – Maintenance

If you are about to do this




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## Equipment Hazards – Maintenance

You may want to look for this!




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## Equipment Hazards – Transporting

Follow (FMCSA) Federal Motor Carrier Safety Administration rules for Cargo Securement.

These rules effective January 1, 2004, include: Minimum number of tiedowns.

- Preparation of equipment being transported. (1) Accessory equipment, such as hydraulic shovels, must be completely lowered and secured to the vehicle.
- Articulated vehicles shall be restrained in a manner that prevents articulation while in transit
- Securement of heavy vehicles, equipment or machinery with crawler tracks or wheels. (1) In addition to the requirements of paragraph (b) of this section, heavy equipment or machinery with crawler tracks or wheels must be restrained against movement in the lateral, forward, rearward, and vertical direction using a minimum of four tiedowns.
- (2) Each of the tiedowns must be affixed as close as practicable to the front and rear of the vehicle, or mounting points on the vehicle that have been specifically designed for that purpose.
- If the article of cargo were greater than 5 ft in length but less than 10 ft, two tiedowns would be needed regardless of the weight.
- When an article of cargo is not blocked or positioned to prevent movement in the forward direction, and the item is longer than 10 ft in length, then it must be secured by two tiedowns for the first 10 ft of length, and one additional tiedown for every 10 ft of length, or fraction thereof, beyond the first 10 ft.




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## Equipment Hazards – Transporting

Know your load!

- How heavy, How tall, How long?
- Do I have the correct trailer/truck combination?
- Is my hitch rated for my load?
- Do I have the correct amount of tiedown chains?
- Do I have the correct chain binders?
- Do I have safety chains rated for the load?
- \*Did I pre-trip check trailer brakes?
- \*Did I pre-trip check lighting and warning devices?
- Do I know my route and will it clear bridges and RR tracks?







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## Equipment Hazards – Transporting



**Driver Cited After Equipment Hits Bridge, Crashes Onto Highway Aug 2011**

A piece of construction equipment hit a bridge at the I-65 & I-70 south split Tuesday, shutting down several lanes of traffic just before rush hour. Police said a road grader on the back of a tractor-trailer clipped the Virginia Avenue bridge above where Interstate 65 and Interstate 70 split on the south side of downtown just before 4:30 p.m.




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## Equipment Hazards – Transporting

Why so many rules?



Its better to lose one minute in life...  
Then to lose a life in one minute!




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EQUIPMENT SAFETY TRAINING

If after all that safety training you need to speed up construction – we have a solution.






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EQUIPMENT SAFETY TRAINING

Questions?






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