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Heavy Equipment & Construction Vehicles

Introductions…

Chad Stuart

Safety & Risk Group

Learning Outcomes

Develop a Common Understanding of the Actions and Necessary Precautions for Compliance:

- **Recognizing and controlling common and foreseeable hazards**
- **Describe hazards created by other contractors and multiemployer communication**
- **Identify the hazards of working in close proximity of moving equipment**
- **Describe the Operator's responsibilities to safeguard all other employees**
- **Identify the communication methods between operators and ground personnel**
- **Identify the purpose of spotters and walk-around inspections**
- **Identify safe operating procedures:** *traveling, backing, parking, loading for transport, maintenance, operation, etc.*
- **Rotating Machinery: Identify the swing radius and hazard zones associated with different types of heavy equipment**

Continued…

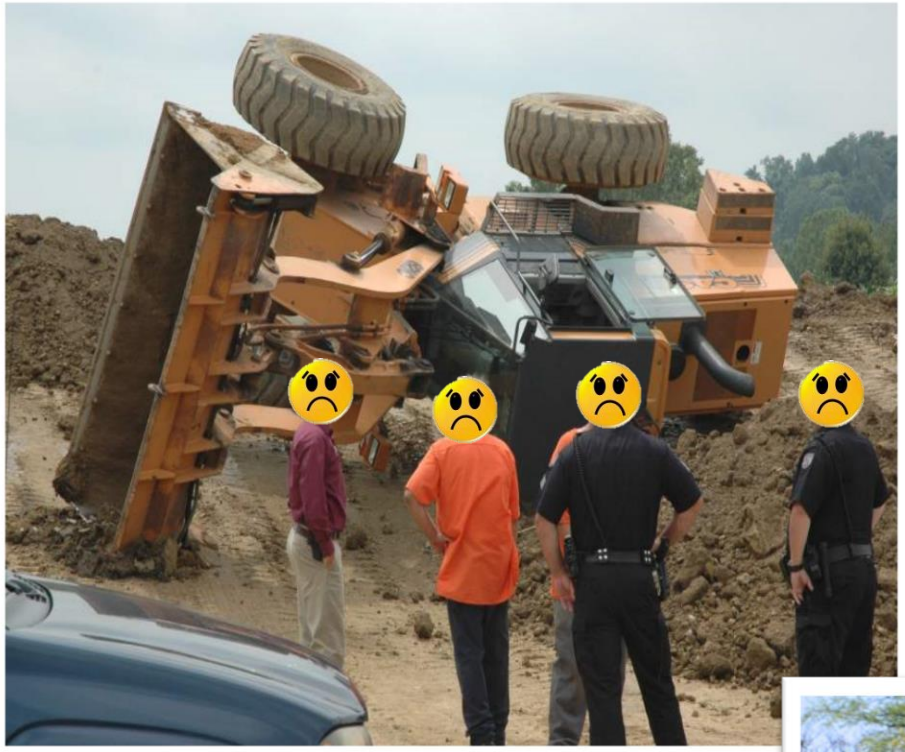
- **Recognize blind spots and/or areas of limited visibility**
- **Identify the procedures for working near or under suspended or overhead loads**
- **Identify the procedures for mounting/dismounting heavy equipment**
- **Describe the procedures for loading and unloading heavy equipment**
- **Recognize how to approach mobile heavy equipment**
- **Identify overhead hazards:** *overhead lines, other fixed structures, etc.*
- **Describe the procedures when working around or adjacent to overhead and/or underground utilities**
- **Recognize utility damage reporting and emergency response process**

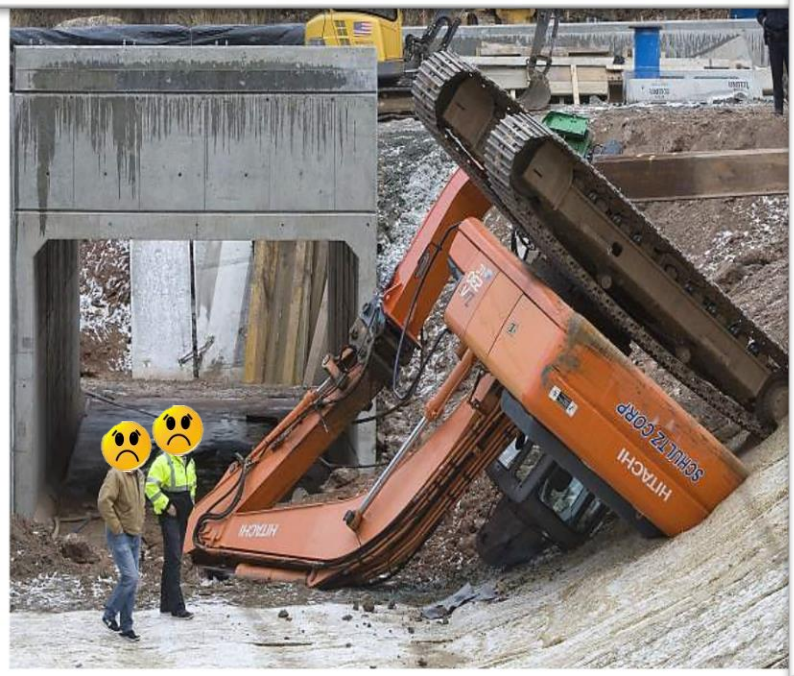
Increasing Trend with Contractors

- **Overlooking, mismanaging or simply ignoring fundamental construction safety and compliance topics**
  - **Focus, Attention and Communication are often place on High Hazard, High Impact Topics**
    - Silica, Cranes, Excavations, Confined Spaces, Fall Protection, etc.
- **Essential *"block & tackle"* components are often missing or only partially complete**
  - **Unable to Achieve and Maintain Compliance**
  - **Citations and Compliance Violations are Common**


TOP STORY
ROAD WORKER KILLED BY CAR
Woodford County


DO NOT FOLLOW

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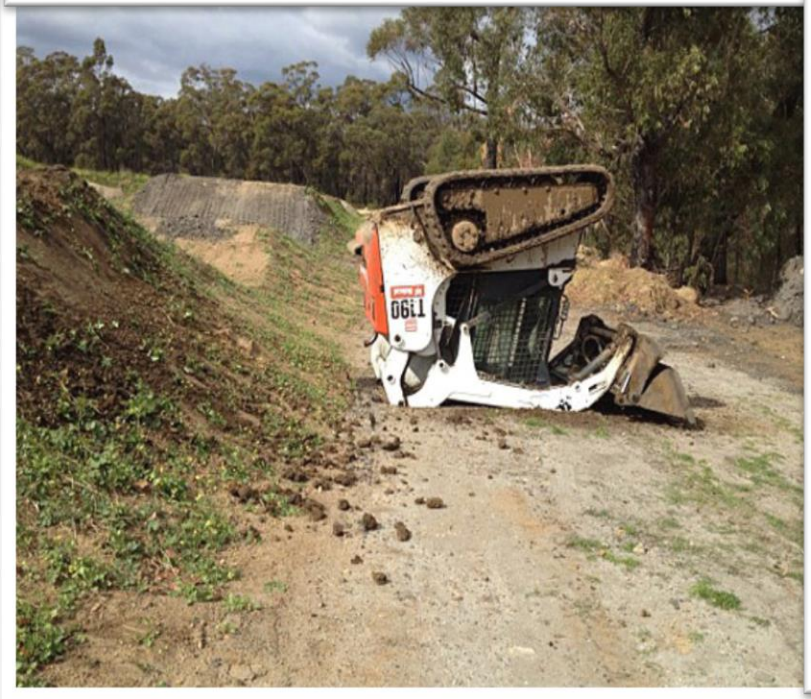
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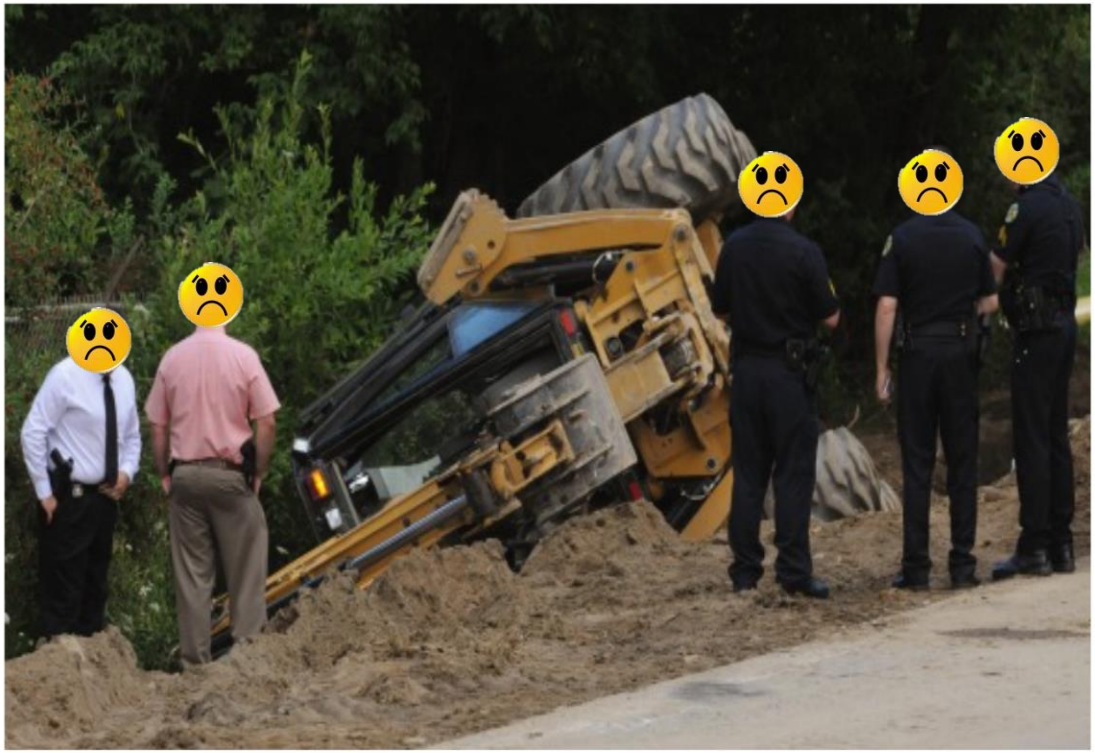
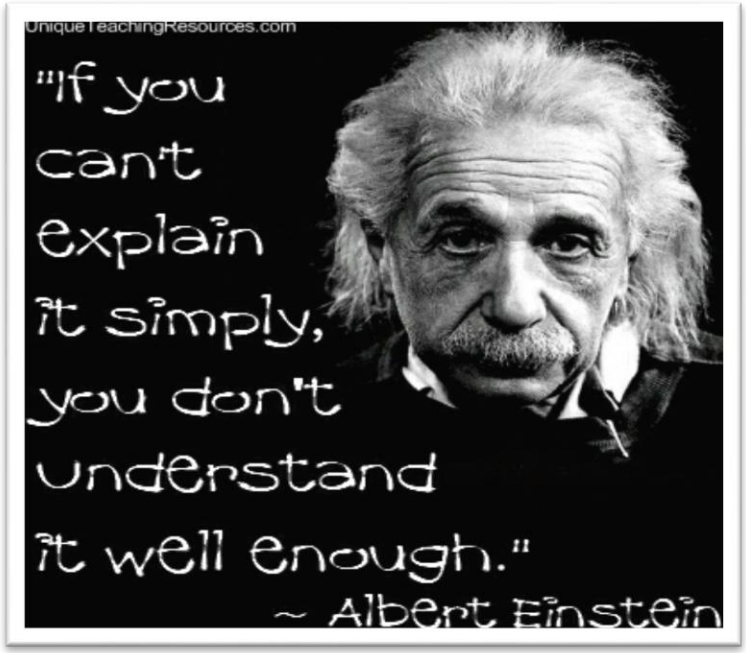


Develop a Common Understanding

To be successful, you must be able to answer:

1. What do You want Me to KNOW?
2. What do You want Me to DO?

Incidents, injuries and fatalities often begin with:



Ignorance

Leadership Barriers

Habits and Perceptions

Overlooked Precautions

Misunderstood Requirements

Miscommunicated Safety Standards

Employees at all Levels who D.G.A.S.!

Be Aware of Unique State Rules/Laws

MN Rule 5207.1000 Operation of Mobile Earth-moving Equip't

- Subp. 2 – **Mobile earth-moving equipment operators and all other employees working on the ground** exposed to mobile earth-moving equipment shall be trained in the safe work procedures pertaining to mobile earth-moving equipment and in the recognition of unsafe or hazardous conditions.
- Subp. 6 – **Contractor responsibility**. If the mobile earth-moving equipment contractor exposes other contractor's employees to the hazard of mobile earth-moving equipment, the controlling employer, such as general contractor or construction manager, for the project shall coordinate a joint contractor employee safety awareness meeting between contractors and employees onsite.
  - *The employee safety awareness **meeting shall be documented**, identifying when the meeting was held and who attended, including a brief summary of what was reviewed. Documentation shall be retained for the duration of the project.*

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Blind Spots

Preventing Run Over and Back Over Injuries and Fatalities

NOTICE: the bigger the vehicle, the larger the blind spot.

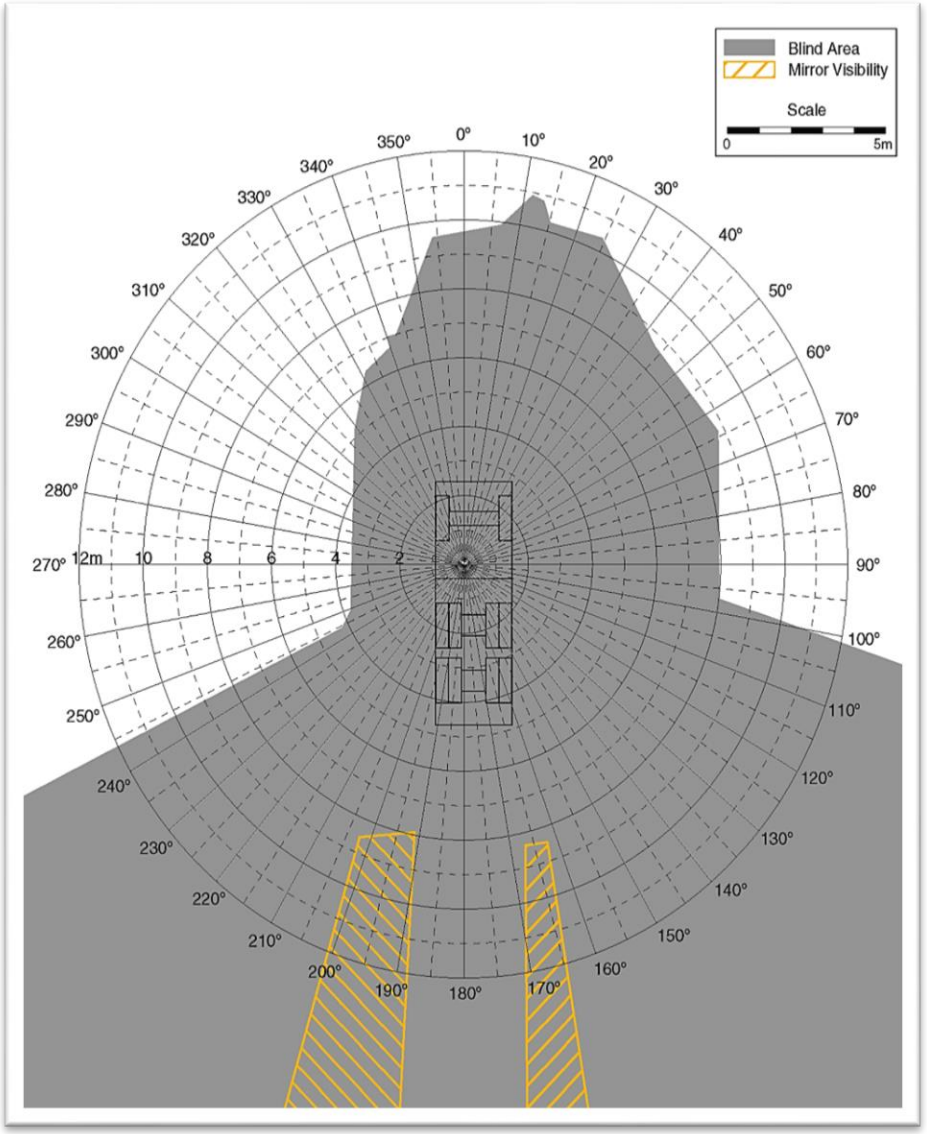
Blind Spots

Preventing Run-overs and Back-overs

- **BLIND SPOT =** the area around a vehicle or piece of construction equipment that is not visible to the operator, either by direct line-of-sight or indirectly by use of internal and external mirrors.
- People working or walking in a blind spot are virtually invisible to the operator.
- Each equipment/vehicle has its own unique blind spots.

Blind Spots – hazards around vehicles & equipment

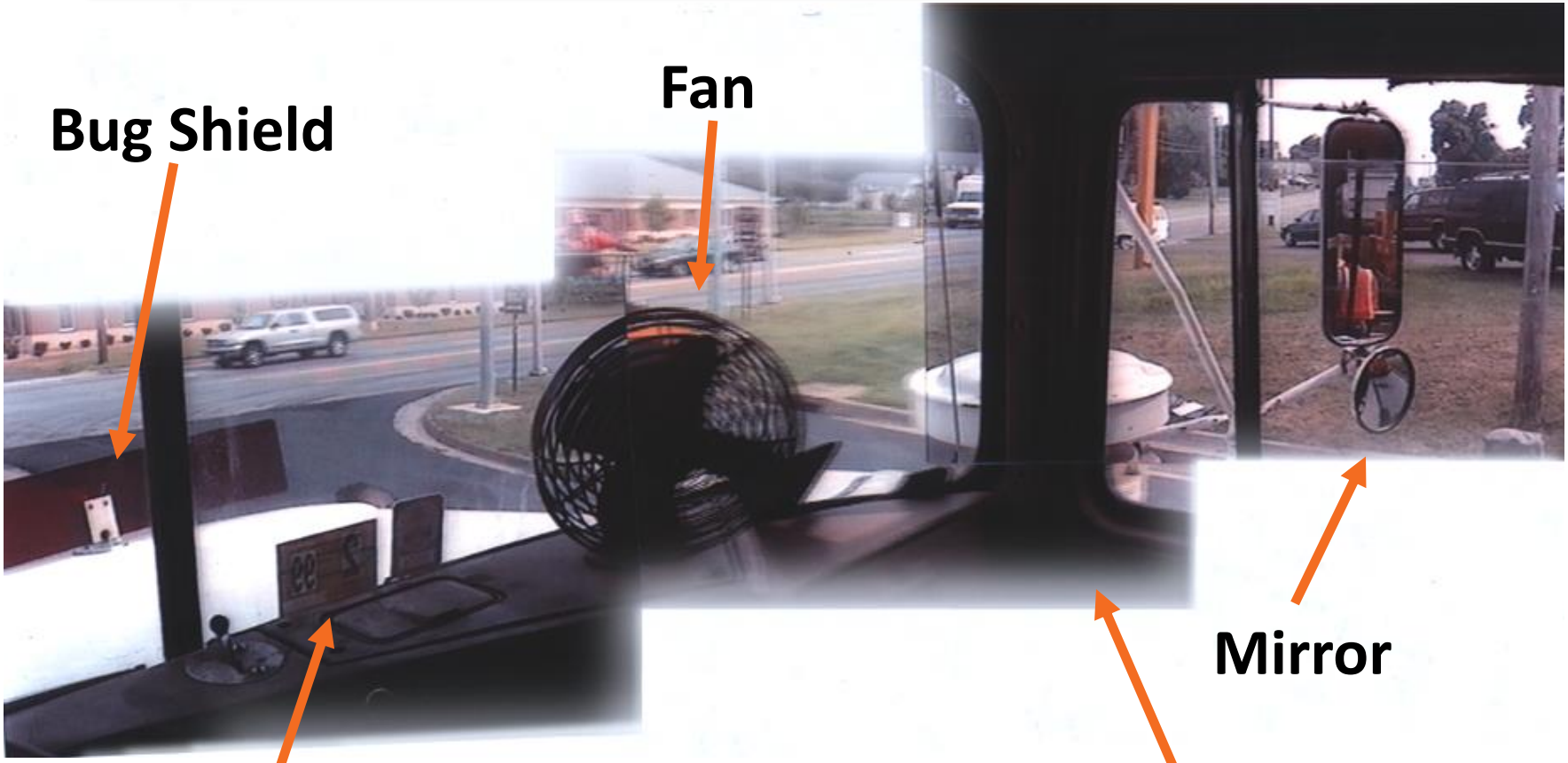
- Running over people
- Running over materials
- Striking equipment & vehicles
- Rollovers
- Contact with utilities



PROBLEM!!

- **Workers must perform tasks near moving equipment**
- **Extensive blind areas around equipment and vehicles**
  - Typically large and has an enclosed cab which can make the blind areas around the equipment rather large.

View from Inside the Cab



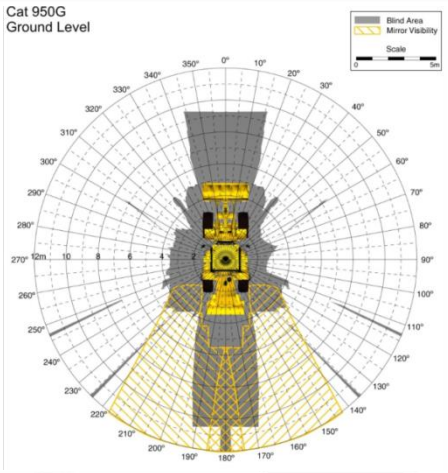
Which of the following are common and foreseeable hazards while working around heavy equipment?

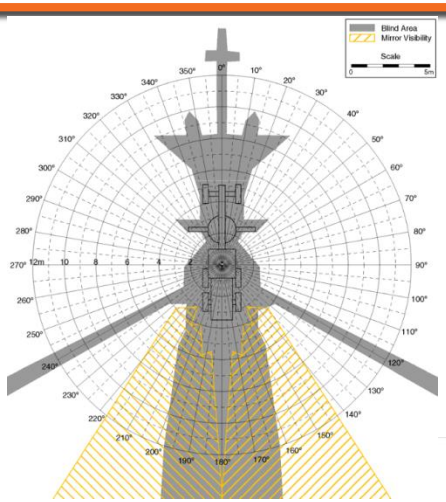
When poll is active, respond at **PollEv.com/csdz**

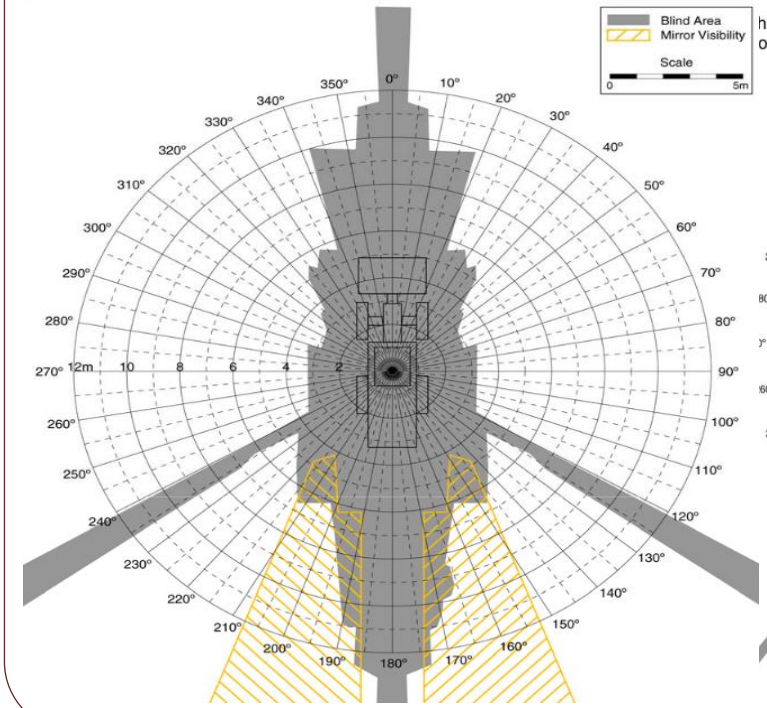
- Running over people
- Rollovers
- Contact with utilities
- Striking other equipment and vehicles
- All of the above

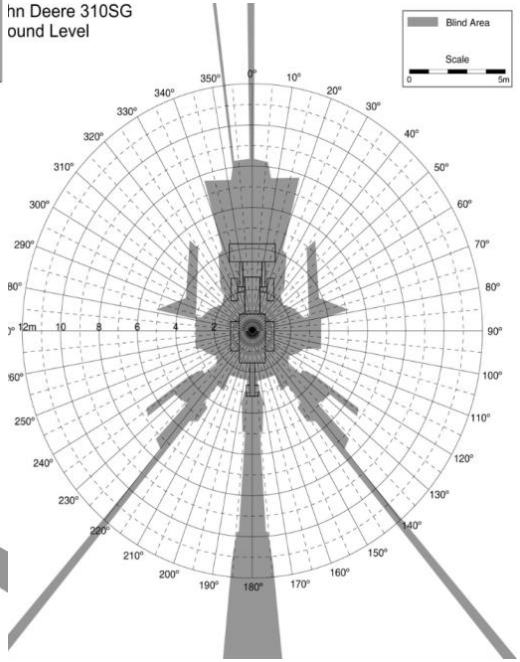
Total Results: 9

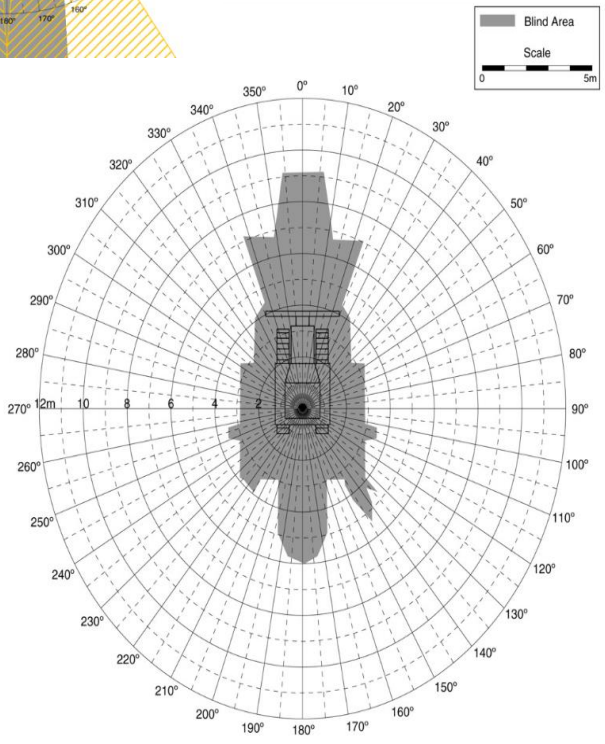
NIOSH Blind Spot Diagrams











View from Inside a Cab

Which of the following is not considered a hazard of working in close proximity to moving equipment

When poll is active, respond at **PollEv.com/csdz**

- Run over
- Caught between
- Reasonable suspicion
- Energized / Electrocution

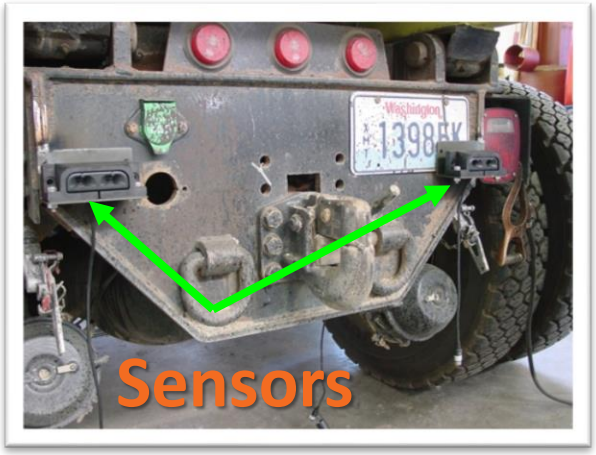
Total Results: 10

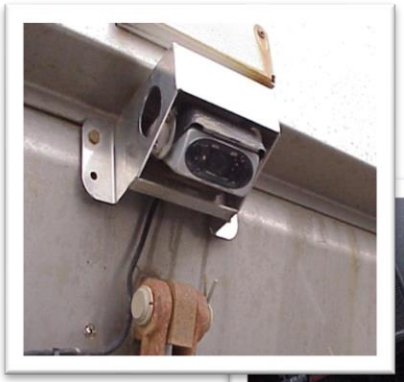
Blind Spot Intervention

Signals, Visual Devices, Alarms, Use of Technology

Improving Visibility

- Alarms – *back-up, travel*
- Spotters
- Cameras / Visual Devices
- “Badge” Sensor Systems
- Radar Systems
- Ultrasonic Sensors
- Hybrid Devices





Approaching Equipment & Vehicles

Recognize blind spots and areas of limited visibility:

- **Rear**
- **Sides**
- **Attachments**

Approach with direct line-of-sight to the operator.

- **Make eye contact with and alert the operator before approaching.**

Wear high-visibility clothing.

Stay Visible to the Operator!

Average Reaction Time is:
"3/4 of a Second"

From the time you "See" an unsafe condition until you "React" to that unsafe condition, it takes *approximately* 3/4 of a second.

That's pretty fast… isn't it??

In ¾ of a second, ***YOU*** could:

- **Fall 12 feet**
- **Have a 9-ft trench wall or 9-ft pile of material fall on you**
- **Have a Suspended Load fall on you**

So, why do people say –

"I'm only going to be here a Minute."

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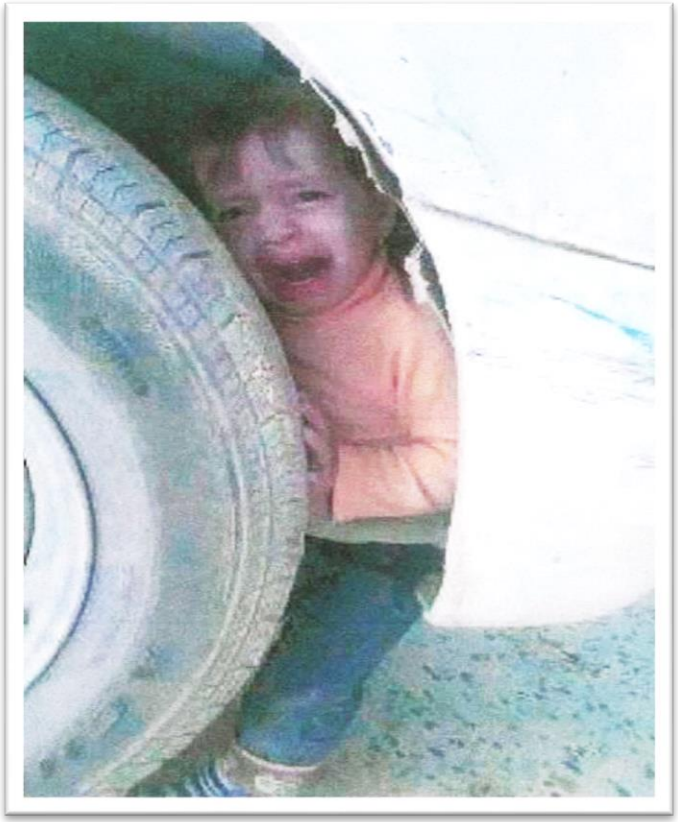
Necessary Precautions during Operation

Backing & Close Maneuvering

- **ALL DRIVERS & OPERATORS** should use a **SPOTTER** when backing or when maneuvering in close proximity to people or other objects.
- **ALL DRIVERS & OPERATORS** should complete a walk-around inspection every time just before moving from a parked location.
- **ALL DRIVERS & OPERATORS** should back into a parking spot or pull through, whenever possible
  - **Prevents having to back out of a parking space**

Walk Around before Operation

Every Operator and Driver should Perform a Walk Around Inspection before Operating Equipment or a Vehicle



A walk around inspection forces the driver to observe the area around the vehicle for any unseen or unknown risk.

When poll is active, respond at **PollEv.com/csdz**

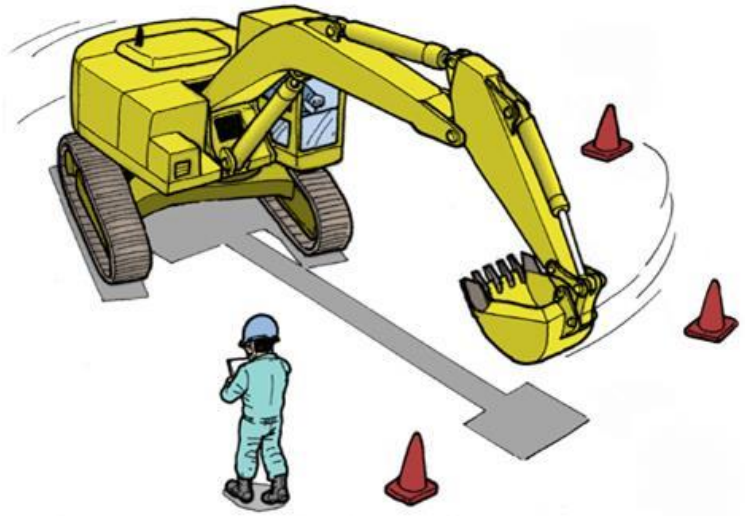
True

False

Total Results: 10

Swing Radius & Rotating Equipment

- Daily pretask planning and discussion
- Define the use of warning devices
  - **Communicate authorized areas**
- Barricade/Warn/Protect accessible areas in and around the rotating superstructure, attachments and full length/reach of equipment
  - **A barricade is defined as a device that delineates and warns of a boundary that is not to be crossed.**
  - **Use of caution tape is permissible to meet the OSHA barricade requirement.**



Working around Suspended Loads

1926.1425(b)

- While the operator is not moving a suspended load, no employee must be within the fall zone, except for employees:
  - **Hooking, unhooking or guiding a load**
  - **Initial attachment of the load**
  - **Operating a concrete hopper or bucket**

1926.1425(c)

- When employees are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone, all of the following criteria must be met:
  - **Rigging must prevent unintentional displacement**
  - **Hooks with self-closing latches or equivalent**
    - Exception: "J" hooks are permitted for setting wooden trusses
  - **All material is rigged by a qualified rigger**

1926.753(d)(2)

When working under suspended loads, the following criteria shall be met:

- **Rigging must prevent unintentional displacement**
- **Hooks with self-closing latches or equivalent**
- **All material is rigged by a qualified rigger**

According to OSHA, employees shall not work under a suspended load.

When poll is active, respond at **PollEv.com/csdz**

True

False

Total Results: 11

Loading & Unloading

Use a spotter to help align equipment with ramps/deck

Prevent damage and personal injury

- Load/unload on firm, even ground
- *BEWARE* of stored energy in chains and binders!
- Lift ramps with your legs
- Secure the hitch
  - If the hitch isn't secure, the front of the trailer can pop up and damage the tow vehicle, trailer, equipment or injure the operator.
- Identify slick surfaces
- Wear your seatbelt

Procedures for loading and unloading equipment are intended to safeguard the operator, all personnel working nearby and protect the equipment from damage.

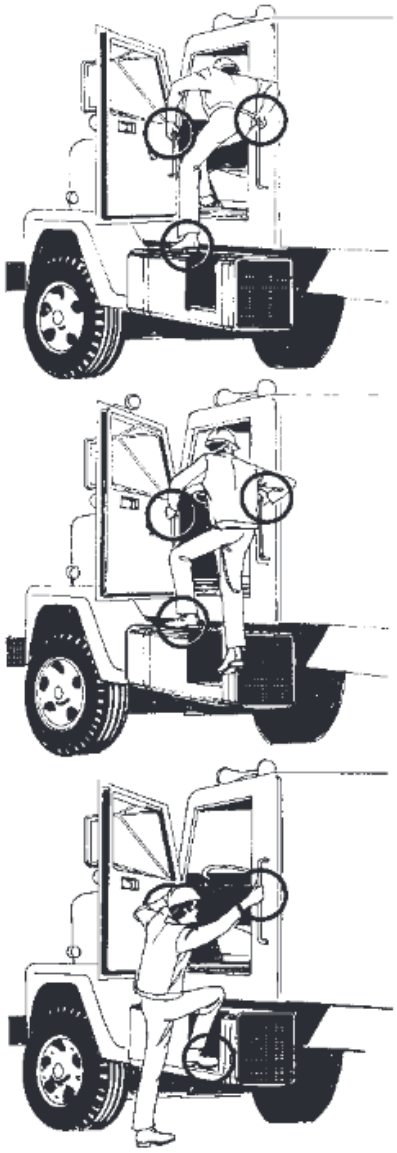
 When poll is active, respond at **PollEv.com/csdz**

True

False

Total Results: 11

Mounting & Dismounting



- Merely being aware of the risk is not enough!
  - **Each person must *consciously* mount and dismount equipment, vehicles and trailers.**
- Never jump from equipment, vehicles or equipment
- Little hazards, big risk:
  - **Slippery surfaces**
  - **Mud or grease on footwear**
  - **Cluttered or uneven landing area**
  - **Carrying something while climbing**
  - **Torn or loose clothing catching on equipment parts**
  - **Using operating levers or steering wheels instead of handholds and handrails.**

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Use of Spotters

Role and Responsibilities

- Spotter's only responsibility is to observe and communicate clear guidance during the movement of equipment and vehicles.
- Spotters should be used when:
  - **Backing equipment and vehicles**
  - **Blind spots are present / visibility is low**
  - **Line of sight obstructed / path of travel is not clear**
  - **Congested work area, close maneuvering, workers on foot**
  - **Operating near overhead utilities**
  - **Excavating near underground utilities / damage prevention**
  - **Working with cranes**

Spotter & Operator Work Together

Spotter

- **Spotter only has one task –** ***avoid distractions, stay focused***
- **Plan and review all signals to be used prior to operations**
- **Stay visible or in constant communication with operator**
- **Allow for sufficient stopping distance and clearance**
- **If you need to move and will pass through the operator's blind spot, communicate intended actions first**

Spotter & Operator Continued…

Operator

- Prior to the task, discuss the positioning, backing, movement and agreed-upon communication method(s) with the spotter
- Always contact the spotter prior to proceeding with any action
- Be consistent with means and methods
- Only move your equipment when you have adequate clearances, a clear view of the spotter and understand the direction you have received from the spotter
- Stop the equipment immediately upon losing sight of the spotter, or the signals are unclear.
- Observe & respond to *STOP* signal from anyone in the work area

Operators and drivers have no responsibility to safeguard other personnel around their equipment.

When poll is active, respond at **PollEv.com/csdz**

True

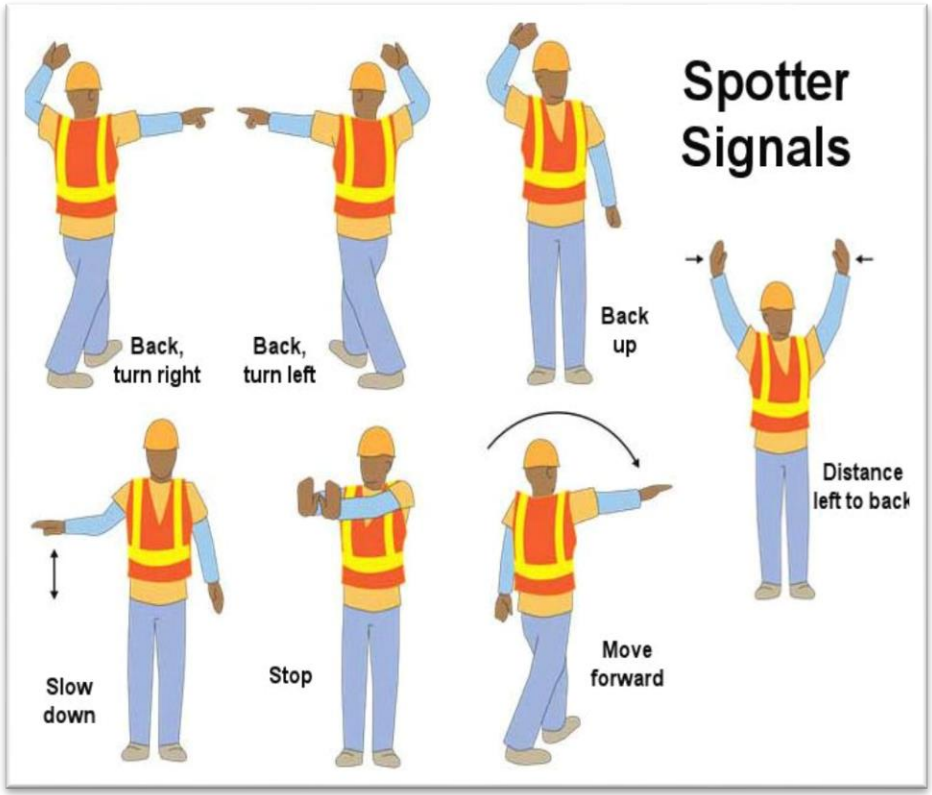
False

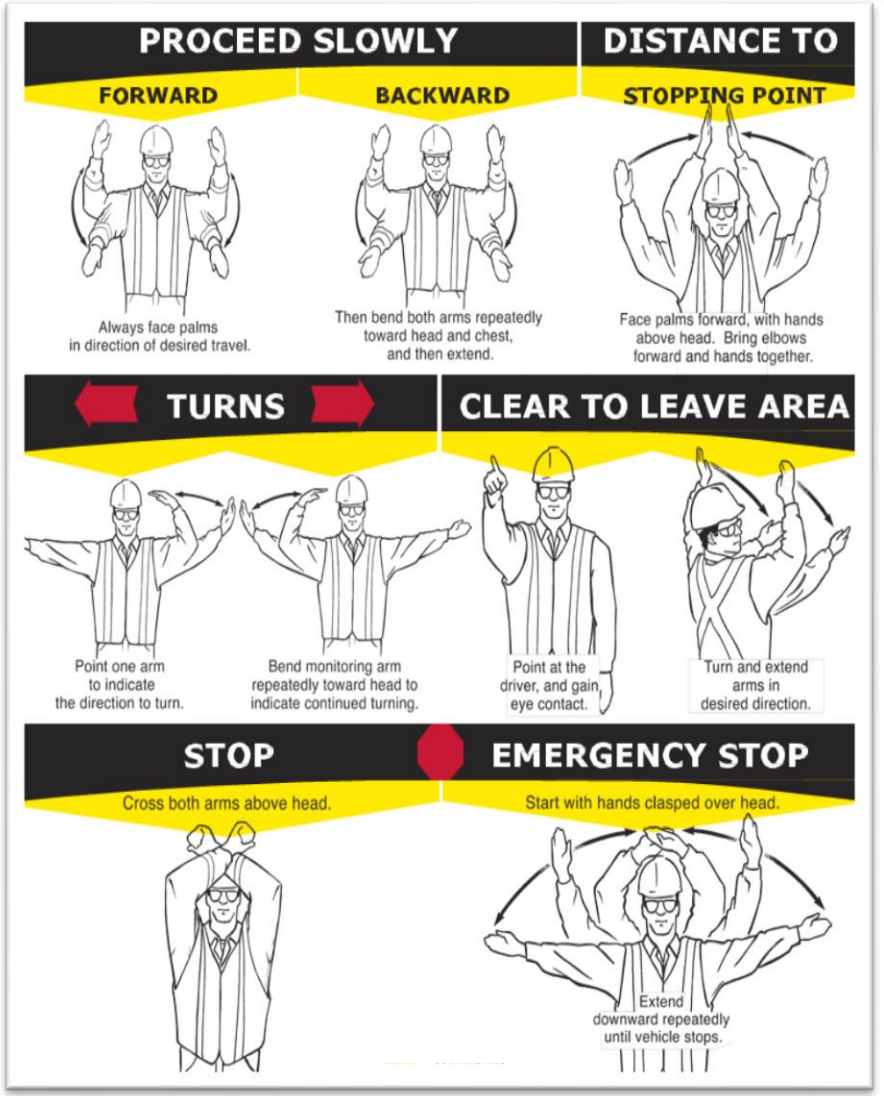
Total Results: 12

Communication with Operators

- Voice
- Hand Signals
- 2-way Radios
- Hands-free Device

Agreed-upon Hand & Arm Signals?

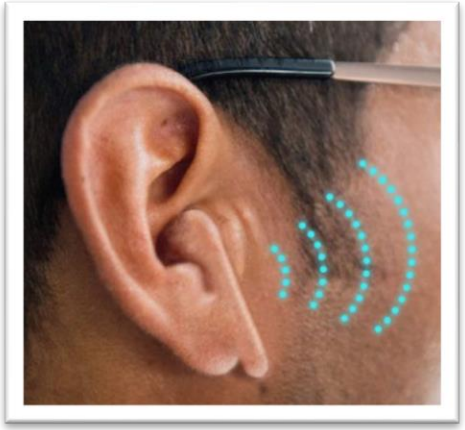




1926.1420 Signals
radio, telephone or other electronic transmission of signals.

(c) The operator's reception of signals must be by a hands-free system.

BEWARE: Ear Buds are Everywhere!!



Complaint communication methods between the operator and ground personnel include:

When poll is active, respond at **PollEv.com/csdz**

- Voice
- Hand signal
- 2-way radios
- Hands-free device
- All of the Above

Total Results: 11

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Equipment Unattended Stopped or Not in Use

May 11, 2005

Mr. Peter Kuchinsky, II
Safety Trainer/Consultant
Construction Building Analysts
1770 Wolverine Way
Vista, CA 92084

Question 1b: Under §1926.600(a)(3), when is the equipment considered to be "not in use" or "parked"?

Answer: *Not in use*

The standard does not define the terms "not in use" or "parked." In light of the purpose of the standard and the context of this provision, "not in use," normally means when the equipment operator is not at the equipment's controls.[1]

Parked

In the context of this provision, this type of equipment is "parked" when the equipment is not going to be in use for a substantial period of time. An example would be where the equipment is used at the start of the work day and will not be used again that day.

Recommendations from OSHA

Unattended = operator within 25 feet *(and still in view)* of the equipment

- All attachments are lowered to the ground
- All controls are in the neutral position and hydraulic pressures equalized
  - *Dissipate Any Stored Energy*
- Whenever the equipment is parked, the parking brake shall be set
- Equipment parked on inclines shall have the wheels chocked
- All manufacturer provided and recommended safety measures are utilized

May 11, 2005

Mr. Peter Kuchinsky, II
Safety Trainer/Consultant
Construction Building Analysts
1770 Wolverine Way
Vista, CA 92084

"…employer is required to fully lower or block the equipment's attachment/feature when the equipment is not in use, placing all controls in neutral, the motor off, and brakes set."

Re: Requirements for leaving construction equipment and powder-actuated tools unattended on a construction building site; impalement protection from reinforcing steel for masonry workers on a scaffold; §1926.701(b). §§1926.302(e)(6), 1926.600(a)(3)

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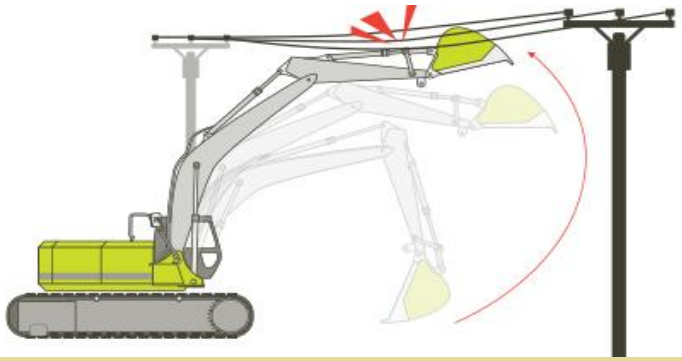
Overhead Lines


Height of the 3-phase
Primary Lines are
Less than the Maximum
Boom and Stick Height of
the Excavator

See Anything Wrong?

Options for Working Near Overhead Lines



If any part of the equipment or load could get closer than *(maximum working radius)* **20-feet to an overhead line, then the employer must meet 1 of 3 requirements:**

1. **Deenergize Overhead Line(s)**
2. **20-foot Clearance Requirement and All Necessary Precautions of 1926.1408(b)**
3. **Table A Clearances**

Clearance Distances

OSHA 1926.1408 Table A

TABLE A—MINIMUM CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

Table T – Minimum clearance distances while traveling with no load	
Voltage	**Clearance**
Up to 0.75 kV	4 ft
>0.75 to 50 kV	6 ft
>50 to 345 kV	10 ft
>345 to 750 kV	16 ft
>750 to 1,000 kV	20 ft
> 1,000 kV	*

*Established by owner or registered professional engineer/qualified person

OSHA 1926.1411 Power line safety while traveling under or near power lines with no load

The three options for working around overhead lines include all of the following except:

When poll is active, respond at **PollEv.com/csdz**

- Deenergize the overhead line(s)
- 20 foot clearance requirements and all necessary precautions of 1926.1408(b)
- Electro-reflective compliance survey
- OSHA table-A clearances

Total Results: 10

Unknown Voltages?

Always go with most stringent standard

Precautions are defined by task function or application

TABLE A—MINIMUM CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

2-day Response Requirement

1926.1407(e) *Voltage information.*
Where Option (3) of this section is used, the utility owner/operator of the power lines must provide the requested voltage information within two working days of the employer's request.

October 13, 2011

Charles Kelly, Director
Industry Human Resource Issues
Edison Electric Institute
701 Pennsylvania Avenue, N.W.
Washington, D.C. 20004

Dear Mr. Kelly:

On October 6, 2010, Edison Electric Institute (EEI) filed a Petition of Review in *EEI vs. the Occupational Safety and Health Administration and Secretary of Labor (OSHA), No. 10-1311 (D.C. Circuit)*challenging various aspects of OSHA's final rule, Cranes and Derricks in Construction (Subpart CC). EEI and OSHA entered a settlement agreement, dated August 22, 2011, in which OSHA agreed to clarify the two Subpart CC requirements below in a letter of interpretation. This letter fulfills that obligation.

(1) 29 CFR §1926.1407(e) states:

> *Voltage information. Where Option (3) of this section is used, the utility owner/operator of the power lines must provide the requested voltage information within two working days of the employer's request.*

Thus, §1926.1407(e) allows a utility owner/operator two working days to provide the requested information. For the purposes of this provision, working days include all calendar days except weekends and holidays. See *75 Fed. Reg. 47951* (Aug. 9, 2010). For example, if an electric utility receives a request for voltage information on one of its distribution lines on a Friday, it will have until the end of the business day on the following Tuesday to provide the necessary information (assuming there are no holidays in between).

(2) The provisions of §1926.1408 (Power Line Safety) allow deenergization as one option for employee protection from electrical hazards of power lines. Employers choosing this option must not proceed with this option if the electric utility does not de-energize the power line, but Subpart CC does not require utility companies to deenergize power lines.

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Contacting an Energized Line

Safest Place to Be is in the Cab

No Threat of Fire or Explosion

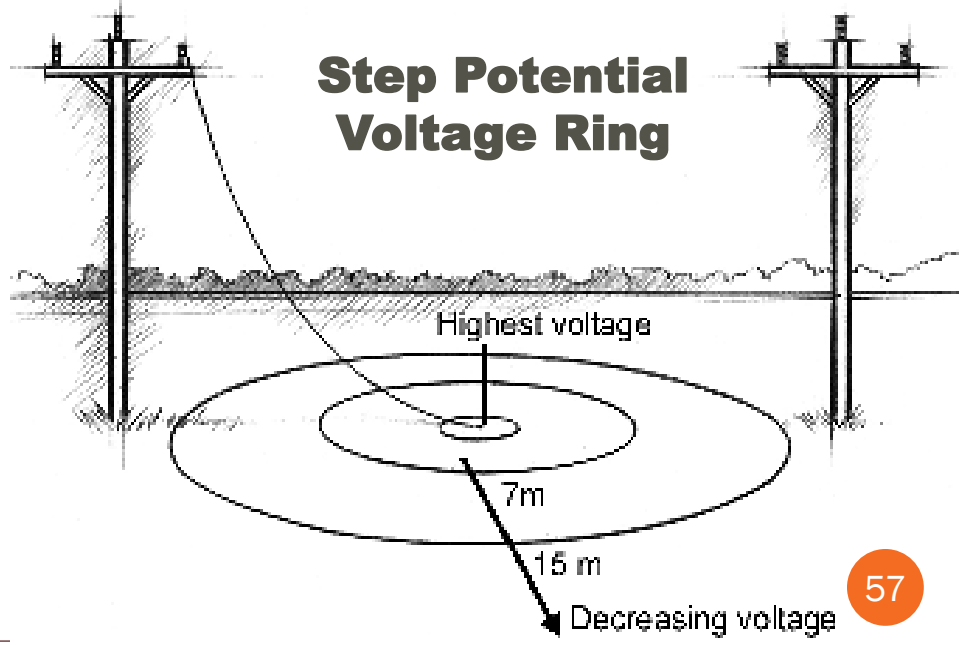
- Call for Help
  - If Using a Metal Encased Cell Phone, Make Sure The Phone Does Not Contact any Metal Objects.
- Do Not Touch any Metal Objects While in the Cab of the Vehicle or Equipment
- Sit Calmly & Wait for Help to Arrive
- Stay In Vehicle Until Emergency Responders Verify the Line and Vehicle/Equipment are De-energized

If a Fire or Explosion Occur…

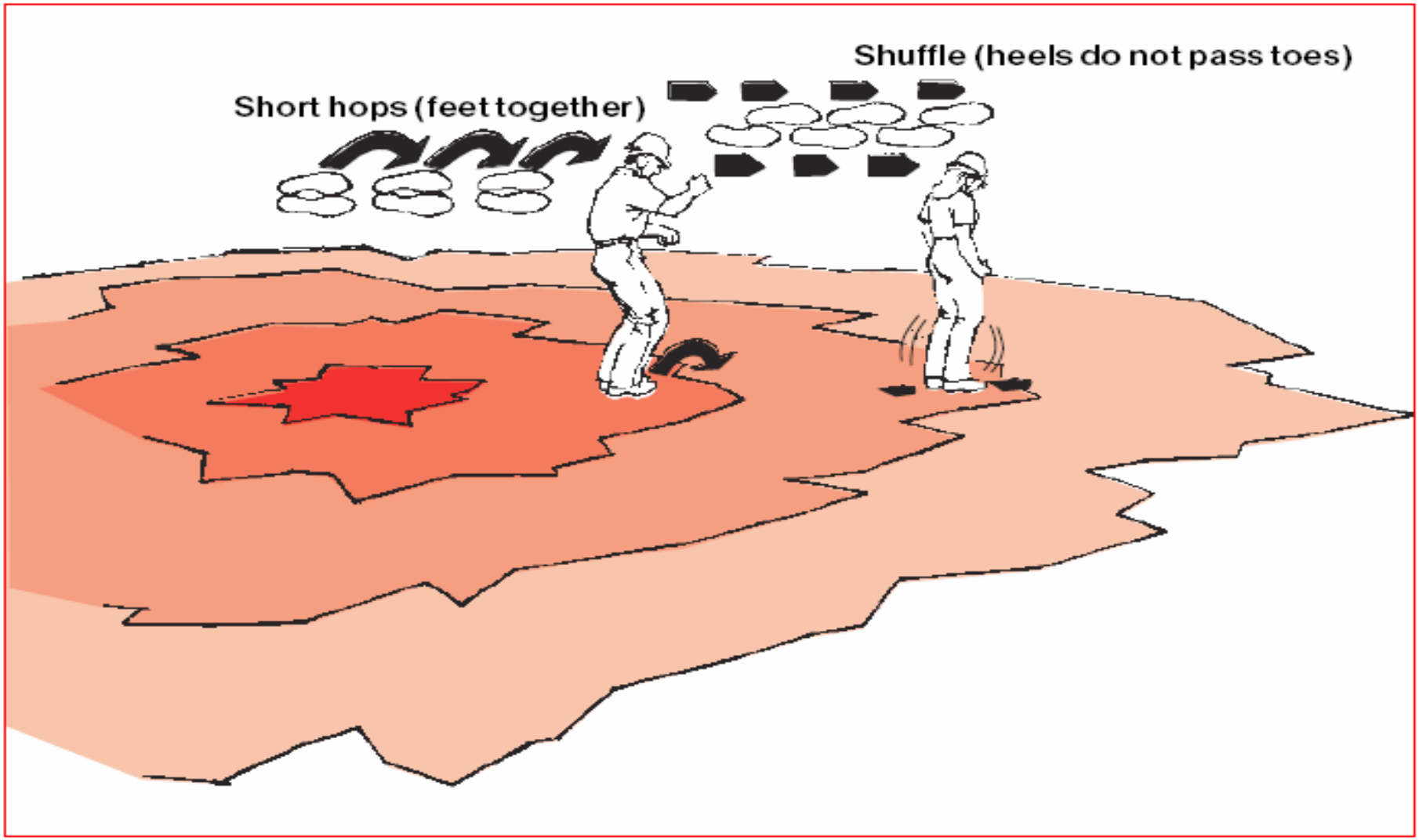
- **If You Must Exit the Vehicle:**
  - **Carefully Open the Door**
  - **DO NOT Touch the Sides of the Vehicle**
- **Slide Your Feet Near the Edge of the Door So You Will Be Able to Jump.**
- **Get Ready to Jump**
  - **Make Absolutely Sure You DO NOT Touch the Ground & the Vehicle at the Same Time.**

Continued…

- **Jump Clear of the Vehicle**
  - **Avoid Contact with Any Part of the of Vehicle**
- **Land With Feet Together and Either:**
  A. **Continue to Jump (Like A Rabbit Hopping) Until a Significant Distance Away from the Vehicle, OR**
  B. **Shuffle Your Feet Without Losing Contact with the Ground.**
- **Once Away, Stay Away from Equipment/Vehicle and any Downed Power Lines**



After You Jump Clear...



If you must move on energized ground, shuffle or hop while keeping your feet together and touching each other. Do not take steps.

OSHA 30-minute Lightning Rule?

FactSheet

Lightning Safety When Working Outdoors

Seek Shelter in Buildings: Employers and supervisors should know and tell workers which buildings to go to after hearing thunder or seeing lightning. NOAA recommends seeking out fully enclosed buildings with electrical wiring and plumbing. Remain in the shelter for at least **30 minutes** after hearing the last sound of thunder.

Vehicles as Shelter: If safe building structures are not accessible, employers should guide workers to hard-topped metal vehicles with rolled up windows. Remain in the vehicle for at least **30 minutes** after hearing the last sound of thunder.

U.S. Department of Labor

OSHA
Occupational Safety and Health Administration

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

OSHA - DTSEM FS-3863 05/2016

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Utility Damage

Emergency Response & Reporting

Immediate Actions

Emergency Damage

Immediately Call 911 to Protect Public Safety, then Call 811 to Report Facility Damage

Natural Gas – High Voltage Electric – Fire / Explosion Liquids
Oil / Petroleum – Public / Environment Safety

Non-Emergency Damage

Immediately Call 811 to Report All Facility Damages

Telephone – Cable – Conduits Communication Lines
Low Voltage – Sewer Laterals – Drain Lines

Secure the Scene

- Stop excavating/disturbing the area near the damage
  - **Preserve all locates in the area**
- Turn off all equipment
- Evacuate the area
- Call emergency services
- Alert pedestrians and residents

All of the following are considered necessary first steps during a natural gas utility damage emergency except:

When poll is active, respond at **PollEv.com/csdz**

- Turn off all equipment
- Evacuate the area
- Call emergency services
- Try to contain or stop the release of gas
- Alert pedestrians and residents

Total Results: 10

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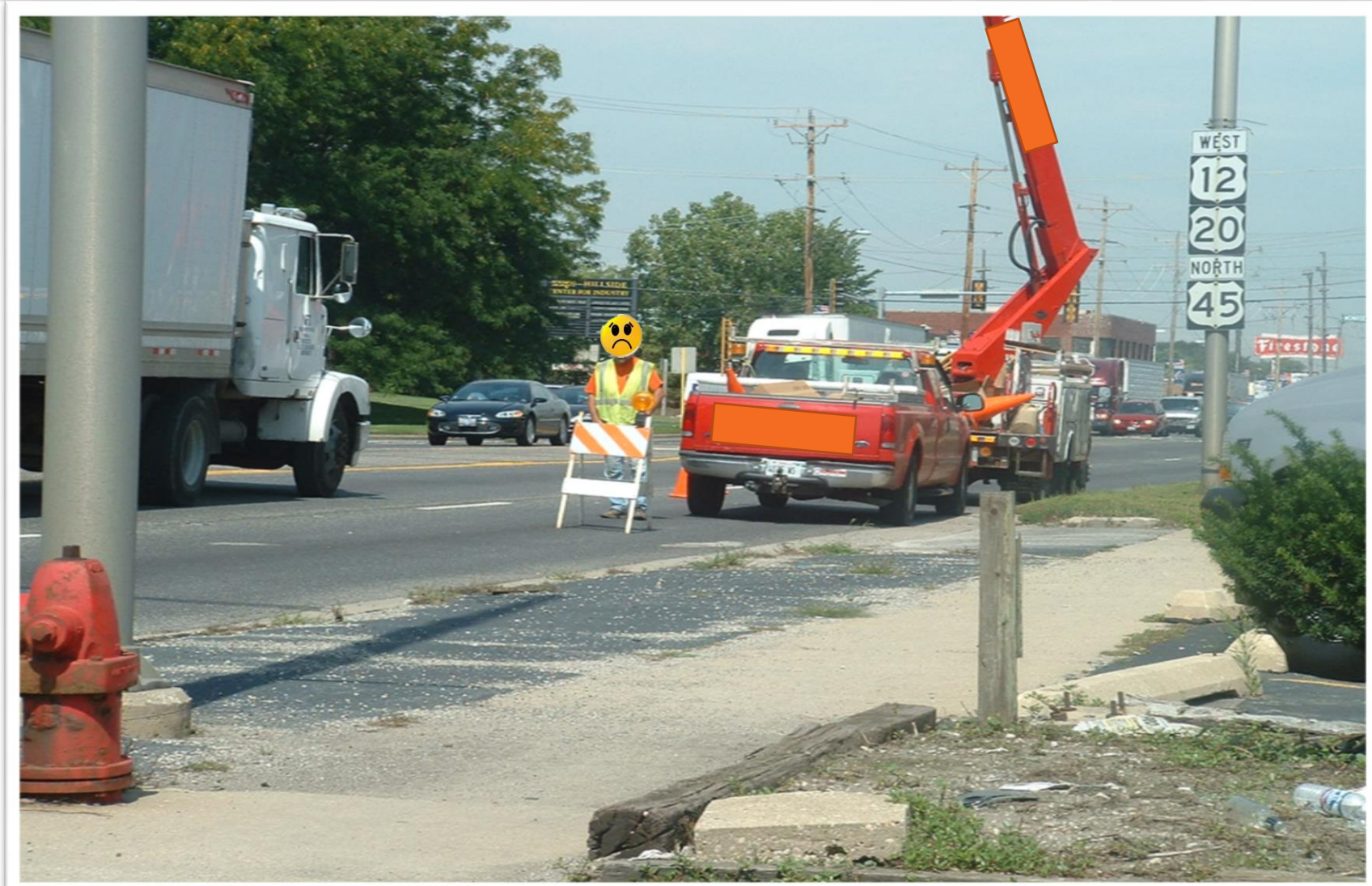
Construction Work Zones

What's Your Strategy?

This is How People Die…



Work Zone

- Any Section of a Traffic-way where Maintenance, Utility Work, Moving/Mobile Work or Any Construction Activity is Performed
  - ***Highway/Street/Road***
  - ***Shoulder – 10 feet off the road edge, varies by state***
  - ***Beyond the Shoulder***
- Requires Temporary Traffic Control
  - ***Extends from the First Device to the Last Device***

Question: **Do You Have Unprotected Work Zones?**

Please Use Actual Traffic Control Devices

Create a Defensible Strategy

1. **Do You Need/Have Permission from the Road Authority?**
   - *State – County – Municipality*
2. **"*Approved*" TTC Plan or Template?**
   - *State – County – Municipality*
3. **Compliant Setup?**
   - *Any Modifications or Adjustments?*
   - *Spacing Requirements?*
   - *Correct Devices?*
4. **Trained or Certified Personnel?**

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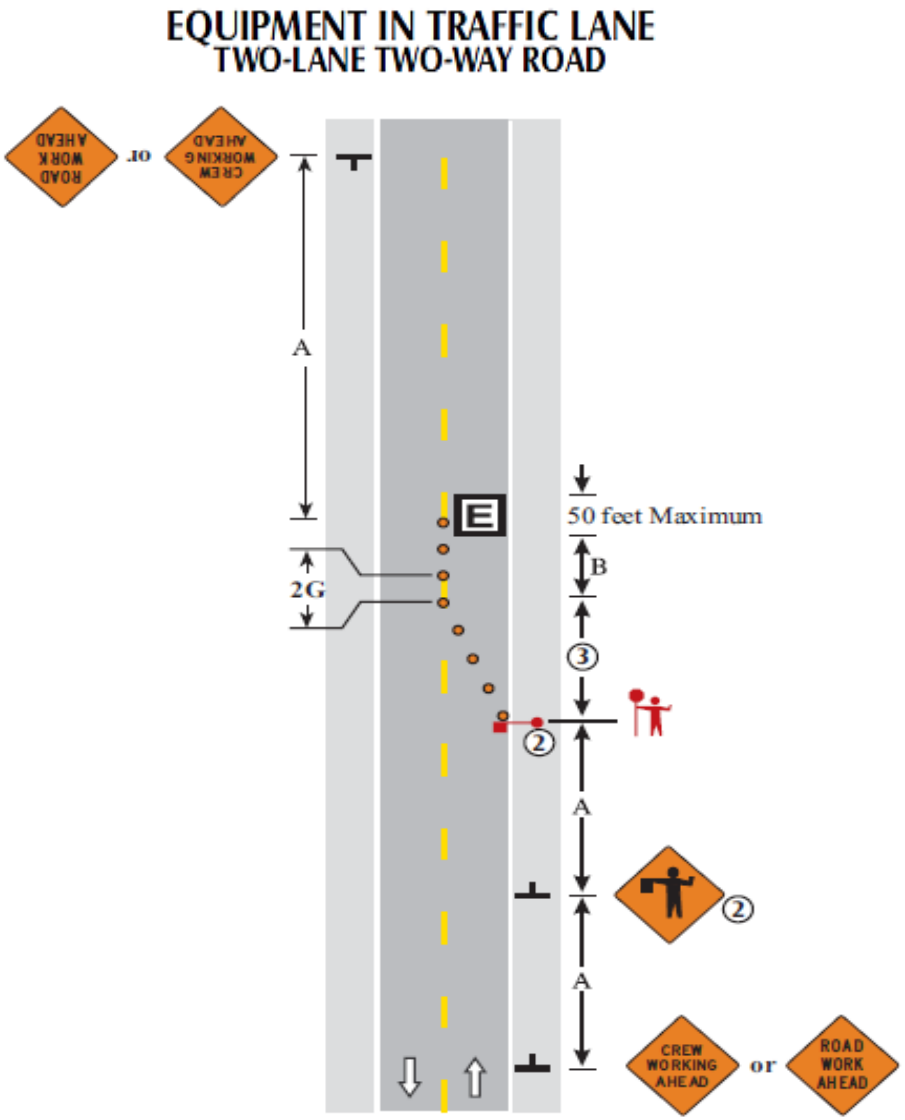
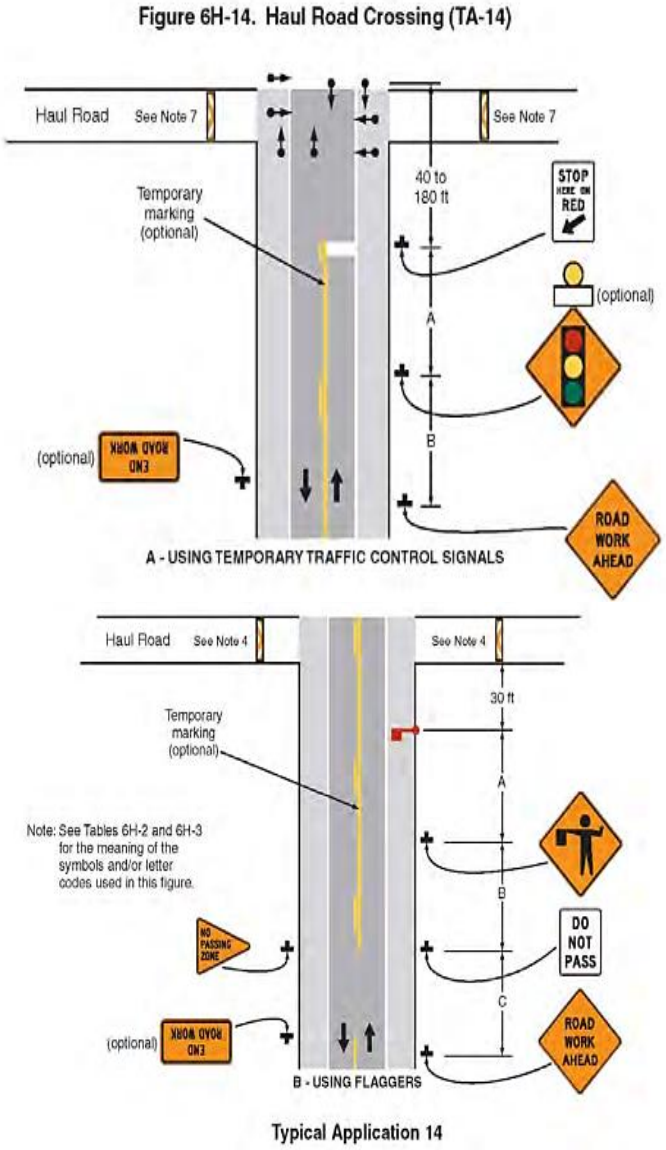
Options for Contractors

- Use another Contractor's Existing Work Zone Protection
  - ***Prime/GC …… Contractor/Sub …… Separate Contract***
- Sub Everything Out
  - ***Design, Devices, Delivery, Setup, Inspection, Maintenance, Removal/Takedown***
- Perform Only Specific, Agreed-upon Tasks
  - ***Contractual – Road Authority Approval – Get it in Writing!***
  - ***Sub:*** ***Initial Design, Devices, Delivery, Setup***
  - ***Self Perform:*** ***Inspection, Maintenance, Removal/Takedown***
- Self Perform Entire TTC Strategy


Ignorance is No Excuse
for Compliance

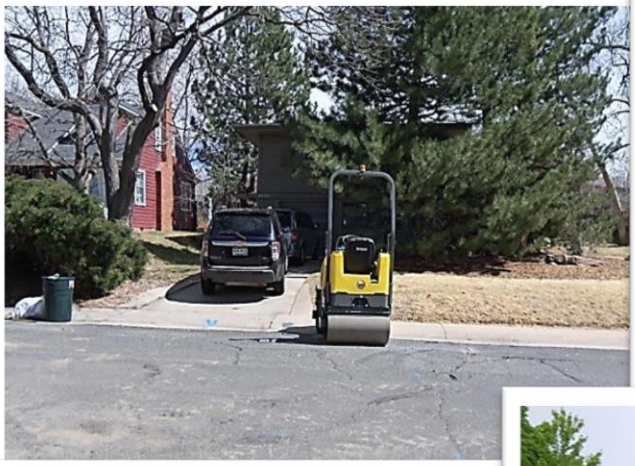
What are Your State's Requirements?

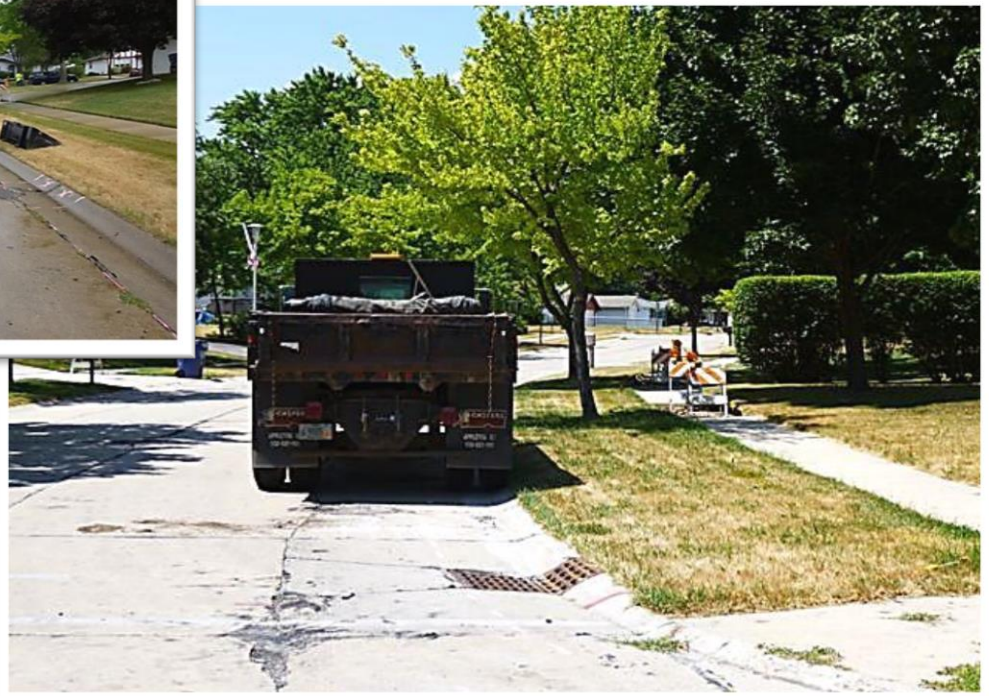





NO
PARKING
BETWEEN
SIGNS
STOP

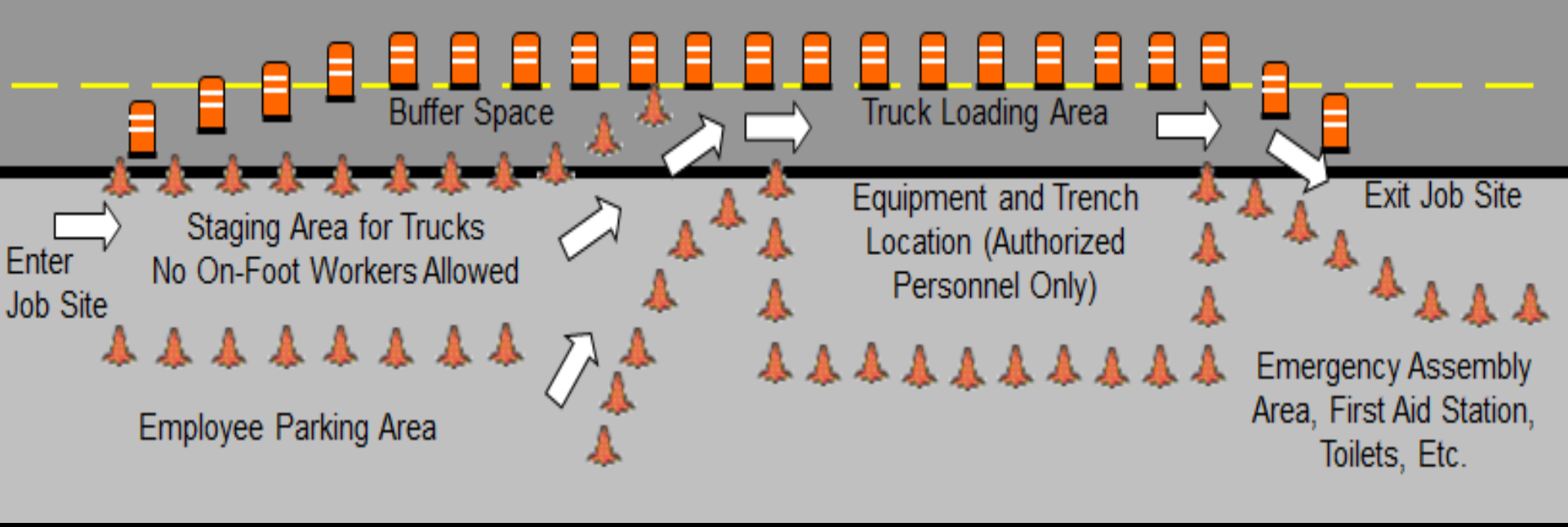
Vehicles, Equipment & Materials





Internal Traffic Control Plan

What is ***your*** strategy to control the flow of construction workers, vehicles and equipment ***inside*** the work zone?



Internal Traffic Control Plan

Strategies to control the flow of construction workers, vehicles and equipment *INSIDE* the work zone.

- Parking
- Staging Areas
- Loading / Unloading
- Entrance / Exit
- Pedestrian Routes
- “Authorized” Areas

Multiemployer Jobsites

Manage vehicle and equipment movement at the jobsite

- Develop and communicate the internal traffic control plan
- Coordinate/schedule operations to reduce equipment risk
  - **EXAMPLES: Deliveries, pickups, hoisting/rigging loads**
- Limit access points
- Identify and coordinate backup and turn around areas
- Employees working and walking around equipment
  - **Pretask planning, agreed upon communication methods**
  - **Fencing, barricades, signage, berms, stop logs, etc.**
  - **Establishing pedestrian-free areas, where possible**
  - **Designing buffer spaces to protect pedestrians**

Contractors need to ensure necessary precautions are taken to account for the hazards created by other contractors' heavy equipment and construction vehicles.

When poll is active, respond at **PollEv.com/csdz**

True

False

Total Results: 12

Pedestrians & 3rd party Risk

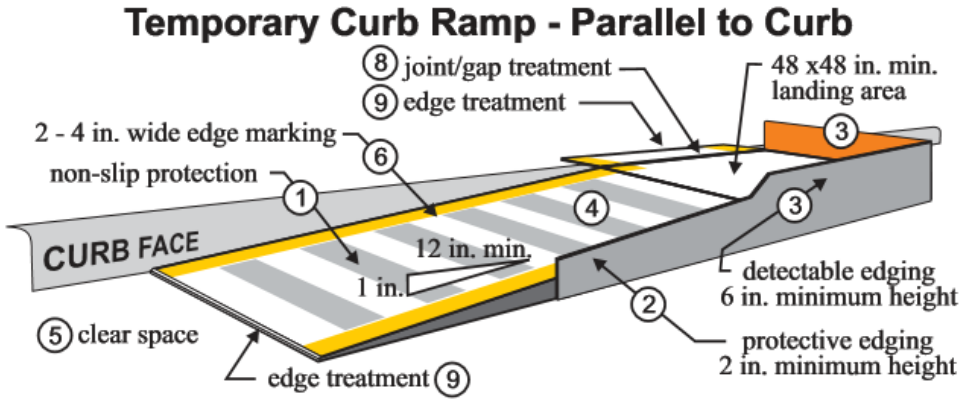
Construction Work Zone

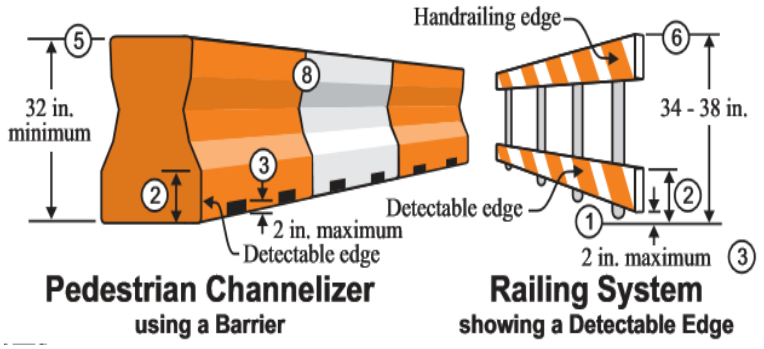
How are You Managing the Herd?

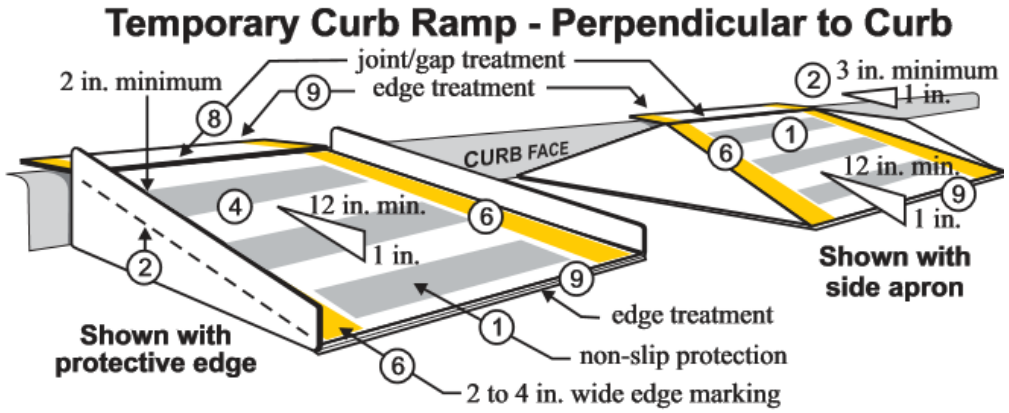
Think of Lemmings…

Unique State-specific Precautions

Contact the Road Authority about Requirements & Limitations







Typical TPAR Devices

Refer to the MnDOT TPAR website for additional standards, guidance, and options for designing temporary pedestrian access routes.
http://www.dot.state.mn.us/trafficeng/workzone/tpar.html

Do You Know the Difference?

- *"Enter, but proceed with caution."*
  - Area has safety and health concern(s) of a lower severity

- Death or serious injury WILL occur if all necessary precautions are not followed

- *"Do not enter without permission from site supervisor."*
  - Area has an immediate safety or health concern with a high severity

- Death or serious injury MAY occur if all necessary precautions are not followed

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In Closing…

Managing Equipment Risk

1. Asset Protection
2. Preserving Profitability Potential

Tracking Costs:

- ✓ Is there a difference btw. *Equipment Damage* and preventative / scheduled maintenance?
  - **PM/SM – Forecast, predictable and repeatable costs**
- ✓ Are you tracking costs with a separate accounting line item for each?
  - **If not, how do you know when and where you are spending money?**

What is Your Strategy?

No amount of "*Safety*" can make up for project mismanagement, poor planning and ineffective site leadership.

Written policies stuffed into a dusty manual do nothing for employees who lack knowledge and skill, and do not prevent leadership from directing employees to make wrong choices.

Thank You!

Chad Stuart

Risk & Safety Group

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