



Roadway Construction Hazards

Infrastructure Investment: Top Hazards in the Transportation Construction Industry

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Photo: Brad Sant/ ARTBA

Safety Hazards in Roadway Construction

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Photo: Brad Sant/ ARTBA

Course Objectives

The objectives for this course are:

1. Identify common safety hazards in roadway construction.
2. Identify the major electrical hazards in roadway construction.
3. List ways to protect yourself from roadway construction hazards.

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**Common
Hazards in
Roadway
Construction**
OSHA's Focus Four

Photo: Brad Sant/ ARTBA

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OSHA Focus Four



- Height
- Equipment
- Same level
- Lower level



- Temporary traffic control
- Flaggers
- Internal traffic control
- Spotters



- Equipment
- Vehicles
- Sphere of safety



- Define electrical hazards
- Identify electrical hazards
- Protect yourself from injury and death

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OSHA Focus Four

1. Fall hazards
2. Struck-by hazards
3. Electrical hazards
4. Caught-in or between hazards



Photo: ARTBA

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Roadway Construction

1. **Struck-by hazards**
2. Fall hazards
3. Caught-in or between hazards
4. Electrical hazards

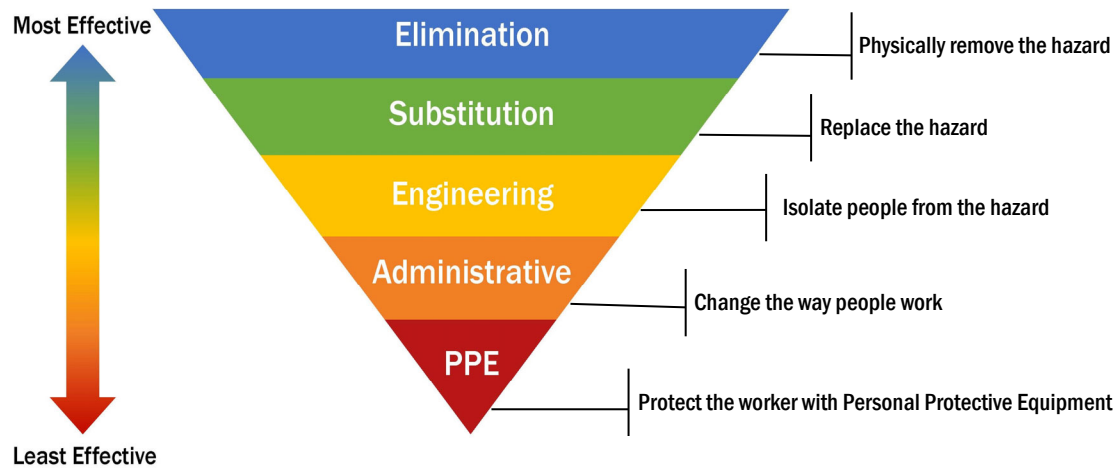


Photo: Virginia DOT

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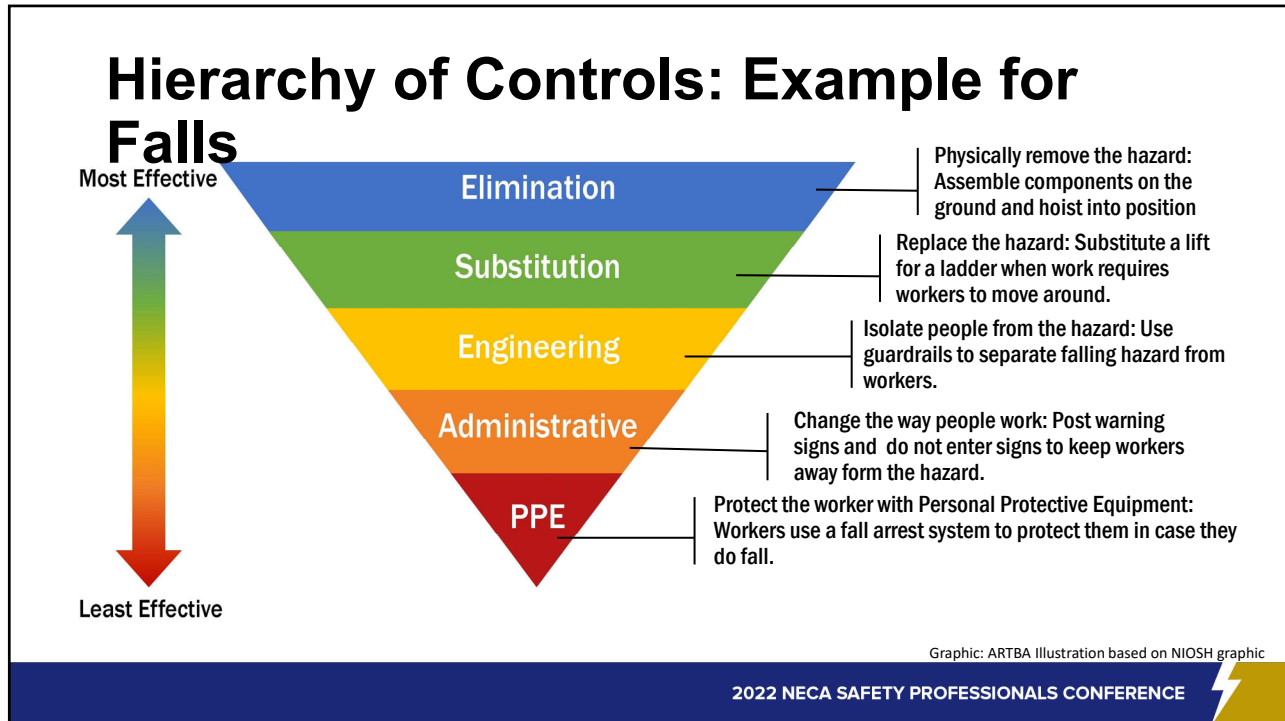
Hierarchy of Controls



Graphic: ARTBA Illustration based on NIOSH graphic

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Falls Knowledge Check Question 1

- What's the trigger height for fall protection in construction?

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Falls Knowledge Check Answer 1



Six feet in the construction industry

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Falls Knowledge Check Question 2

- What's the trigger height for fall protection from scaffolds in construction?

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Falls Knowledge Check Answer 2

Ten feet above a lower level



Type of scaffold	Fall Protection required
Aerial lifts	Guardrails and fall restraint
Mobile Scaffold (scissor lifts)	Guardrails required & fall restraint recommended
Float & Needle beam scaffold	Personal fall arrest system
Ladder & pump jack scaffold	Personal fall arrest system OR guardrail system
Self-contained scaffold	Personal fall arrest system OR guardrail system
Single-point and two-point suspension scaffold	Personal fall arrest system AND guardrail system
Supported scaffold	Personal fall arrest system OR guardrail system
All other scaffolds	Personal fall arrest system OR guardrail system that meets criteria

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Falls Knowledge Check Question 3

- How many feet from an unprotected edge constitutes as fall protection?

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Falls Knowledge Check Answer 3



There is NO safe distance from any unprotected edge

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Falls from Height

- Maintenance & repair of bridges & overpasses
 - Installing bridge decking
 - Installing overhead signs
- Form work & reinforcing steel
 - Mounting, dismantling, & moving cranes & other equipment
- Accessing work areas from mobile elevated work platforms, scaffolding & ladders
- Demolition



Photo: PxHere

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Preventing Falls from Height

- Guarding the hazard
- Fall arrest system
- Fall restraint system
- Nets

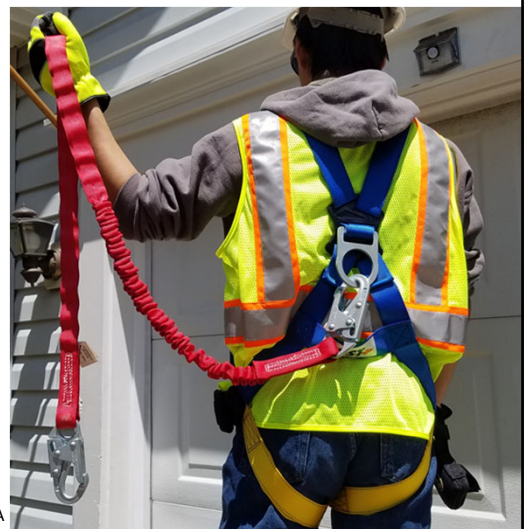


Photo: Robinson Vasquez / ARTBA

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Falls from Equipment

- Getting in & out of cabs
- Paving machines & other ride-on equipment
- Mobile elevated work platforms (MEWPs)



Photo: Granite Construction

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Preventing Falls from Equipment

- Don't jump down or off equipment
- Use 3-point system
- Follow manufacturer's instructions
- Use fall protection system on MEWPs and lifts



Photos: ARTBA

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Falls from the Same Height

- Ice & snow
- Water & mud
- Rocks
- Work site debris
- Heavy equipment tracks



Photo: Beth Stinson / ARTBA

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Preventing Falls from the Same Height

- PPE
- Good housekeeping
- Mark ground hazards
- Clear pedestrian pathways of hazards



Photo: Beth Stinson / ARTBA

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Falls to a Lower Level

- Holes
- Pits
- Trenches
- Excavations



Photo: Beth Stinson / ARTBA

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Preventing Falls to a Lower Level

- Cover holes
- Roadway covers must support 2x max. axle load of largest vehicle to cross over
- Internal traffic control plan
- Mark hidden edges of trenches
- Keep workers away



Photo: NIOSH

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BREAK



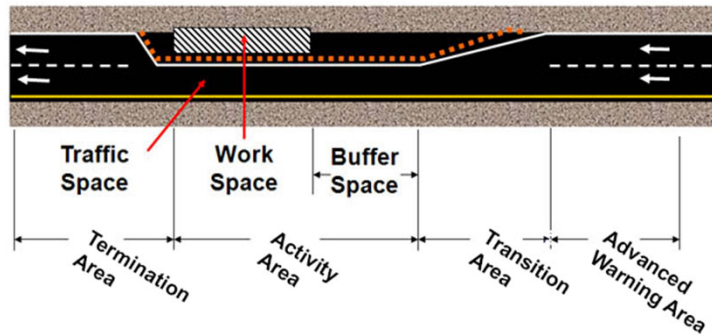
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Temporary Traffic Control

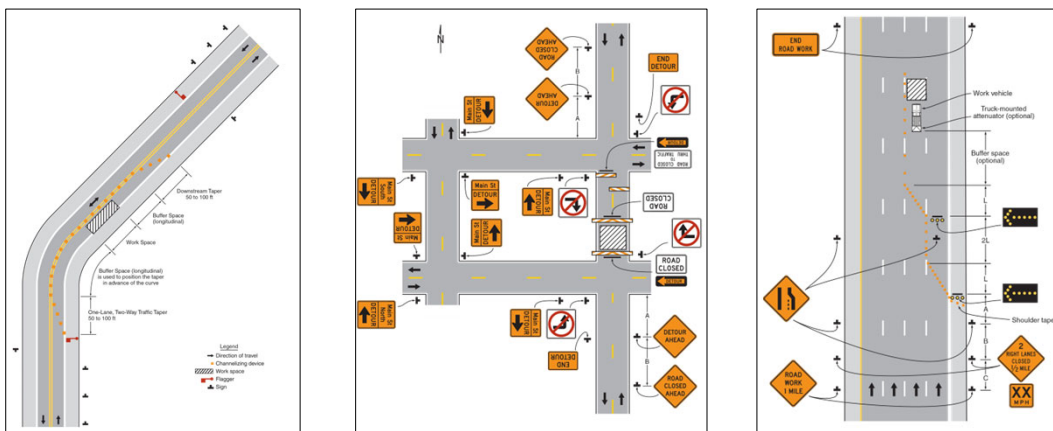
- **A** advanced warning area
- **T** transition area
- **B** buffer space
- **A** activity area
- **T** termination area



Graphic: ARTBA

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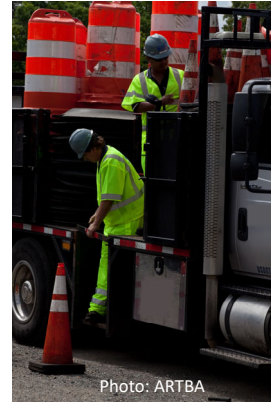
Temporary Traffic Control Plan - TTCP



Source: MUTCD

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Temporary Traffic Control Devices



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Flaggers



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Preventing Motorist Struck-by Incidents

- Monitoring TTCDs
- Positive protection
- Escape route
- Stay alert



Photo: Mobile Barriers

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Internal Traffic Control

- Separate workers on foot from equipment & vehicles
- Coordinate & control flow of construction vehicles
- Establish a communication plan

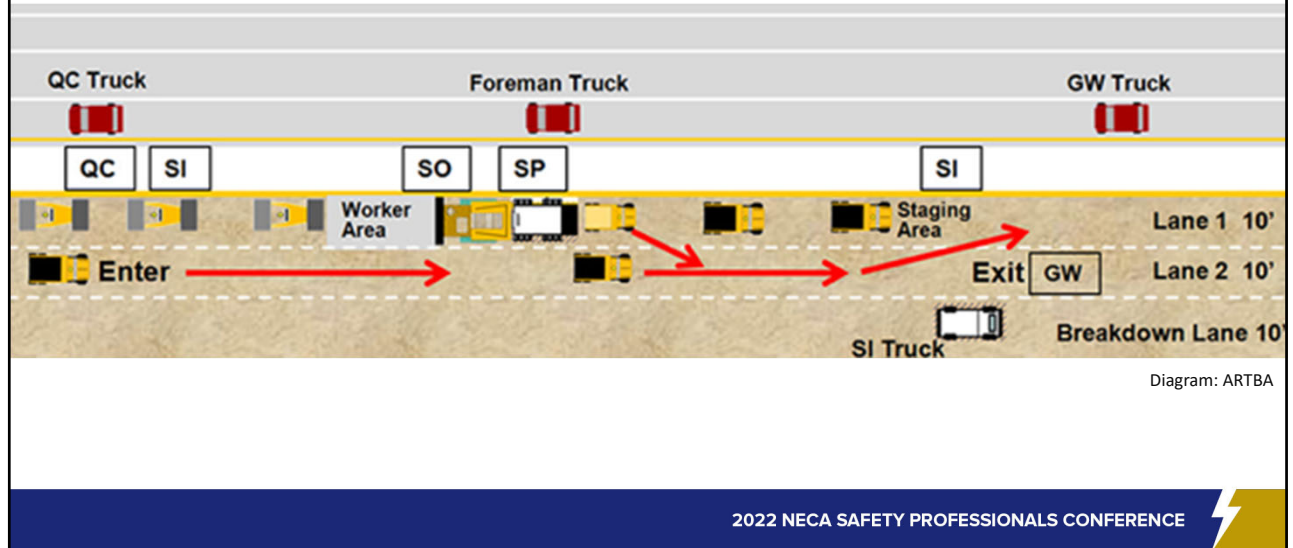


Photo: ARTBA

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Internal Traffic Control Plans



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Access & Egress



Photos: ARTBA

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Parking, Staging & Rest Areas



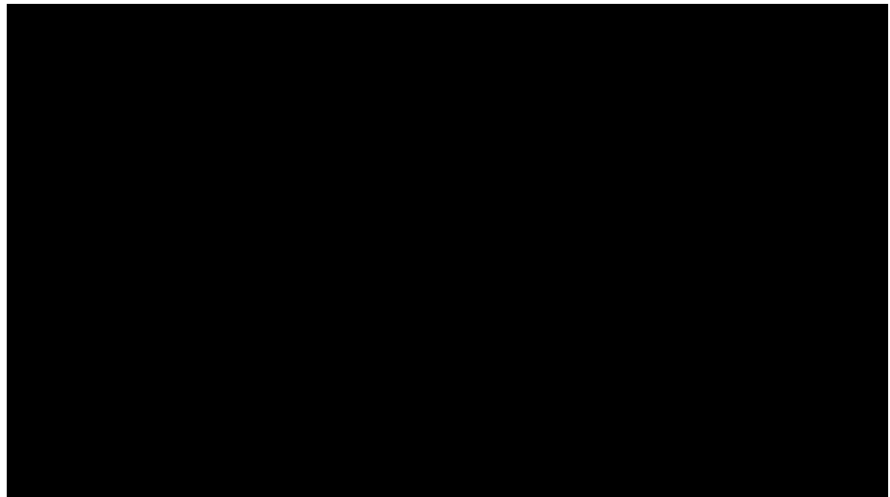
Photo: ARTBA

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Blind Spots Video Presentation

Produced by ARTBA and
the Federal Highway
Administration



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Spotters

- Know the ITCP
- High visibility clothing
- Hand signals



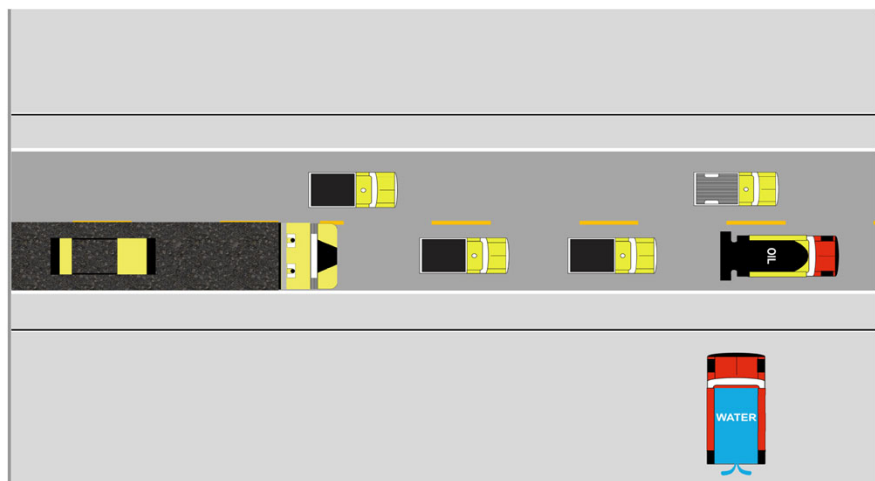
Photo: ARTBA

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Draw an Internal Traffic Control Plan

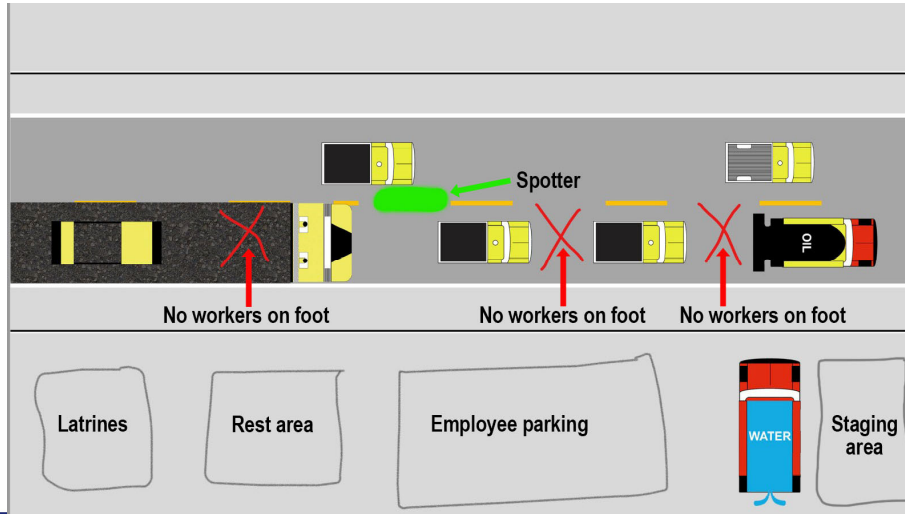
1. Outline
 - Employee parking
 - Rest area
 - Latrines
 - Staging area
2. Place an X in places where workers on foot are NOT allowed
3. Draw an oval for where to station a spotter



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Draw an Internal Traffic Control Plan



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Caught-in or Between



Photo: ARTBA

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Rollovers

- Steep grades
- Soft shoulders
- Exceeding manufacturer operating limits
- Loading and unloading for transport



Photo: Pixabay

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Preventing Rollovers

- Brakes
- Alarms & cameras
- Mirrors
- Tires
- Manufacturer's specs
- Training



Photo: ARTBA

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Cranes

- Pinched in hooks
- Crushed or tangled in rigging
- Crushed between loads
- Assembly & disassemble



Photo: Bill Jacobus CC 2.0

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Preventing Caught-in or Between Cranes

- Stay away from crane operations
- Visual contact with crane operator
- PPE
- Movement alarms



Photo: ARTBA

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Trailers & Transport

- Shifting loads
- Overloaded trailers
- Load not secured
- Damaged trailer



Photo: PxHero

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Preventing Caught-in Trailers & Transport

- Walk around safety inspection before loading
- Secure all equipment & moving parts
- Use trained spotters & riggers
- Keep non-essential personnel away



Photo: Steven Martinez / CDOT

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BREAK



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Electrical Safety



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Video Presentation

Why Don't Birds Get Electrocuted on Powerlines?

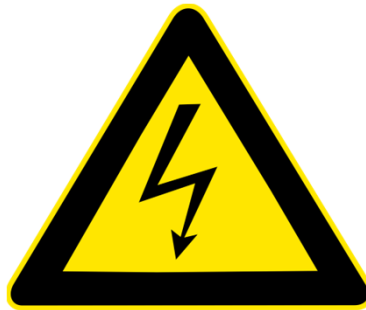
WHY DON'T BIRDS GET ELECTROCUTED ON POWER LINES?

INTERESTING ENGINEERING

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Dangers of Electricity



Graphics: Public domain

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Electrical Hazards

- Underground power lines
- Overhead power lines
- Arc flash
- Electrical panels
- Transformers & generators
- Power tools & extension cords



Photo: Brad Sant / ARTBA

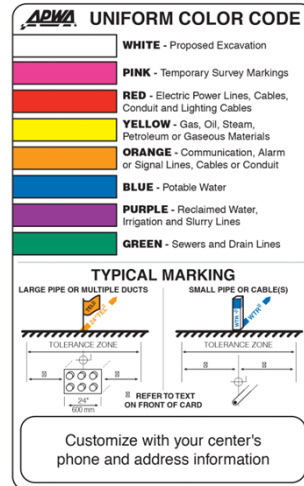
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Underground Power Lines & Utilities



Photo: Public Domain



Graphic: APWA

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Overhead Power Lines

- Dump trucks
- Cranes
- Concrete pumps
- Excavators
- Mobil elevating work platforms (MEWPs)
- Ladders/Scaffolds
- Equipment/Material storage



Photo: ARTBA

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Safe Distance - Overhead Power Lines

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, qualified professional engineer.)

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.

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Dump Trucks



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MARCH 15, 2018

- **LORTON, Va.** - Police have identified the truck driver who was killed after being electrocuted when his vehicle made contact with power lines Thursday morning in Lorton.
- 47-year-old Bobby Blevins, Jr. was found unconscious on the side of the road near Mordor Drive and Furnace Road around 6 a.m. Paramedics who were providing him medical attention noticed that the metal arm of the extended truck cover appeared to be in contact with the overhead wires along the roadway.

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Video Presentation

Besides electrocution, when a dump truck or other equipment hits a power line, the tires can blow out.



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Cranes



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Encroachment Prevention Strategy

- Planning meeting
 1. De-energize & ground
 2. Respect 20-foot clearance
 3. Ask utility for voltage and use Table A



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Concrete Pumps & Excavators



Photo: ARTBA

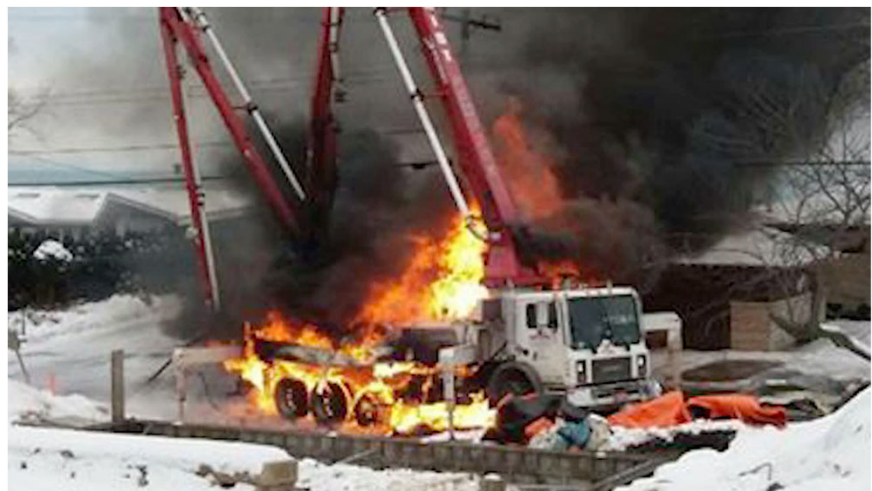
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Video Presentation

Result of a boom contacting power lines



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Swing Radius

- Cranes
- Concrete pumps
- Excavators



Photo: ARTBA

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Sphere of Safety

- The Sphere of Safety means no matter how the equipment pivots or moves, it will not come in contact with workers, utilities or other objects during its planned, stationary operation.
- Control Zones should be designated so workers and equipment do not likewise enter the imaginary sphere.



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Mobile Elevated Work Platforms (MEWPs) & Fork Lifts



Photo: ARTBA

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If Contact is Made . . .

1. If possible, back away to break contact.
2. Stop, set break and shut-down equipment.
3. Operator should stay seated in the cab, avoiding contact with any metal until line is de-energized – if safe
4. Contact 911 and secure the area.
5. Workers outside the equipment should stay back and not attempt to assist operator.

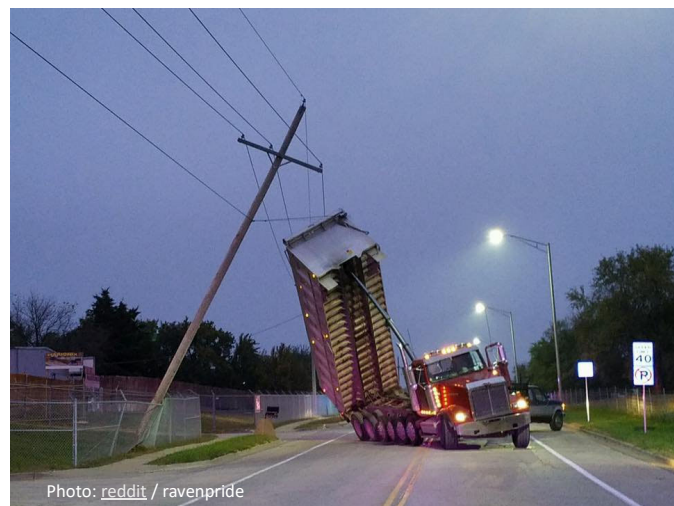


Photo: reddit / ravenpride

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Video Presentation

How to safely exit a vehicle that has contacted power lines

This video is produced by WorkSafe BC.



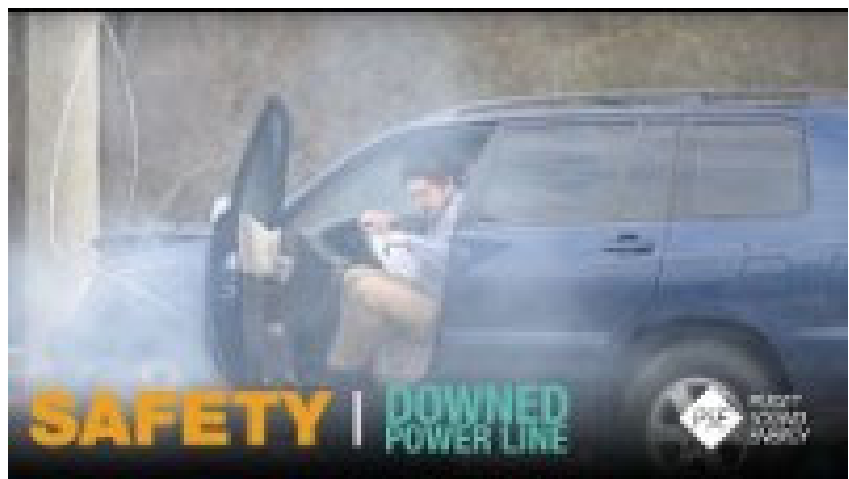
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Video Presentation

This Might Shock You: Downed Power Line

Produced by Puget Sound Energy



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Course Summary

1. Describe what employers are required to do to protect their workers.
2. Identify common safety hazards in roadway construction.
3. Define electrical hazards common in roadway construction.
4. Identify the major electrical hazards in roadway construction.
5. List ways to protect yourself from electrical hazards.



Version: November 2017

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Complete the Online Evaluation



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