

RUNOVERS AND BACKOVERS

ROADWAY SAFETY⁺

Awareness Program

Trainee Booklet



U.S. Department of Transportation
Federal Highway Administration

A Road Construction Industry Consortium Awareness Program

Runovers/Backovers

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Introduction

Runovers and backovers cause most of the deaths in road construction work zones.

This booklet presents the hazards of runovers and backovers. Then this booklet presents best practices and protections for all road workers, for operators and drivers, for contractors, and for owners/agencies.

Road workers, operators and drivers, contractors, and owners/agencies must work together to prevent runovers and backovers.

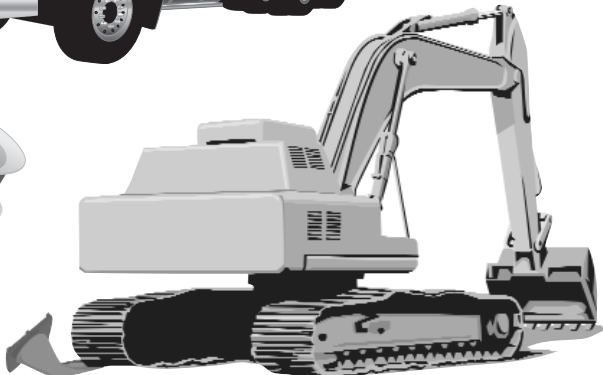
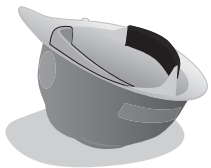
Runovers/Backovers: All Workers

What Are Runovers and Backovers?

A 'runover' or 'backover' happens when a worker on foot is struck by a vehicle.

Vehicle types:

- Motorists' vehicles passing through a work zone.
- Construction vehicles and equipment operating in the work zone.



Runovers/Backovers: All Workers

Are Runovers and Backovers a Problem?

Runovers and backovers are the main cause of road worker deaths.

Facts:

- In recent years, about two-thirds of road worker deaths were due to runovers/backovers.



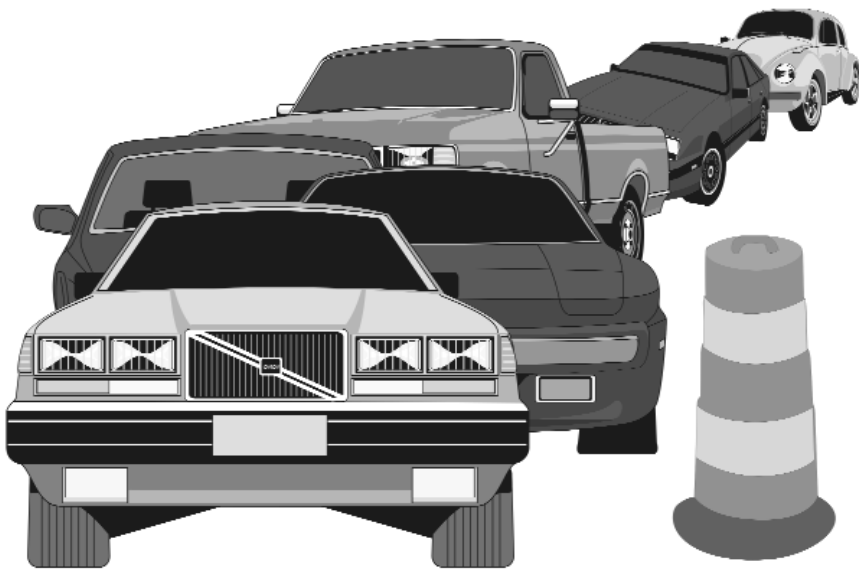
- More than half are by construction vehicles and equipment — especially dump trucks.
- The remainder are by vehicles traveling through the work zone.
 - Intrusions into the work space.
 - Workers in traffic space.

Why So Many Runovers and Backovers?

Mainly because roads are more congested.

Congestion:

- Expedited schedules, small work spaces, rapid work to minimize impact on traffic flow.



- Work on existing roads exposes workers to traffic.
- More work zones — tens of thousands during peak construction times.

Runovers/Backovers: All Workers

Why Are Workers Killed by Motorists?

Motorists enter the work space. Motorists may be:

- Unable to see workers.



- Surprised by work zone and TTC set up.
- Ignoring warnings.
- Distracted or impaired.
 - Phones, handheld devices.
 - Drowsy.
 - Drugs, alcohol.
- Speeding.



Why Are Workers Killed by Motorists?

Workers stray into the traffic space. Workers may:

- Be preoccupied by work.
- Not appreciate the risks.
- Have no convenient access to work areas.
 - Rest rooms.
 - Food and water.
 - Shade/breaks.
 - Other local work areas.
 - Staging of company and personal vehicles.



Can you spot the flaws in the layout of this job?

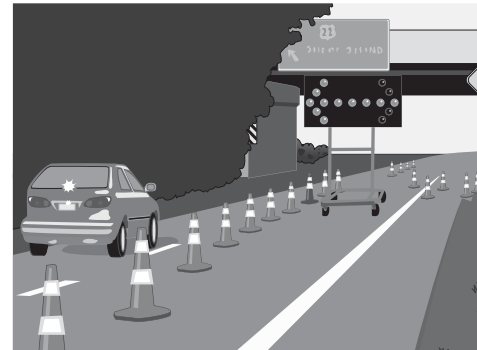
Runovers/Backovers: All Workers

How Do We Prevent Runovers by Motorists?

Use proper TTCD set and retrieval.
(TTCD: *Temporary Traffic Control Devices*).

Proper TTCD set up/retrieval:

- Comply with MUTCD and state or local document.
(MUTCD: *Manual on Uniform Traffic Control Devices*).
- Inspect and maintain TTCDs.
- Ensure a qualified engineer makes changes or that engineering judgment is used in making modifications to the TTCD in the field.
- Setup/retrieve in correct order.



Notify supervisor if TTCDs are:

- Not in proper position.
- Damaged or dirty.
- Not being seen or recognized by motorists.

TTCD stands for Temporary Traffic Control Devices.

How Do We Prevent Runovers/Backovers?

Workers must always be sure to be visible.

How to be visible:

- Wear appropriate high-visibility garments.
 - Safety supervisor will determine type.
 - FHWA regulations require **Class 2** or better garments on all jobs (FHWA: *Federal Highway Administration, U.S. Department of Transportation*).
 - Retroreflective high visibility apparel meeting ANSI / ISEA* 107-2004 - **Class 3** to improve visibility.

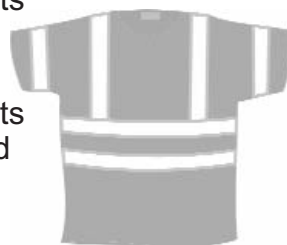
* ANSI/ISEA - American National Standards Institute/
International Safety Equipment Association

Class 2



- High visibility garments must be clean and in good condition.
- High visibility garments must fit and be closed in front.

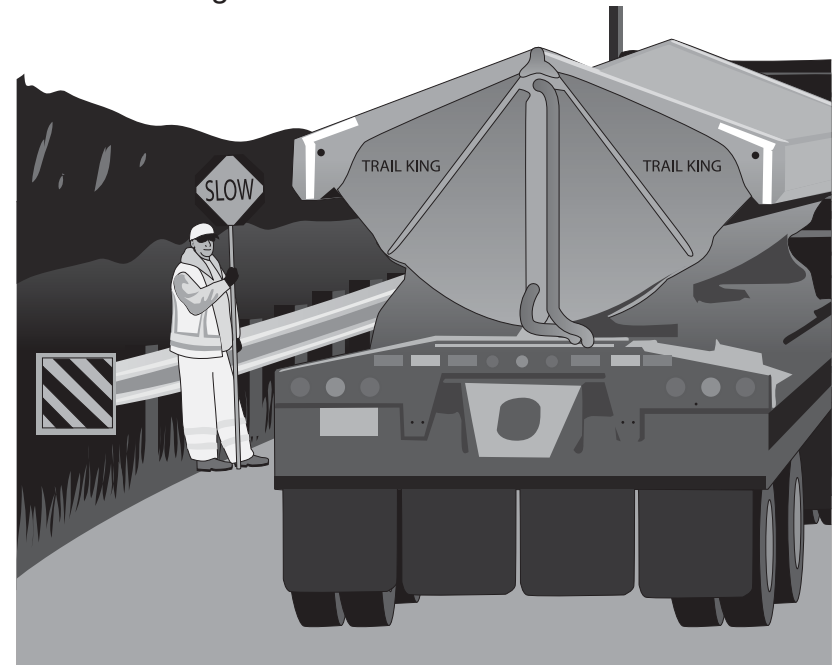
Class 3



Class 3 Apparel: For work when exposed to high speed traffic and/or conditions where visibility of workers may be reduced. For conditions where equipment operators perform tasks near pedestrian workers. Worker must be conspicuous through a full range of body motions at a minimum of 1,280 feet and identifiable as a person. Examples include flaggers, roadway construction workers, utility survey crews, and emergency responders.

Runovers/Backovers: All Workers

- Wear hard hat, sleeved shirt, and other PPE (Personal Protective Equipment).
- Don't stand over the crest of a hill, in shadows, or other places where you may not be visible to motorists and operators.
- Lighting affects visibility. Drivers' vision may be hindered by:
 - Bright sunlight, sun close to horizon (dawn, sunset).
 - Work lights, equipment lights, and the lights of oncoming traffic.



How Do We Prevent Runovers/Backovers?

Workers should stay in protected areas.

Protected areas:

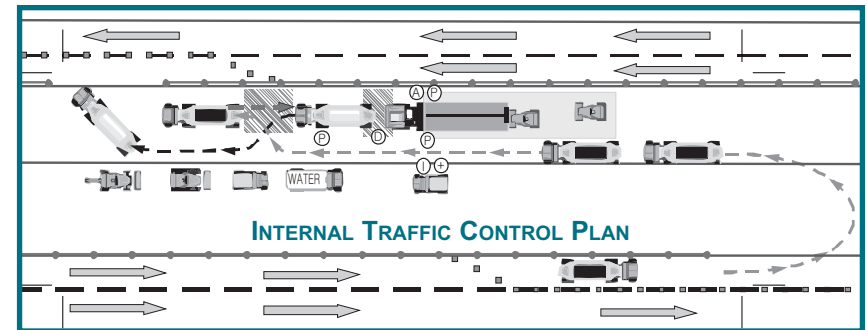
- Stay on work side of barrier.
- Know proper path/course to leave for breaks.



- Stay away from open traffic lanes.
- Talk with others only in a safe area away from traffic.
- Get in/out of vehicles on non-traffic side.
- Plan emergency escape route and revise as needed.
- Park personal vehicle for safe access to work and to the vehicle.

Can an ITCP Help?

Yes. An Internal Traffic Control Plan coordinates the flow of equipment and workers.



An ITCP will:

- Route vehicles to minimize backing.
- Create traffic-free zones for workers on foot.
- Reduce speed through work areas.
- Limit access to and exit from work areas.
- Improve communication between workers and equipment.

Workers must be trained on where equipment operates — and enters and exits the work space. See more ITCP detail on page 20.

How Can We Be Safe Around Equipment?

Avoid entering equipment operating areas.

Near moving, swinging, or 'pinch point' vehicles:

- Obey markings and barricades in work space, stay outside "danger zone."
- Never enter space unannounced.

Approach only after communicating with the operator:

- By radio.
- With hand signals.
- Wait until operator returns signal.
- Never assume operator sees you.



Ride on vehicles and equipment only in a proper seat designed for human occupancy.



What About 'Blind Spots'?

'Blind spots' are areas where workers on foot cannot be seen by operators:

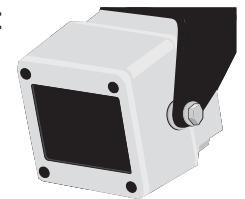
- Each type of equipment has different 'blind spots'.



- If you can't see operator's face in mirror, operator can't see you.
- Operators focus on gauges, tasks, conditions, etc.
- Proper communication is key.

Devices help eliminate 'blind spots':

- Cameras.
- Sonar devices.
- Radar devices.
- Tag systems.



Why Do We Use Back-Up Alarms?

An alarm warns that the operator may not see workers when backing up.

Respond to alarm!



Respond to alarm:

- Immediately identify alarm source.

Don't rely only on alarms:

- Alarms can become 'background noise'.
- Listen for alarms masked by other noise.
- Use and trust your senses.

What Is a Spotter?

Spotters warn operators about nearby workers and hazards.

If you are a spotter, make sure:

- Operators know your position.
- Workers know your responsibilities.
- Workers do not move behind equipment until you signal permission.



Spotters must:

- Be trained in safe procedures including continuous visibility/contact with operator

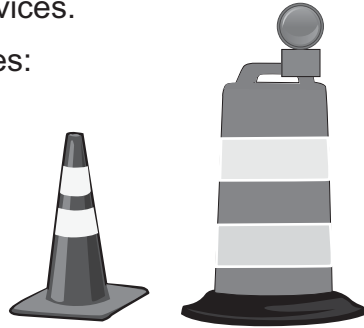
With no spotters present, workers must be extra careful and communicate with operator directly before approaching equipment/vehicles.

Why Must We Learn About TTCDs?

We must understand use, spacing, and maintenance of Temporary Traffic Control Devices.

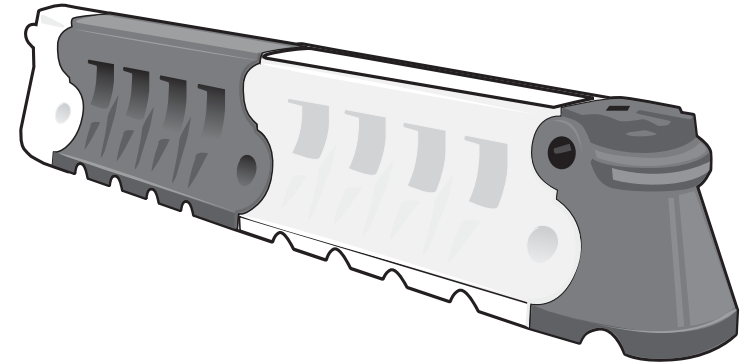
Barrels, cones, tubular devices:

- Will not stop cars from entering work space.
- Mark boundary between work and traffic spaces.
- Align/space so driver sees boundary.
- Maintain retroreflective bands for night visibility. Keep clean of dirt and marks.
- Notify supervisor if set up might need correction.

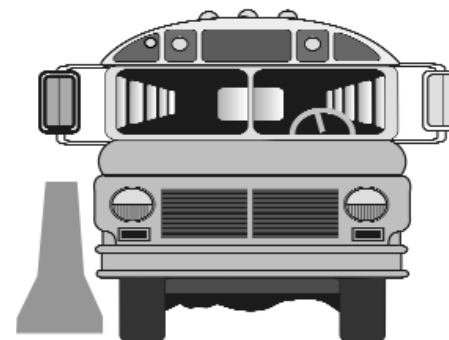


Runovers/Backovers: All Workers

Barriers — concrete, steel, moveable, water-filled, or sand-filled:



- If hit hard enough, can be pushed into work space — some types can be anchored.
- Large vehicle could possibly roll over the barrier though this would be unusual.



Barriers may not protect from mirrors or other objects extending from vehicles. Avoid working or standing close to a barrier.

What Are the Best General Safety Tips?

The work zone is hazardous and requires you to be fully alert at all times.

Safety tips:

- Check surroundings often, listen for warnings.
- Avoid distractions such as cell phones and other personal electronic devices.
- Never work impaired by alcohol, drugs, medications, or any substance that makes you alert.
- Get enough sleep, rest before starting your shift.
- Look out for each other, warn coworkers!



Operators and Drivers

How Do We Learn About the ITCP?

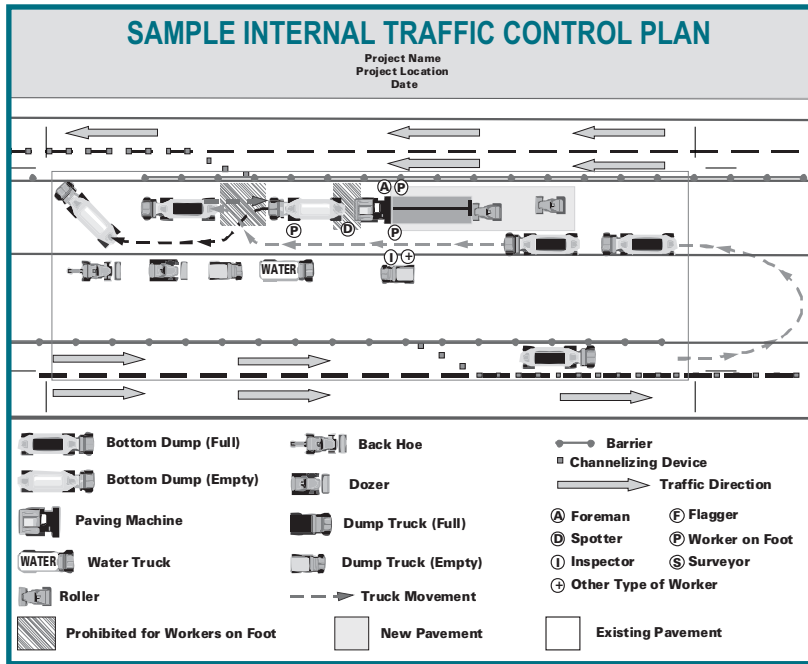
Get a copy of the Internal Traffic Control Plan from the site safety officer or foreman.

Review ITCP:

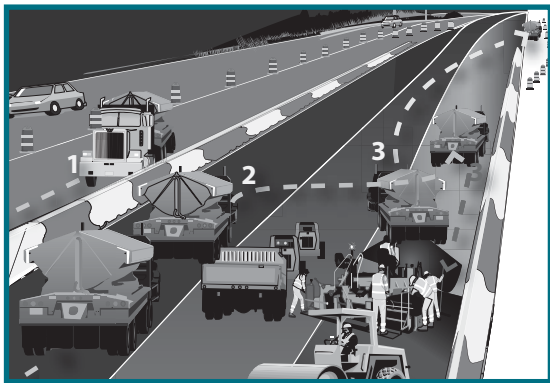
- Note where workers on foot will work.
- Set up forms of communication with workers on foot.
- Ensure worker and equipment areas are marked.
- Talk with other operators and drivers to confirm their understanding of the ITCP.



Workers must be trained on where equipment operates — and enters and exits the work space.



An Internal Traffic Control Plan (ITCP) coordinates the flow of equipment and workers.



What Are Basic Backing Rules?

Avoid backing unless absolutely necessary.

Backing rules:

- Never back up unless you are certain no workers on foot are behind — get out of cab to check if necessary.



- If no spotter is assigned, ask someone to spot for you.
- If you see a worker in the mirror, stop until you are certain the worker is in a safe position.
- Never assume a worker will walk safely behind the vehicle — don't continue backing until you know worker is safely in the clear.

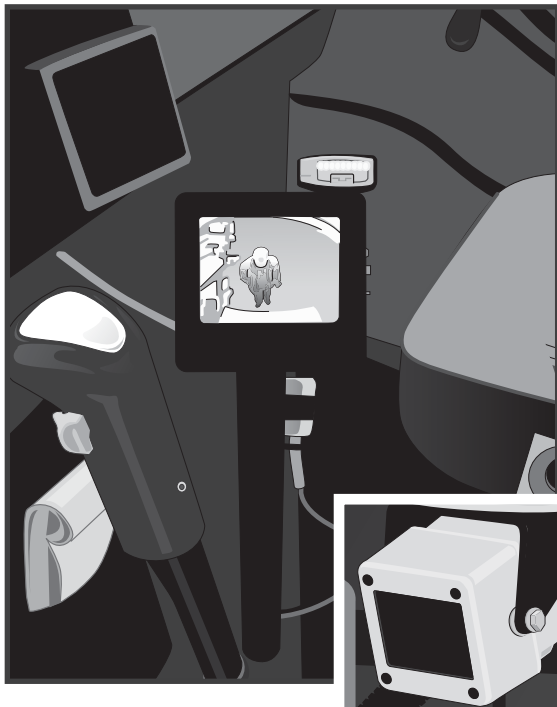
What Prevention Devices Can We Use?

Alarms, cameras, radar systems, and mirrors can be used.

Back-up alarms:

- Make sure alarm is working.
- Alarms with broadband white noise make it easier to distinguish/locate.
 - When several vehicles operate, worker cannot distinguish alarms from surrounding noise.
 - Quieter alarms may be required in cities (NYC).

Alarms were inoperable in 28% of fatalities.

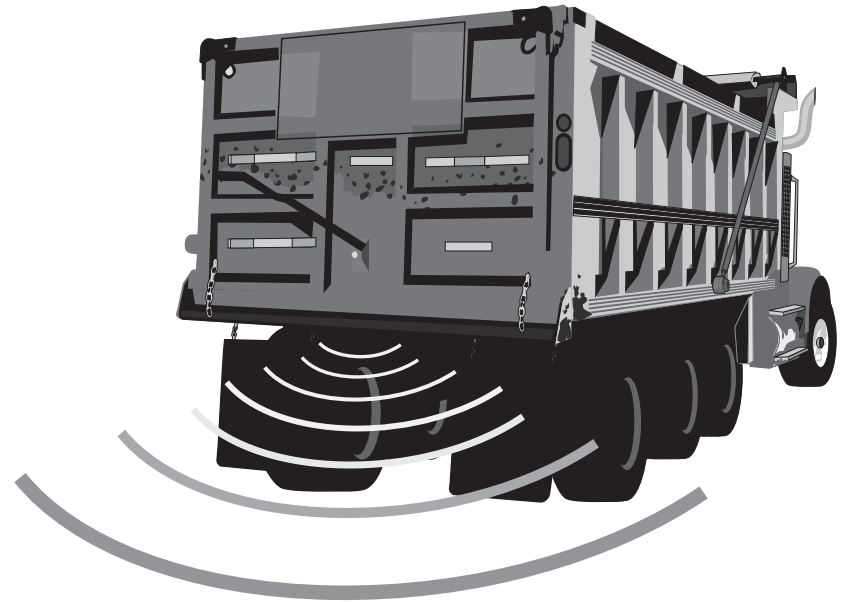


Video cameras:

- Properly mounted cameras eliminate 'blind spots' in rear view mirrors.
- Best system pairs camera with sensor to tell driver to look at screen.

Radar systems:

- Warn drivers as vehicle nears an object.



Mirrors:

- Not high-tech — must be working, clean, properly adjusted
- May still be blind spots.

What Should We Know About Spotters?

Spotters are recommended by NIOSH, ANSI, and other experts. Spotters:



- Are required by some states when cameras/radar systems are not used.
- Can also be in danger — who spots the spotters?

- Can help protect workers with their backs to equipment or traffic.



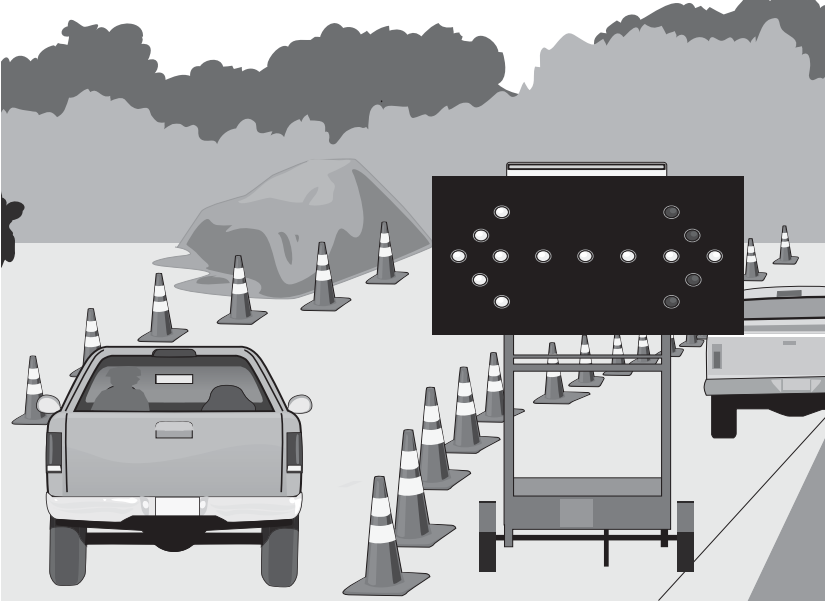
If you lose visual contact with spotter, stop until you reconnect.

Contractor Responsibilities

How Do We Prevent Runovers by Motorists?

Use proper set up of Temporary Traffic Control Devices (TTCDs). Proper TTCD set up/retrieval:

- Comply with MUTCD and state/local document.
- Inspect and maintain TTCDs.
- Test drive the work zone to find problems with set up.



- Ensure only a qualified engineer makes modifications when necessary.
- Detect vehicles entering buffer area between crews and traffic.

How Can Worker Clothing Help?

Follow recommendations in *ANSI/ISEA 109*.^{*} Ensure workers are distinguished from surroundings:

- Provide appropriate class of clothing.
 - Class 2.
 - Class 3.
- Strive for high contrast: if equipment is orange, wear bright yellow-green, etc.
- Set and enforce rules to require all workers to properly wear high visibility apparel.

^{*} **ANSI / ISEA - American National Standards Institute / International Safety Equipment Association**

Class 3 Apparel: For work when exposed to high speed traffic and/or conditions where visibility of workers may be reduced. For conditions where equipment operators perform tasks near pedestrian workers. Worker must be conspicuous through a full range of body motions at a minimum of 1,280 feet and identifiable as a person. Examples include flaggers, roadway construction workers, utility survey crews, and emergency responders.



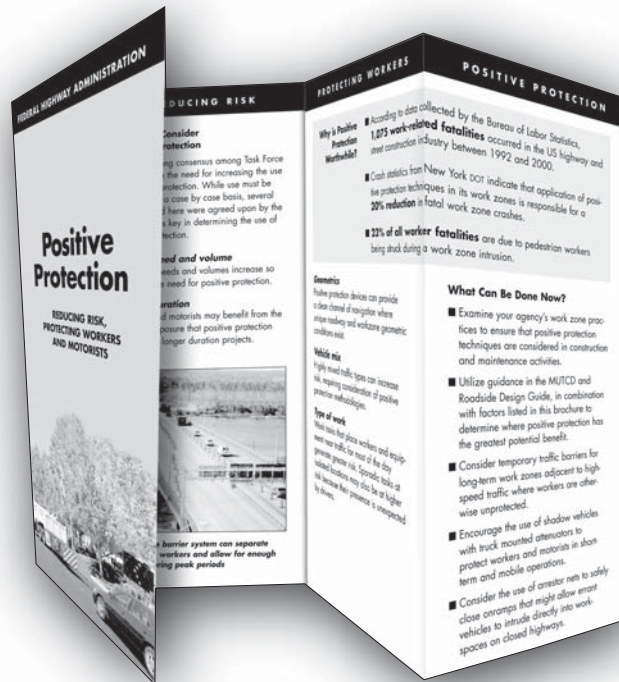
Class 1 clothing is not appropriate for road work.

What Other Measures Can We Use?

Use positive separation whenever possible:

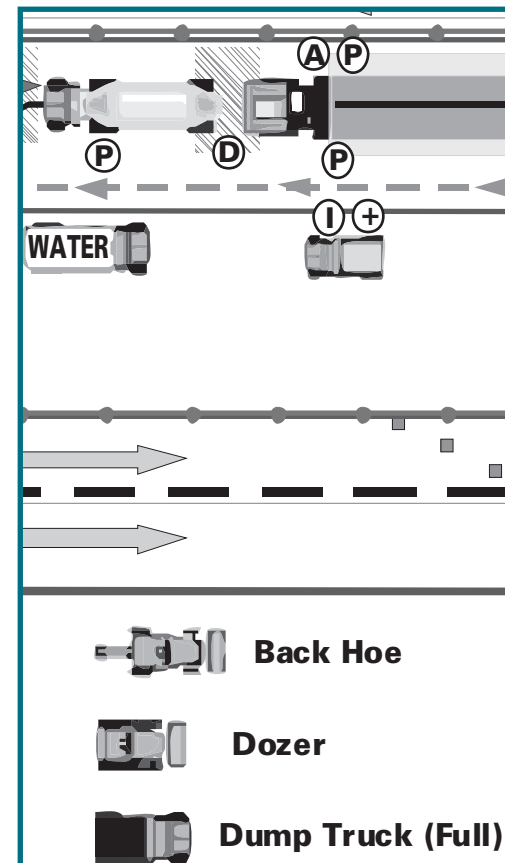
- Provide shadow vehicles and truck-mounted attenuators (TMAs) in mobile work zones and where workers need more protection from motorists.
- Temporary barriers installed by trained personnel.
- Train workers on contractual provisions for worker protection required by the owner agency.
- Use good procedures for setting, retrieving TTCDs.

Download the **POSITIVE PROTECTION** brochure
www.fhwa.dot.gov/workzones.



How Do We Communicate the ITCP?

The site safety officer and/or foreman are responsible for communicating the Internal Traffic Control Plan. The Internal Traffic Control Plan coordinates the flow of equipment and workers.



CLOSE UP OF AN ITCP

- Site safety officer, foreman explain ITCP and hand out copies.
- Copies to all workers, inspectors, subs, and truckers.
- As updated, relay revised ITCP to all workers.
- Warn workers on foot out of position, vehicles in pedestrian zones, truck drivers exceeding site speed limit.

Workers must review and follow the Internal Traffic Control Plan (ITCP).

What Prevention Devices Can We Use?

We can use back-up alarms, cameras, radar systems, mirrors. (See pages 22-23.)

What Should We Know About Spotters?

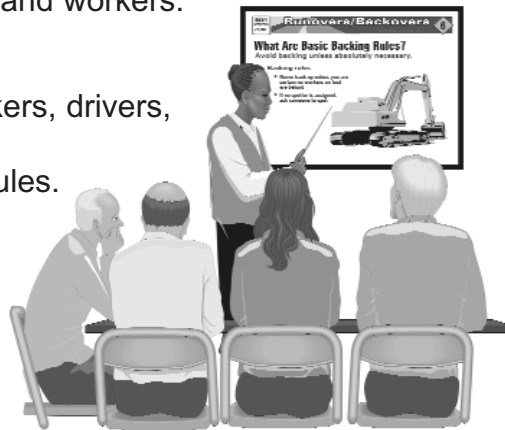
Spotters are recommended by NIOSH, ANSI, and other experts. (See pages 18 and 25.)

What Are Key Training and Safety Rules?

Training and rules must be consistent for operators, drivers, and workers.

Training rules:

- Make sure all workers, drivers, and operators are trained on safety rules.
- Establish no 'blind backing' rules for trucks and equipment.



Set up accountability procedures for those who violate the rules.

What Are Best Practices for Temporary Traffic Control Management?

Provide at least one trained work zone supervisor/TTC technician onsite.

Best practices:

- Keep logs, records, photos, and other documentation of TTCP (Temporary Traffic Control Plan).



- Document problems.
- Note, evaluate, and correct problem 'indicators' such as
 - Displaced TTCDs.
 - Skid marks.
 - Erratic traffic.

Agency/Owner Responsibilities

How Can We Protect Workers from Traffic?

Provide traffic monitoring and management.

Traveler information systems:



- Alternate route information.
- Estimated delay (time/distance).
- Notification of stopped, slowed traffic.

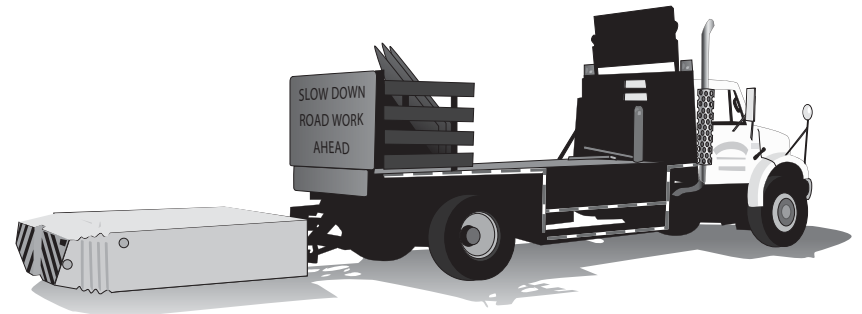
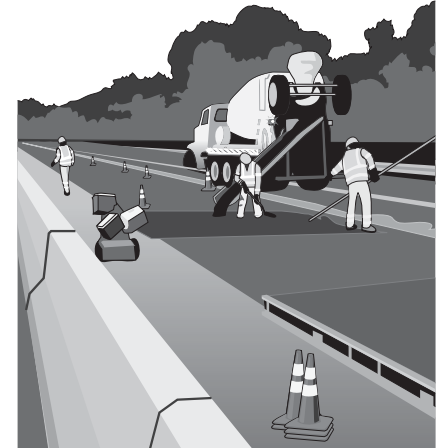
Runovers/Backovers: Agency/Owner

How Do We Prevent Runovers by Motorists?

Provide positive separation of workers and motorists when appropriate.

Positive separation:

- See FHWA Subpart K and state or local regulations to determine the type most appropriate for the work zone.
- Options
 - Full road closure.
 - Temporary barrier.
 - Movable barrier.
- Truck-mounted attenuators (TMA).



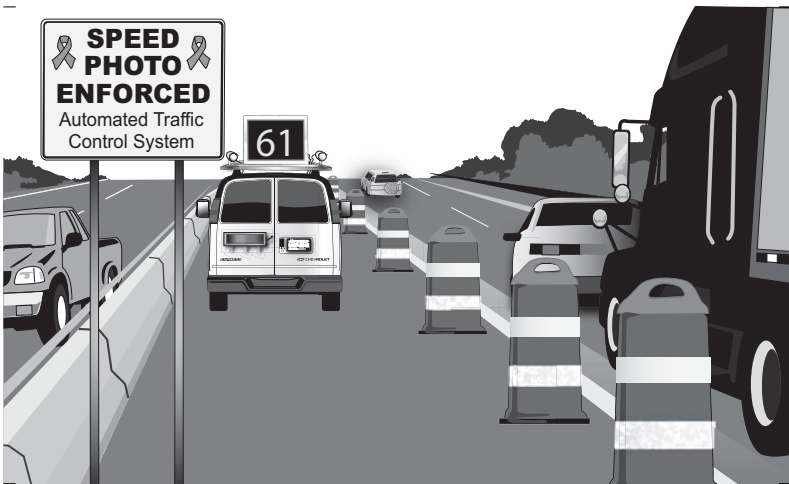
Download the *POSITIVE PROTECTION* brochure
www.fhwa.dot.gov/workzones.

What Else Prevents Runovers by Motorists?

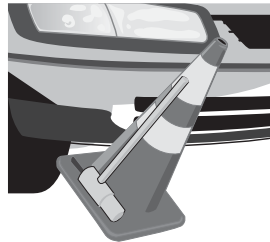
Use Intelligent Transportation System (ITS) technology.

ITS technology:

- Sensors, queue detectors, counters, cameras, and variable message systems.
- Automated enforcement where legal.

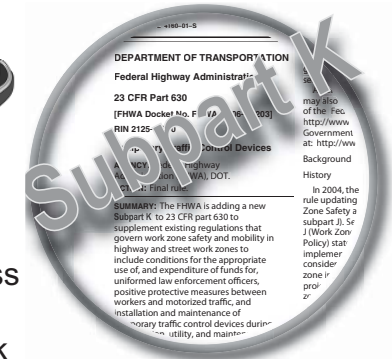


- Variable speed limits based on detected traffic volume, back ups.
- Work space intrusion alarm.
- Dynamic lane merging.
 - Creates dynamic no-passing zone based on detected traffic volume and back ups.



What Else Can Owners/Agencies Do?

Here are additional protections to consider:



- Adequate oversight to enforce TC requirements.
- QC/QA programs to address project specific problems and to improve overall work zone safety programs.
- See items for work zone traffic control — Subpart K.



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