Improving Large Truck Safety through Better Design and Operation of Work Zones
Outline of Webinar

• Characteristics of large truck crashes in work zones

• Large truck characteristics affecting work zone safety

• Transportation management plan accommodations for large trucks
Large Trucks are Overrepresented in Work Zones...

![Graph showing the percentage of fatal crashes involving large trucks in work zones over the years from 2005 to 2014. The graph indicates a decreasing trend in the percentage of fatal crashes involving large trucks, with a few spikes in certain years, and an increasing trend in the number of fatal work zone crashes per year.](image-url)
Why the Overrepresentation?

• More large trucks around work zones

• More work zones when trucks travel more

• Work zones more challenging for trucks to negotiate
Types of Large Trucks Involved in Fatal Crashes

<table>
<thead>
<tr>
<th>Type of Truck</th>
<th>Non-Work Zone</th>
<th>Work Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Van</td>
<td>0.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Single-Unit Truck &gt; 10,000 lb</td>
<td>28.2%</td>
<td>27.2%</td>
</tr>
<tr>
<td>Truck-Tractor (Semi)</td>
<td>67.2%</td>
<td>69.4%</td>
</tr>
<tr>
<td>Pickup &gt; 10,000 lb</td>
<td>4.3%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>
Interstate and Freeway Work Zones are Especially Problematic
Large Truck Crashes in Work Zones are Different than Non-Truck Crashes

Rural - Interstates

- Single Vehicle: 16.3% (Non-Large Truck), 16.3% (Large Truck)
- Rear-End: 37.4% (Non-Large Truck), 75.0% (Large Truck)
- Head-on: 2.2% (Non-Large Truck), 2.2% (Large Truck)
- Angle: 6.6% (Non-Large Truck), 3.8% (Large Truck)
- Sideswipe: 2.2% (Non-Large Truck), 3.8% (Large Truck)

% of Fatal Work Zone Crashes
Urban - Interstates/Freeways/Expressways

% of Fatal Work Zone Crashes

- Single Vehicle: 20.5% (Non-Large Truck-Involved), 58.1% (Large Truck-Involved)
- Rear-End: 26.3% (Non-Large Truck-Involved), 48.9% (Large Truck-Involved)
- Head-on: 2.3%, 2.3%
- Angle: 2.3%, 5.1%
- Sideswipe: 5.6%, 26.1%
Types of Work Zone Crashes Where Large Trucks are Overrepresented

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>Types of Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-Speed Controlled Access Roadways</td>
<td>Rear-End Collisions</td>
</tr>
<tr>
<td></td>
<td>Sideswipe Collisions</td>
</tr>
<tr>
<td>Other Multi-Lane Roadways</td>
<td>Sideswipe Collisions</td>
</tr>
<tr>
<td></td>
<td>Angle Collisions</td>
</tr>
<tr>
<td></td>
<td>Impacts with Objects</td>
</tr>
<tr>
<td>Two-Lane Highways</td>
<td>Rear-End Collisions</td>
</tr>
<tr>
<td></td>
<td>Head-On Collisions</td>
</tr>
</tbody>
</table>
Large Truck Characteristics Affecting Work Zone Safety
Large Trucks

- Longer and wider
- Heavier
- Higher center-of-gravity
- Larger blind spots
- Lower acceleration and deceleration rates
- Greater distance between driver eye and vehicle headlights
Signs and Markings Appear Less Bright to Truck Drivers
So How Can Large Truck Safety in Work Zone be Increased?
Incorporate Large Truck Considerations into Transportation Management Plan

- Traffic control plan
- Traffic operations plan
- Public information and outreach plan
Include Temporal Effects of Large Trucks in Impact Analyses

![Graph showing expected work zone capacity per lane and percent trucks in the traffic stream by time of day. The graph indicates peaks in capacity and truck presence during the day, with a decline at night.]
Work Zone Design Practices to Better Accommodate Large Trucks
Lane Width Considerations

- 11 ft minimum, 12 ft desirable
- Differential lane widths
- Provide sufficient warning of limited lane width work zones
Encourage Large Truck Diversion

• Ensure that the route can accommodate:
  • Volumes
  • Heights, widths, and weights
  • Turning, off-tracking
• Minimize additional travel distance
• Good outreach is critical
Establish Truck-Only Lane(s) through Work Zone
Maintain Adequate Truck Parking at Nearby Rest Areas
Improve Work Space Access
Construction access warnings

Non-Intrusive Detection placed along the roadway as needed for proper system operations. The detection may include radio control devices operated by the truck drivers.

TRUCK HAUL ROAD

TRUCKS MERGING 1000 FT BE PREPARED TO STOP

OR

Optional Signing

TRUCKS MERGING TRAFFIC WHEN FLASHING

WORK VEHICLE FREQUENT TURNS
Improve Sight Triangles
Use Heavier Shadow Vehicles with Proper Truck-Mounted Attenuators
Consequences of an 80,000 lb Truck-Tractor Collision

![Graph showing skid-ahead distance after impact for Mobile Operation Moving at 15.5 MPH. The graph compares impact speed (45 mph, 55 mph, 65 mph) with different vehicle weights (10,000 lbs, 25,000 lbs, 50,000 lbs).]
Other Good Practices

• Establish reasonable design speeds and speed limits
• Maintain good sign, channelizing device, and pavement marking visibility
• Avoid short or no-acceleration lane entrance ramps
• Establish contingencies for hazardous material incidents
Strategies to Help Truck Drivers Traverse Work Zones Safer and More Easily
Truck Driver-Focused Information and Outreach

• Distribute at truck stops, rest areas, dispatching centers, etc.
• General work zone safety outreach
• Targeted project-specific information
Utilize Work Zone ITS Where Appropriate

- Real-time traveler information
- Queue warning
- Dynamic merging
- Construction access warning
- Variable speed limits
- Automated enforcement
- Temporary ramp metering
End-of-Queue Warning
Dynamic Merge

- **BUFFER**
- **MERGE TAPER**
- **CMS located at point of merge**
- **Non-intrusive Detection spaced along the route as needed for proper system operations**
- **CMS located beyond the estimated queue length at the time when system activation will occur**
- **CMS located beyond the estimated maximum queue length**
- **The first advance warning sign should be located before the estimated queue beginning**
Temporary Ramp Metering
Portable Rumble Strips
Sequential Warning Light Systems

![Image of sequential warning lights]

<table>
<thead>
<tr>
<th>Type of Vehicle</th>
<th>Without Warning Light System</th>
<th>With Warning Light System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger</td>
<td>30%</td>
<td>23%</td>
</tr>
<tr>
<td>Truck</td>
<td>19%</td>
<td>7%</td>
</tr>
</tbody>
</table>
Resources

• **Large Trucks in Work Zones webpage:**
  [https://www.workzonesafety.org/work_zone_topics/heavy-vehicles/](https://www.workzonesafety.org/work_zone_topics/heavy-vehicles/)
Resources

• Safe Trucking Through Work Zones (brochure)
• Design and Operation of Work Zone Strategies to Improve Large Truck Safety
• National Symposium on Work Zones and Large Trucks (April 13, 2015, Jacksonville, FL)
  • Presentations
  • Summary Report
• Strategies to Enhance Large Truck Safety in Work Zones (Webinar: August 25th, 1 pm EDT)
SEPT. 20-22, 2016
SPRINGFIELD, VIRGINIA

2016 National Work Zone Management Conference

Springfield Virginia Hilton: Make your room reservations at 703.971.8900. Group rate $139 per night with the code AR0919. Group name is American Road and Transportation Builders Association.

Register: www.workzonesafety.org. Registration of $100 includes lunch and breakfast for two days.

The National Work Zone Safety Information Clearinghouse

U.S. Department of Transportation
Federal Highway Administration

workzonesafety.org
Questions?

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