Countermeasures to Improve Pedestrian Visibility to Tall Vehicles

Objectives

- Investigate the relationship between tall vehicles and pedestrian visibility to provide safety recommendations
- Analyze crash data and identify safety and policy measures aimed at improving pedestrian safety and visibility

Benefits

- Research provides WisDOT with actionable strategies to address the increasing threat posed by tall vehicles to pedestrian safety
- Recommendations will create a safer transportation environment for all users

Background

Over the past few decades, tall vehicles have become much more commonplace on American roads. These vehicles pose great risks to pedestrians as they have significantly larger blind zones and higher levels of pedestrian injury severity. This phenomenon, combined with distractions from electronic devices and risky driving behaviors, has contributed to an 80% rise in pedestrian fatalities in the United States since 2009.

A 2023 Insurance Institute for Highway Safety (IIHS) study found that vehicles with hood heights over 40 inches are approximately 45% more likely to cause fatal pedestrian crashes than lower-profile vehicles. Wisconsin's crash trends reflect this national pattern, with tall vehicle-involved crashes now surpassing those involving non-tall vehicles in recent years.

Methodology

The research team conducted a comprehensive review of 83 academic and industry sources and analyzed 39 years of single-vehicle single-pedestrian (SVSP) crash data from Wisconsin, Tennessee, and Florida. The dataset comprised 101,778 crashes that spanned the 2010s, a decade marked by rapid growth of tall vehicles. Vehicle heights were identified by joining crash data with the Canadian Vehicle Specifications (CVS) database through the National Highway Traffic Safety Administration (NHTSA) VIN Decoder, defining tall vehicles as those exceeding 66 inches in height.

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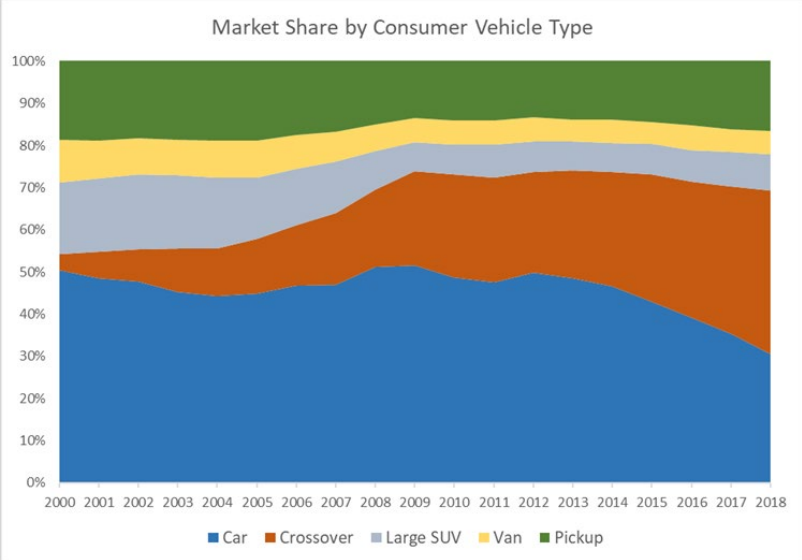

Consumer Vehicle Market Share. Consumer Reports, 2019

"Cars are getting bigger – we need to understand the implications of this so we can be proactive in our response. We must continue to create safer roads for all road users, including pedestrians." –

Maryne Taute, WisDOT

Results

Results from the study revealed several key predictors of SVSP crashes in Wisconsin. Left turns and backing maneuvers significantly increased the likelihood of tall vehicle involvement, while right turns and actions like merging or parking were negatively associated. Driver behaviors such as failure to yield were also strong predictors, each linked to a 54% higher chance of tall vehicle involvement, highlighting visibility challenges. Pedestrian location being in the crosswalk or roadway increased the likelihood of a tall vehicle crash by at least 50%.

Rural roads, likely due to the prevalence of large vehicles, were associated with a 56% increase in tall SVSP crashes. Additionally, posted speed limits of ≤15 mph, 30–40 mph, and ≥45 mph were all significantly associated with higher tall vehicle involvement (increases of 56%, 55%, and 54%, respectively), compared to 20–25 mph zones. Divided roadways and parking lots/private property also showed strong associations, each linked to a 53% higher likelihood of tall vehicle involvement, underscoring the influence of roadway design and visibility limitations.

Generally, tall vehicles in Wisconsin exhibit 22% higher severity risk, likely due to greater average height and more low-speed crashes than in other states. Other key predictors of injury severity include high speed limits, poor lighting, alcohol or drug impairment (especially in drivers). Male drivers were also consistently associated with higher injury severity.

Recommendations for Implementation

Based on the research findings, the team recommends several proven countermeasures that improve pedestrian visibility including:

- Low-cost, high-impact engineering treatments such as advance yield markings, high-visibility crosswalks, curb extensions with daylighting, leading pedestrian intervals (LPIs), refuge islands, and raised crosswalks.
- Flashing pedestrian beacons like Rectangular Rapid Flashing Beacons (RRFBs) and High-Intensity Activated Crosswalks (HAWKs) to improve driver awareness.
- Intersection and midblock design changes that reduce speeds and improve sightlines.

Using the Safe Systems approach, countermeasure selection should be based on pedestrian safety being fully integrated into transportation planning, and roadway design should shift from prioritizing efficiency to emphasizing safety. Agencies should use data-driven analysis to identify and address pedestrian visibility issues. Since speeding and failure to yield are major contributors to crashes involving tall vehicles, agencies should update their driver education materials and partner with local communities to promote awareness of pedestrian visibility challenges.

Interested in finding out more?
Final report is available at:
WisDOT Research website

This brief summarizes Project 0092-24-12
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