Work Zone Barriers™

An Online Guide to Reducing Work Zone Intrusions Using Positive Protection

Work Zone Fatalities, Injuries, & Crashes

Between 2013 and 2022, work zone fatalities increased 50 percent. In 2022, over 891 work zone fatalities were recorded. [9] Stated another way, 891 work zone fatalities is the equivalent of 5 commercial domestic airliners. In 2021, over 105,000 work zone crashes were estimated to have occured resulting in over 42,000 injuries. [8,] Stated another way, 42,000 injuries is about the capacity of a football stadium.

Damages and losses from work zone crashes are estimated to reach over $38.9 billion annually (2025 dollars, comprehensive crash costs). [28, 29, 43] Cost savings from reducing the number crashes by implementing Positive Protection & barrier separation in work zones can be estimated at over $3.8-$8.9 billion annually (10%-23% of work zone crash costs, 2025 dollars). [42] Stated another way, $3.8 to $8.9 billion in annual cost savings is equivalent to 7 to 17 transportation "Major Projects". [47]

In 2020, during the COVID-19 pandemic, work zone crashes & fatalities climbed despite lower traffic volumes. [20, 21, 22, 23, 32, 33] For the first half of 2021, USDOT estimated another 18.4% surge in traffic fatalities over 2020 and the largest number of traffic fatalities since 2006. [35] In 2021, TxDOT reported that work zone fatalities in fact surged 33%. [36] For the first quarter of 2022, USDOT estimated a record increase in fatalities nationwide. [38] In early 2024, the Governor's Highway Safety Association (GHSA) found that the U.S. pedestrian fatality rate has jumped 48% from a decade ago. [34]

A prior study found that 38% of "Pedestrian" fatalities in work zones were workers (i.e. road construction/maintenance workers, utility workers, and planning/surveying workers). Working on foot along our roadways is dangerous.

Highway Maintenance workers died on the job 3.7 times more often than the average American worker & 19 times more often than Engineering & Office/Administrative workers. [39,40] "In 2015, 35 percent of all highway worker fatalities at road construction sites resulted from a vehicle striking a worker. By 2021, this alarming figure had increased to 63 percent" notes Laborers' Health & Safety Fund of North America (LHSFNA). [44] Tunnel, culvert, bridge repair work zones, etc. are known to be especially hazardous with high-speed traffic moving in close proximity to employees, roadside hazards, and/or little or no means for employees to escape from errant vehicles. The serious hazards faced by highway workers along our roadways, who are among the most "Vulnerable Road Users", highlights the need for Positive Protection & barrier separation in work zones.

More motorists and road workers are being killed or injured in preventable work zone crashes. In a 2022 survey, most highway contractors (64%) reported crashes into their work zones. In an earlier survey, 89% of highway contractors think Positive Protection would help improve safety and prevent these horrific crashes. [38, 4] Speaking up about work zone safety issues could reduce risk & save a life.

The rising number of accidents, injuries, and fatalities further highlight the imperative for Positive Protection. In 2015, Congress directed FHWA to "do all within its power to protect workers in highway work zones." [45] Federal law and ANSI standards identify types of projects that need Positive Protection. For such projects, a “separate pay item” for positive protection is required under federal law and regulations. [1, 11] The Infrastructure Investment and Jobs Act of 2021 (IIJA) amends the Highway Safety Improvement Program (HSIP) to increase funding & protection for "Vulnerable Road Users", which includes "highway workers on foot". [41] In 2021, USDOT set the value of a single life (VSL) at $11.8 million dollars. [13, 37] California research found a cost benefit for highly mobile barrier of $1.9 million per year, per barrier in 2008 ($2.87 million in 2025 dollars). [14]

> *"If a work zone has 'no means of escape' from motorized traffic, then no operating speed is truly safe.* ***An unprotected worker who cannot escape faces serious injury from motor vehicles at any speed, even walking speeds...*** *One study cited by FHWA show[ed] that the risk of a pedestrian crash fatality reaches 45% at 30 mph and 85% at 40 mph, and another study estimat[ed] that pedestrians have less than a 50% chance of surviving a crash with a vehicle traveling 30 mph or above... The risks posed to road workers will likely further increase as the size of vehicles in the U.S. continues to grow larger. According to a recent Insurance Institute for Highway Safety (“IIHS”) study, the average U.S. passenger vehicle has grown 4 inches wider, 10 inches longer, 8 inches taller, and 1,000 pounds heavier over the past 30 years. Significantly, the IIHS study found that vehicles with higher front ends (pickup trucks, SUVs and vans with a hood height greater than 40 inches) were 44% to 45% more likely to cause fatalities in crashes with pedestrians than smaller cars and trucks. "*
>
> — Mobile Barriers: Comments on Work Zone Safety Rulemaking (November 2023).

"We have the technology and 'know how' to build our roadway system to anticipate user error. It can be designed, constructed, equipped, and operated to forgive the errant user and protect the innocent victim."

— ARTBA, "Every Life Counts: Improving the Safety of our Nation's Roadways"

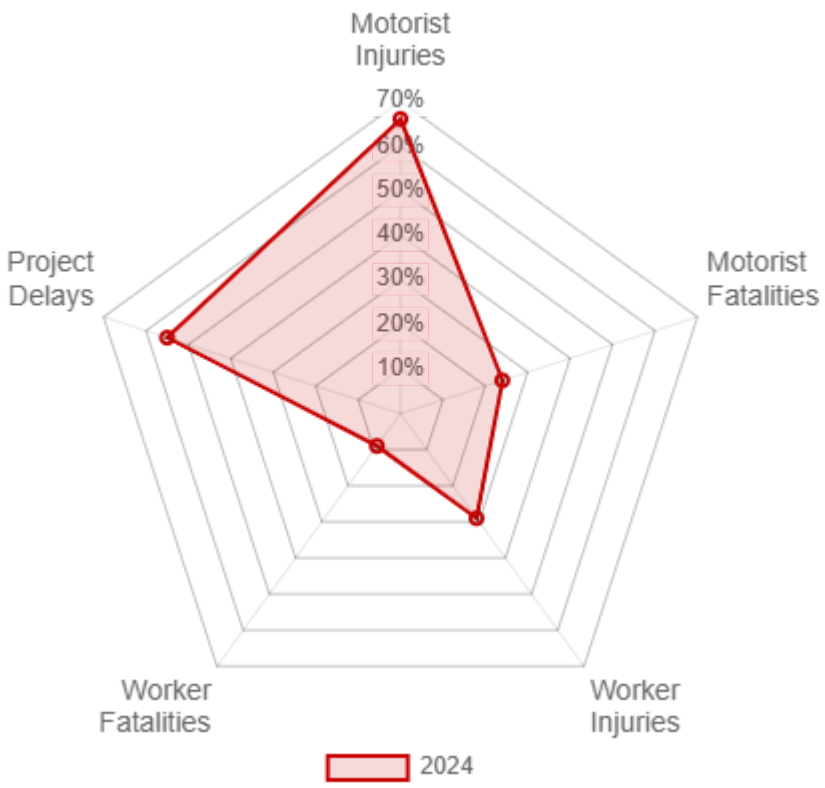
2022 Contractor Reported Work Zone Crashes, Project Delays, Injuries, & Fatalities

The Associated General Contractors of America's (AGC) 2024 nationwide study on highway work zone safety reveals that **64% of highway contractors reported work zone crashes** over the last year. As a result of these work zone crashes, 55% of firms reported project delays, 9% reported worker fatalities, 29% reported worker injuries, 24% reported public fatalities, and 66% reported public injuries. 97% of highway contractors also reported that the risk of highway work zone crashes is as great or greater than a year ago. [46]

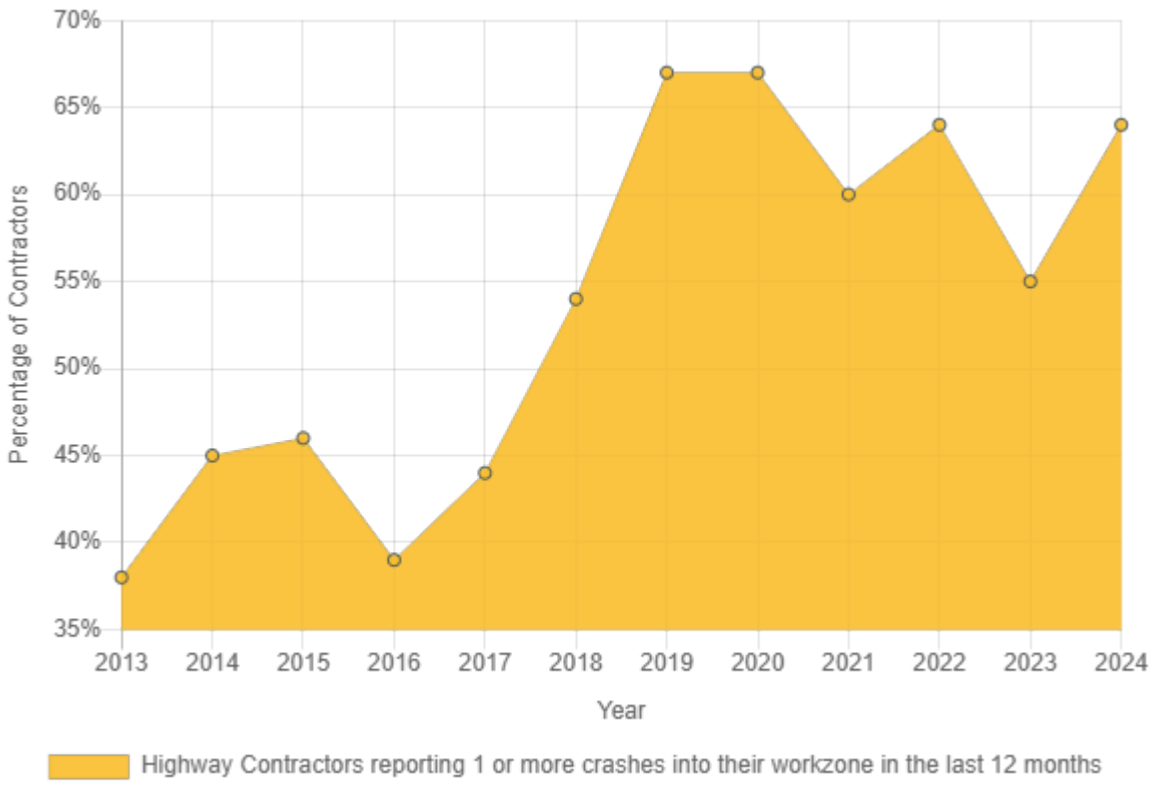
In 2024, 64% of Highway Contractors Reported Crashes into their Construction Work Zones

AGC Study - Outcomes of Work Zone Crashes [46]

(Mouseover data points for details.)



AGC Study - Percentage of Highway Contractors Reporting Work Zone Crashes Over Time [46, 45, 38, 26, 25, 4, 5, 6, 7, 19, 18, 17]



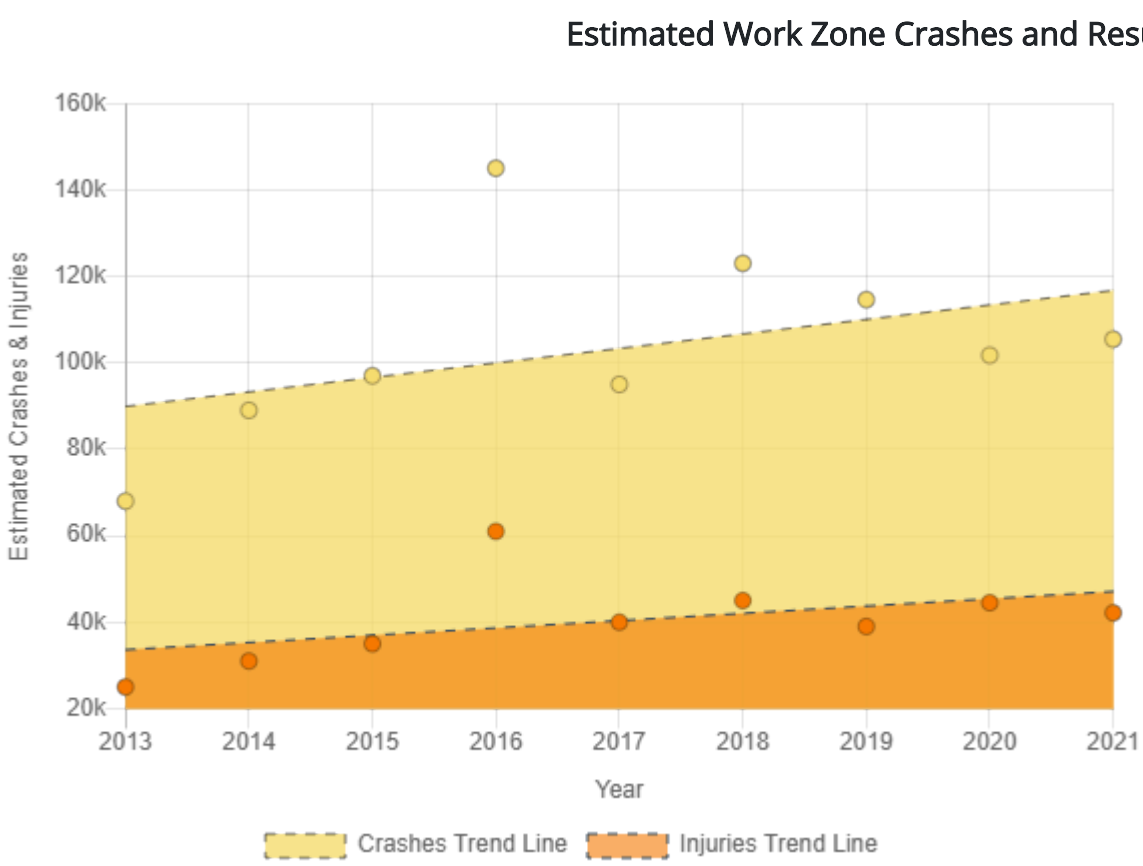
The 2019 AGC study revealed that an increasing percentage of contractors believe Positive Protection would improve safety on their projects.

- **89%** of contractors report that increased use of Positive Protection barriers would help reduce injuries and fatalities on their projects.
  4

Estimated National Work Zone Crashes & Injuries [8]

The number of crashes in work zones and injuries resulting from those crashes has been increasing.

- In 2021, an estimated 105,000 crashes and 42,000 injuries were estimated to have occurred in work zones.



* Estimated Work Zone Crashes & Injuries Data are obtained from NHTSA statistical models (NASS/GES & CRSS). The NHTSA statistical models underestimate work zone crash fatalities by as much as 64% in 2019 (see Table 1 below). In general, the NHTSA FARS & CRSS crash report datasets underreport work zone crashes as well as resulting injuries and fatalities (see note †).

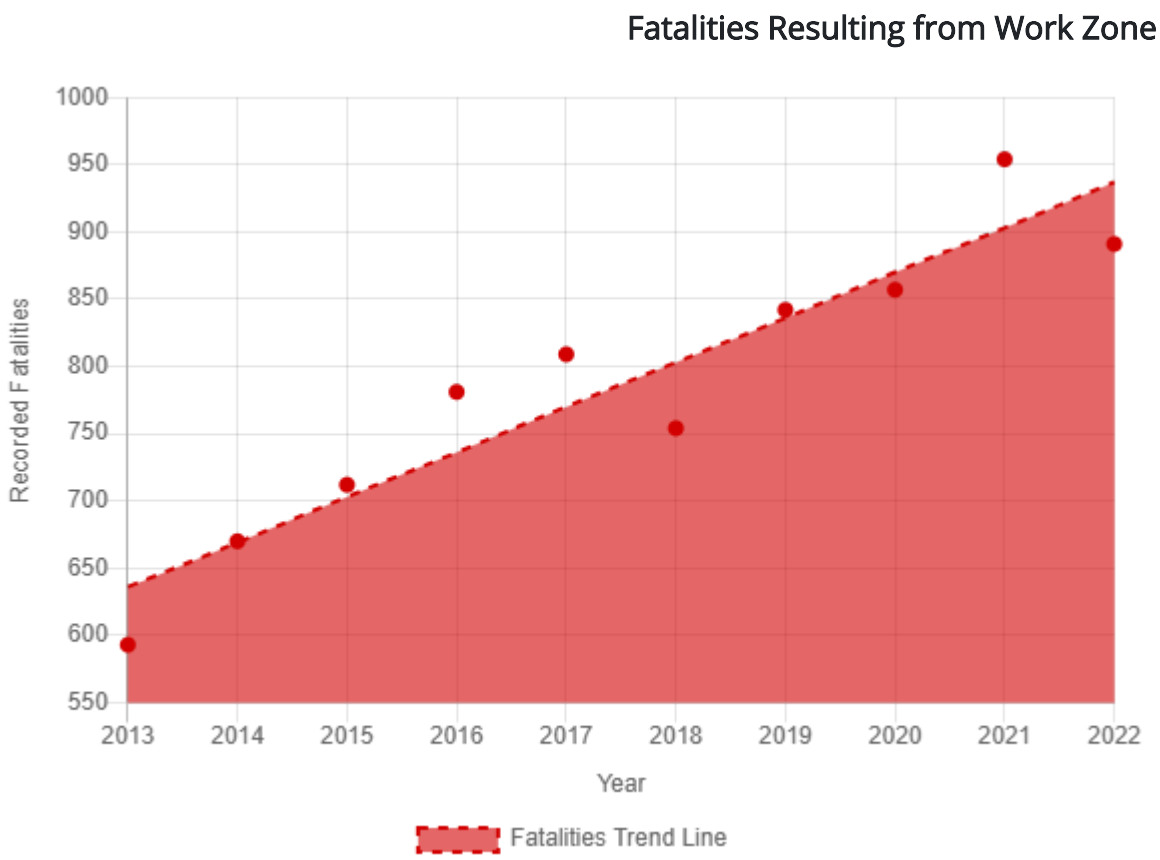
Table 1. NHTSA CRSS Statistical Model Percent Error:

	2015	2016	2017	2018	2019	2020	2021
Recorded Fatalities (FARS)	701	781	806	754	842	857	954
Estimated Fatalities (CRSS Statistical Model)	349	525	597	636	298	478	714
Percent Error (of CRSS Statistical Model)	-50%	-32%	-26%	-15%	-64%	-44%	-33%

National Work Zone Crash Fatalities [9]

Work zone crash fatalities have been on the rise nationally.

- 50% increase in fatalities since 2013.



† In general, the NHTSA FARS & GES/CRSS crash report datasets underreport work zone crashes as well as resulting injuries and fatalities.

The statistic for fatalities resulting from work zone crashes is obtained from NHTSA FARS dataset which attempts to aggregate various state police crash report datasets. However, crashes occurring inside work zones are not always properly classified by police as work zone related.

A cursory glance of NHTSA FARS data in 2018 quickly reveals examples of missed fatalities resulting from work zone crashes. A number of studies confirm that work zone crashes are underreported in crash report datasets. [31]

Pedestrian Fatalities in Work Zones

In 2018, there were 122 cases of pedestrians killed as a result of a work zone crash. [9] Work zone pedestrian fatalities are often assumed to be members of the public who have fallen into complacency walking a routine route. However, in 2018, **38% of pedestrian fatalities in work zones were actually on the job and primarily engaged in road work, utility work, and planning/surveying.**

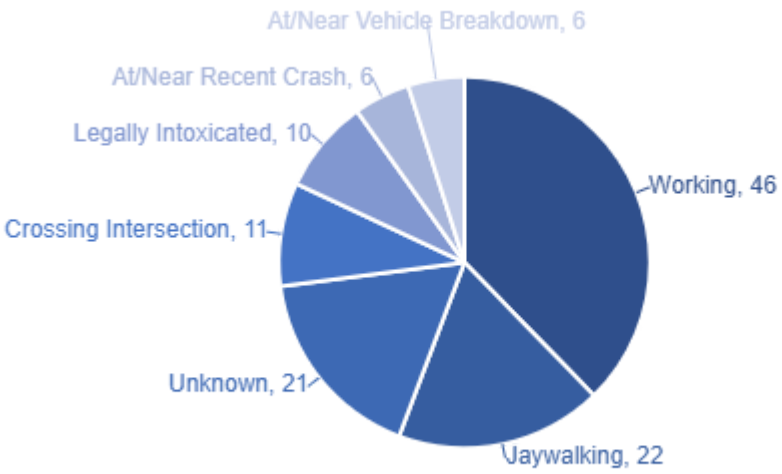
Work activities at the time of death include activities such as installing traffic signs, reopening a lane, flagging, picking up debris, replacing damaged concrete, paving operations, exiting a work vehicle, utility work, construction labor, DOT electrical work, DOT maintenance work, fence contracting, repairing guardrail, stringing cable guard rail, and repairing a bridge.

Based on a review of each work zone pedestrian fatality, it is found that

- **Activity:** Many Pedestrian Fatalities in Work Zones occurred while working (38%, 46 of 122).
- **Work Activity:** The majority of Working Pedestrian Fatalities in Work Zones were engaged in road work, utility work, planning/surveying (87%, 40 of 46 Working Pedestrians).
- **Work Hazard:** The majority of Working Pedestrian Fatalities in Work Zones were killed by motorist incursions (80%, 37 of 46 Working Pedestrians)
- **Location:** Few Pedestrian Fatalities in Work Zones occurred at/near intersections (15%, 18 of 122).

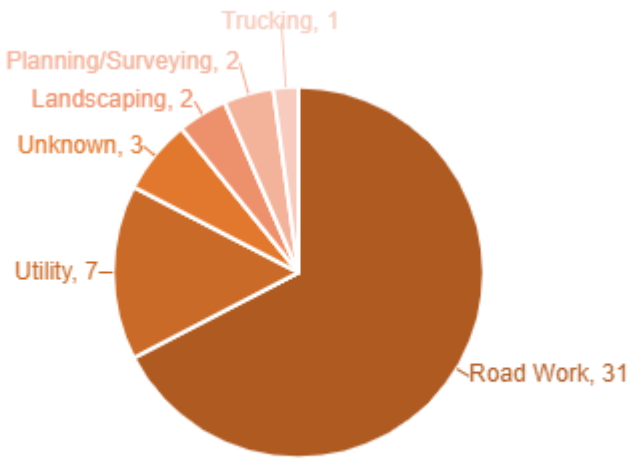
38% of Pedestrian Work Zone Fatalities occured while working.

Primary Activity of the 122 Pedestrian Work Zone Fatalities (2018)



87% of Working Pedestrians were engaged in Road Work, Utility Work, or Planning/Surveying.

Work Activity of the 46 Working Pedestrians in Work Zones (2018)



Road Work activities at the time of death include activities such as installing traffic signs, reopening a lane, flagging, picking up debris, replacing damaged concrete, paving operations, exiting a work vehicle, utility work, construction labor, DOT electrical work, DOT maintenance work, fence contracting, repairing guardrail, stringing cable guard rail, and repairing a bridge.

Footnotes

[1] Temporary Traffic Control Devices, 23 U.S.C. § 112(g).

[2] Definitions, Subpart K - Temporary Traffic Control Devices, 23 C.F.R. § 630.1104.

[3] Positive Protection Measures Defined, 23 U.S.C. 112(g)(4).

[4] 2019 Associated General Contractors of America (AGC) Highway Workzone Safety Study.

[5] 2018 Associated General Contractors of America (AGC) Highway Workzone Safety Study.

[6] 2017 Associated General Contractors of America (AGC) Highway Workzone Safety Study.

[7] 2016 Associated General Contractors of America (AGC) Highway Workzone Safety Study.

[8] Estimated Total Crashes & Injuries Data: 2013-2015 data from NHTSA National Automotive Sampling General Estimates System (NASS/GES). NHTSA retired NASS/GES at the end of 2015. 2016-2021 data from NHTSA's replacement Crash Report Sampling System (CRSS).

[9] Fatalities Data: NHTSA Fatality Analysis Reporting System (FARS) Encyclopedia. 2022 is the last year with available data.

[10] Positive Protection Devices, Subpart K - Temporary Traffic Control Devices, 23 C.F.R. § 630.1108(a)(1-5).

[11] Payment for Traffic Control, Subpart K - Temporary Traffic Control Devices, 23 C.F.R. § 630.1108(f)(2).

[12] "Portable Positive Protection: A Guide for Short Duration and Short Term Work Zones", Updated by Mobile Barriers LLC, Based on Material Developed by ATSSA for the FHWA Work Zone Safety Grant Program (June 2016).

[13] U.S. Department of Transportation, "Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses - 2016 Adjustment," (August 8, 2016).

[14] UC Davis/AHMCT, “A Risk Assessment and Cost Benefit Analysis for [Highly Mobile Barriers],” Technical Report Number UCD-ARR-08-09-30-01, (2008). Ibid, Attachment 3.

[15] Mobile Barriers LLC internal crash analysis for Washington D.C. located highly mobile barrier.

[16] Former Deputy Executive Director of the Texas Department of Transportation (TxDOT).

[17] 2013 Associated General Contractors of America (AGC) Highway Workzone Safety Study.

[18] 2014 Associated General Contractors of America (AGC) Highway Workzone Safety Study.

[19] 2015 Associated General Contractors of America (AGC) Highway Workzone Safety Study.

[20] Work Zone Crashes Climb During Pandemic, Even as Traffic Ebbs, PEW Charitable Trusts, October 6, 2020.

[21] Missouri work zone crashes double despite half the traffic, Better Roads, September 1, 2020.

[22] Ohio DOT reports string of work-zone crashes despite less traffic, Better Roads, June 8, 2020.

[23] CDOT and CSP warn that not all workplaces are meant to zoom: Fatal crashes in work zones on the rise Journal Advocate, November 27, 2020.

[24] An Optimization Methodology to Improve Work Zone Safety within a Limited Budget in a Roadway Network, Promothes Saha, Ph.D., International Conference on Transportation and Development 2020 : Transportation Safety.

[25] 2020 Associated General Contractors of America (AGC) Highway Workzone Safety Study. Study based on nationwide survey of approximately 224 highway construction firms.

[26] 2021 Associated General Contractors of America (AGC) Highway Workzone Safety Study. Study based on nationwide survey of approximately 292 highway construction firms.

[27] Work Zone Fatalities at Highest Level Since 2006, New Data Shows, Roads & Bridges, April 28, 2021.

[28] An Optimization Methodology to Improve Work Zone Safety within a Limited Budget in a Roadway Network, Promothes Saha, Ph.D., International Conference on Transportation and Development 2020 : Transportation Safety.

[29] "Crash Costs for Highway Safety Analysis", FHWA-SA-17-071
"Economic costs (a.k.a., human capital costs) are the monetary impacts of crashes including goods and services related to the crash response, property damage, and medical costs...Comprehensive crash costs (a.k.a., societal crash costs) are the combination of tangible impacts (i.e., economic costs) and the monetized pain and suffering (i.e., QALY). Comprehensive costs are meant to capture all the impacts that result from crashes...It is critical to account for the comprehensive costs of crashes."

[30] Ullman, G. L., & Scriba, T. A. (2004). Revisiting the Influence of Crash Report Forms on Work Zone Crash Data. Transportation Research Record, 1897(1), 180–182. https://doi.org/10.3141/1897-23.

[31] Md Abu Sayed, Xiao Qin, Rohit J. Kate, D.M. Anisuzzaman, Zeyun Yu, Identification and analysis of misclassified work-zone crashes using text mining techniques, Accident Analysis & Prevention, Volume 159, 2021, 106211, ISSN 0001-4575, https://doi.org/10.1016/j.aap.2021.106211.

[32] Despite fewer drivers on the road, Texas work zone traffic deaths climb during pandemic CBS Austin, April 26, 2021.

[33] AGC: Work Zone Crashes Up Despite Pandemic Traffic Drop AASHTO Journal, June 4, 2021.

[34] Early 2024 U.S. Pedestrian Fatalities Up 48% From a Decade Ago , Governors Highway Safety Association (GHSA), 2024.

[35] USDOT Releases New Data Showing That Road Fatalities Spiked in First Half of 2021 , Secretary Buttigieg calls rising traffic deaths a crisis and calls for cooperation among all levels of government, industry, and advocacy to change course, October 28, 2021.

[36] Traffic Deaths Spike in Texas Work Zones , Texas Department of Transportation, April 4, 2022.

[37] U.S. Department of Transportation, "Departmental Guidance on Valuation of a Statistical Life in Economic Analysis," (March 23, 2021).
"Based on the methodology adopted in the 2013 guidance, price and real income changes since 2012 yield a current VSL estimate of $11.8 million for analyses using a base year of 2021."

[38] NHTSA Early Estimates Show Record Increase in Fatalities Nationwide , USDOT, August 17, 2022.
"NHTSA estimates that 9,560 people died in motor vehicle traffic crashes in the first quarter of 2022. This is an increase of about 7% as compared to the 8,935 fatalities projected for the same quarter in 2021. This would be the highest number of first-quarter fatalities since 2002."

[39] The Center for Construction Research and Training (CPWR), "Fatal Injuries at Road Construction Sites among Construction Workers", Second Quarter 2018.
Figure 14 shows for Road Maintenance occupations that there have been 13.6 fatalities per 100,000 full-time equivalent (FTE) workers on average.

[40] Forbes, "Fatal Employment: Men 10 Time More Likely Than Women to Be Killed at Work", Dec 19, 2018.
The national average was 3.5 workplace fatalities per 100,000 full-time worker equivalents (FTE). Architecture and engineering occupations had had a fatality rate of 0.7 fatalities per 100,000 full-time equivalent (FTE) workers. Office and administrative support occupations had a fatality rate of 0.6 fatalities per 100,000 full-time equivalent (FTE) workers.

[41] "Vulnerable Road Users" as defined in the Infrastructure Investment and Jobs Act (IIJA or BIL) includes road construction workers and people working on foot on or along our roadways. Sec. 11111 amends the Highway Safety Improvement Program (HSIP) to increase funding & protection for "Vulnerable Road Users".

- FHWA Guidance "Vulnerable Road User Safety Assessment Guidance" published October 21, 2022 states that "A **vulnerable road user** is a nonmotorist with a fatality analysis reporting system (FARS) person attribute code for pedestrian, bicyclist, other cyclist, and person on personal conveyance or an injured person that is, or is equivalent to, a pedestrian or pedalcyclist as defined in the ANSI D16.1-2007. (See 23 U.S.C. 148(a)(15) and 23 CFR 490.205). A vulnerable road user may include people walking, biking, or rolling. Please note that a vulnerable road user:
  • Includes a highway worker on foot in a work zone, given they are considered a pedestrian.
  • Does not include a motorcyclist."

[42] "Work Zone Intrusion Countermeasure Identification, Assessment, and Implementation Guidelines", FHWA/CA10-1102, pp. 4.
On average, 10% of work zone crashes are intrusion impacts with workers, equipment, or debris. An additional 13% of work zone crashes are non-intrusion impacts with workers, equipment, or debris "(e.g., a crash involving a worker conducting a task outside the actual work space)" but still occuring inside a designated work zone.

[43] "The Economic and Societal Impact of Motor Vehicle Crashes, 2019 (Revised)", DOT HS 813 403
Nationally, Comprehensive Costs for 33,244 fatal crashes "which includes both economic impacts and valuation for lost quality-of-life, was $1.37 trillion in 2019". Comprehensive Costs "represent the value of the total societal harm that results from traffic crashes". In 2019, there were 765 fatal work zone crashes (2.301% of all fatal crashes) resulting in an estimated $31.5 billion (2019 dollars) in comprehensive costs. Adjusted for inflation, comprehensive costs of work zone crashes are estimated at over $38.9 billion in 2025 dollars.

[44] Laborers Health & Safety Fund of North America - Comments on FHWA-2022-0017-0016, November 19, 2023. Available at: https://www.regulations.gov/comment/FHWA-2022-0017-0016 "In 2015, 35 percent of all highway worker fatalities at road construction sites resulted from a vehicle striking a worker. By 2021, this alarming figure had increased to 63 percent... The heightened risks underscore the specific vulnerability of highway workers, a concern acknowledged by Congress through the categorization of pedestrians, inclusive of workers operating on or along roadways, as Vulnerable Road Users (VRUs) in the BIL. This legislative move amended the Highway Safety Improvement Program to incorporate safeguards for VRUs. The DOT similarly recognizes highway workers as among the most vulnerable in its 2022 VRU Safety Assessment Guidance. The FHWA urges states and other funding recipients to prioritize safety for VRUs in all federal highway investments and relevant projects."

[45] 2023 Work Zone Awareness Survey Results: National Results , AGC, May 25, 2023.
Study based on nationwide survey of highway construction firms with approximately 901 responses from contractors.

[46] 2024 Work Zone Awareness Survey Results: National Results , AGC, May 23, 2024.
Study based on nationwide survey of highway construction firms with approximately 514 responses from contractors.

[47] "Major Projects", FHWA.
Prior to the enactment of SAFETEA-LU in August 2005, projects with over $1 billion in construction costs were designated as "Mega Projects". SAFETEA-LU lowered the monetary threshold from an estimated total cost of $1 billion to $500 million or greater, and the term "Mega Project" has since been eliminated and replaced with the term "Major Project".

Work Zone Barriers

Defining Positive Protection

Examples & Types of Positive Protection

Benefits of Positive Protection

Work Zone Crash Data

Contractor Reported Crashes & Outcomes

Workzone Total Crashes & Injuries

Work Zone Crash Fatalities

Work Zone Pedestrian Fatalities

Firetruck and Emergency Response Collision Crash Data

Implementation

When are Positive Protection Barriers Appropriate?

What Federal Funding is Available for Positive Protection Barriers?

How Can Contractors Obtain & Use Positive Protection Barriers?

FHWA Repeals Proprietary Product Rule