

Highway Barriers for Work Zone Safety

"Roadway work zones are some of the busiest, and potentially most hazardous, work environments you can find, as workers perform tasks in close proximity to vehicles that are often traveling at high speeds."

— [American Society of Safety Professionals \(ASSP\), "4 Steps to Creating Safer Work Zones"](#)

The [serious hazards](#) faced by highway workers, who are among the most "[Vulnerable Road Users](#)", makes it vitally important that engineers and contractors use [positive protection](#) barriers to ensure worker safety. In a 2022 survey, 64% of highway contractors reported crashes into their work zones. [24] In an earlier survey, 89% of highway contractors think [positive protection](#) barriers would help improve safety and prevent these horrific crashes. [4]

Innovative highway barriers such as **Mobile Barriers, Movable, & Temporary Barriers** are enabling engineers and contractors to **accelerate highway projects**, increase roadway capacity to match daily traffic patterns, physically separate moving traffic and workers, minimize workzone footprints, and increase work zone safety.

Why Proactively use Positive Protection?

"...safety, health, and well-being are inherent rights of every worker."

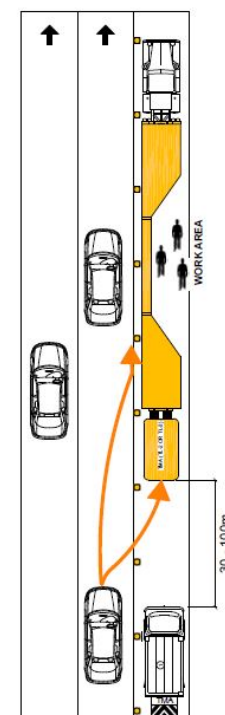
— [American Society of Safety Professionals \(ASSP\), "Code of Professional Conduct"](#)

Today, we have the technology, 'know how', and responsibility to protect workers from errant vehicles by using Positive Protection. The [USDOT Safe System Approach](#) (based in part on the "Hierarchy of Controls" protocol) emphasizes that death/serious injury for highway workers is unacceptable and that safety is proactive (e.g. using Positive Protection barriers proactively).

Professional safety protocols such as the "[Safety Hierarchy](#)", "[Hierarchy of Controls](#)", and "[High-energy control assessment \(HECA\)](#)" prioritize hazard elimination followed by implementing direct controls (e.g. Positive Protection barriers) to address [high-energy hazards](#) (e.g. errant moving vehicles). "*Direct controls are actions that...reduce or eliminate the energy associated with these high-energy hazards... A barrier alongside a busy highway is a direct control for the kinetic energy of motor vehicles.*" [20]

[ANSI Standard A10.47-2021 \(§4.4\) and Federal Law](#) directs that positive protection "shall be used" in, at minimum, 5 circumstances. In 2021, the Infrastructure Investment and Jobs Act (IIJA) amended the [Highway Safety Improvement Program \(HSIP\)](#) to add protection for "[Vulnerable Road Users](#)", which includes road construction & highway workers on foot in work zones.

Where would **you** want your **office chair**?



Positive protection provides separation and helps prevent longitudinal and lateral crashes into work zones.

In 2021, California launched its award-winning [Caltrans Positive Protection Program](#) which directs Caltrans design engineers and contractors to use Positive Protection to ensure worker safety. 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

"A physical barrier provides one of the best possible protection solutions for workers exposed to the flow of traffic. [Implementing Positive Protection] is a common-sense and cost-effective way for safety reform that will prevent death and injuries of workers on roads and highways."

— [California Legislature's Committee on Transportation: "March 20, 2023 Hearing: Assembly Bill No. 752, Blanca Rubio. State highways: worker safety."](#)

What are the Types of Positive Protection?



Mobile Barriers

[Mobile Barriers MBT-1®](#) is a highly mobile traffic barrier system for incident response & work zone safety. The mobility of the MBT-1® allows rapid work zone setup/removal and enables managers to reduce project duration & cost, schedule around peak traffic hours, and minimize roadway congestion.

The versatile MBT-1® integrates equipment & supplies for comprehensive on-site logistics with 85,000 lbs (38500 kg) GVWR carry capacity, integrated crane & heavy lifting capabilities, generator, high lumen work lights, TMA, electronic signage, and more. Tested and accepted under NCHRP 350 & MASH for TL-2 and TL-3 usage.



Moveable Barrier - Concrete

[Lindsay Transportation Solutions QMB Zipper](#): The Road Zipper System is designed to increase capacity and reduce congestion by making more efficient use of new or existing roadways & highways. This technology is used for managed lanes and construction applications to create safe, dynamic highways that offer [real-time roadway reconfiguration](#) while maintaining positive barrier protection between lanes. The Road Zipper System can be used to move barrier from one side of a lane to the other to create work space and reopen lanes again to restore capacity.



Moveable Barrier - Steel

[Valtir's Vulcan® moveable steel barrier](#) is comprised of lightweight, galvanized steel segments that offers [real-time roadway reconfiguration](#). It is tested to NCHRP Report 350 Test Level 3 and Test Level 4, and EN1317 H2 and N2 specifications. The Vulcan® Moveable Barrier is designed for easier movement with the Vulcan® Transfer Attachment (VTA) when connected to a skid steer or front end loader. The VTA is also designed to help the operator work from either side of the barrier.



Temporary Steel Barrier

[Hill & Smith Zoneguard®](#) temporary steel barrier, offers the road construction industry a revolutionary temporary barrier solution that provides superior protection. A cost-effective alternative to traditional concrete barrier, Zoneguard's lightweight configuration allows 750 feet to be hauled on one truck and up to 1500 feet to be installed in one hour. Zoneguard's low weight does not affect its performance, as it meets both NCHRP 350 (TL-3 & TL-4) and MASH (TL-3) crash test standards.



Traditional Concrete Barrier (TCB)

Traditional concrete K-rail or Jersey Barrier is generally considered a device for use on Long-Term Projects. With a weight of 4,000 lbs or more, concrete Jersey Barrier requires heavy equipment to install, rearrange, and remove at the end of a project. As a result, traditional concrete barrier is often left-in-place for the duration of a project, limiting roadway capacity & flexibility to respond to rush hour traffic congestion. Commonly cited challenges of using concrete Jersey Barrier or K-Rail include installation/removal time & cost, safety risks of installation/removal in live traffic, and impracticality for Short-Term and Short-Duration work zones and/or where it is desirable to reopen lanes and relieve congestion for rush hour highway traffic.

Why is it so Important to Speak up about Work Zone Safety Issues?

Speaking up about work zone safety issues could reduce risk & save a life.

A National Safety Council (NSC) survey found 58% of Americans working in construction feel that productivity or speed is prioritized over safety. [21] A recent [Construction Dive](#) article reveals that one of structural engineers' biggest concerns (who are responsible for structures and bridges across the nation) includes overly aggressive construction project timelines (42% respondents).

"These issues represent **safety hazards**... The push to shorten project timelines can lead to **compounding errors** during construction... This **push** to go too fast and possibly **cut corners** can be **combatted by a strong safety culture**."

— Chris Cerino, National Council of Structural Engineers

Associations in ["The Need for Speed Can Lead to Problems on Projects, Engineers Say", ConstructionDive, Sept. 5 2024.](#)



Improved road-user and worker safety is a proven [benefit](#) from using Positive Protection.

Compromising on safety can lead to severe injuries, fatalities, liability, and/or rework. [22] One example is a tragic and preventable [2011 incident](#) which resulted in a serious injury resulting from engineers' choices to withhold Positive Protection. The incident and engineers' choices attracted statewide news coverage, numerous questions, concern for the safety of people constructing and maintaining the state's roads, and a \$56 million judgement. This incident led to major safety reforms in 2019 through the enactment of a new law directing design engineers and contractors in the state to use Positive Protection to ensure worker safety.

In addition, recent studies have found that higher levels of injuries on highway and infrastructure projects are also associated with rework and quality issues. [27] According to some industry estimates, the direct costs of rework on infrastructure projects amounts to over 5.7% of a project's total cost. [23] [26] In addition, rework often adversely affects project schedules, leading to overruns and delays. [25] For large infrastructure projects, this can mean millions of dollars in unexpected expenses.

"An undeniable feature that contributed to both NCRs [non-conformances and rework] and safety incidents was human error [on infrastructure, rail, and building projects]; the fragility of human beings inexorably ensures that errors will occur...

In acknowledgment of this, ...there is therefore a need to 'anticipate what might go wrong' and accommodate the likelihood of errors occurring **when undertaking a risk analysis prior to the commencement of construction**...

When rework was required, for example, it was noted that people tended to take 'short-cuts'...and there may no longer be equipment in place that supports a safe work environment...

People make mistakes, but organizations make it possible for them to be really serious."

— Chris Cerino, National Council of Structural Engineers Associations in [P. Love, P. Teo, J. Morrison, "Unearthing the Nature and Interplay of Quality and Safety in Construction Projects: An Empirical Study", Safety Science 103 \(2018\) 270-279.](#)

"The project manager needs to constantly reinforce the message that safety will not be compromised for any reason, especially, cost or schedule reasons...A project that finishes on time and under budget should not be considered successful if a teammate is seriously injured...Projects having fewer safety problems usually have fewer quality problems."

— [Terrell, M.S., "The project manager's role as a safety champion", Paper presented at Project Management Institute Annual Seminars & Symposium, 2000.](#)

"Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare."

— [National Society of Professional Engineers, "Code of Ethics for Engineers"](#)

"Members should hold paramount the health, safety, and welfare of the workplace and the public."

— [Construction Management Association of America, "Code of Professional Conduct"](#)

"Safety is a people profession. We want to help workers feel safe, contribute to organizational goals and return home healthy at the end of the workday."

— [Bradley D. Giles, P.E., CSP, STS, FASSP, GIOSH, 2021-2022 ASSP President, "Ethics and Our Profession"](#)

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. 2016-2017 data from NHTSA's replacement Crash Report Sampling System (CRSS).

⁹ Fatalities Data: NHTSA Fatality Analysis Reporting System (FARS) Encyclopedia. 2018 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 [Urbint, "High-Energy Control Assessments \(HECA\) — What They Are and How They Save Lives".](#)

²¹ ["58 Percent of Construction Workers Say Safety Takes a Backseat to Productivity", EHS Today, May 18 2017.](#)

²² [Forcada, Nuria & Rusinol, Gerard & Macarulla, Marcel. \(2013\). Rework in highway projects. Journal of Civil Engineering and Management. 20. 1-11. 10.3846/13923730.2014.893917.](#)

Project 5: "In this particular project, a great number of unexpected issues appeared: ... an accident forced [the project management team] to include stricter safety systems [which required rework]." Project 8: "Incomplete project documentation such as extra safety conditions or enlargement of car protections in case of impact provoked rework activities."

²³ ["The Impact of Rework on Construction & Some Practical Remedies", Construction Management Association of America.](#)

²⁴ [2022 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#) Study based on nationwide survey of approximately 538 highway construction firms.

²⁵ ["8 Ways to Reduce Construction Rework", AutoDesk, July 1 2023.](#)

²⁶ ["Root Causes & Consequential Cost of Rework", XL Catlin, Insurance: North America Construction, 2015.](#)
"Abdul-Rahman (1995) determined non-conformance costs in a highway project to be 5% of the contract value (excluding material wastage and head office overhead). Abdul-Rahman specifically points out that non-conformance costs may be significantly higher where poor quality management practices were implemented."

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](#)

[California's Positive Protection Program](#)

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