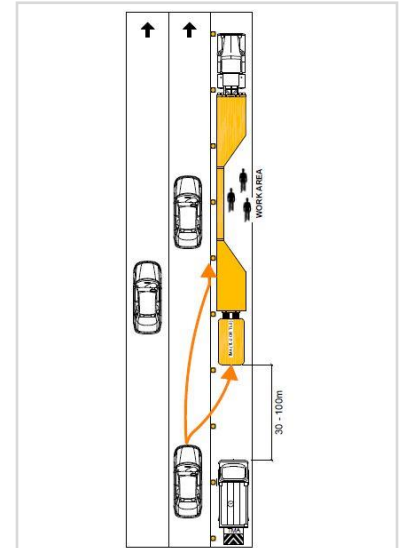


## What is Positive Protection?

Positive Protection are measures “between workers and motorized traffic” which “contain and/or redirect vehicles” and meet applicable crashworthiness criteria.<sup>1,2</sup>

Positive Protection may include highly mobile barrier, movable and temporary steel barrier, movable concrete barrier, traditional concrete barrier, associated cushions, and other strategies to avoid traffic accidents in work zones including full road closure.<sup>3</sup>

Mobile and other movable barriers enable field crews to quickly create work spaces that are physically separated from moving traffic and quickly removed from the roadway once the work is completed.



*Positive Protection Barriers provide separation and help prevent longitudinal and lateral crashes into work zones.*



The rising number of accidents, injuries, and fatalities highlight the need for positive protection. In a 2019 survey, 67% of highway contractors reported crashes into their work zones and 89% think positive protection would improve safety on their projects.<sup>4</sup>

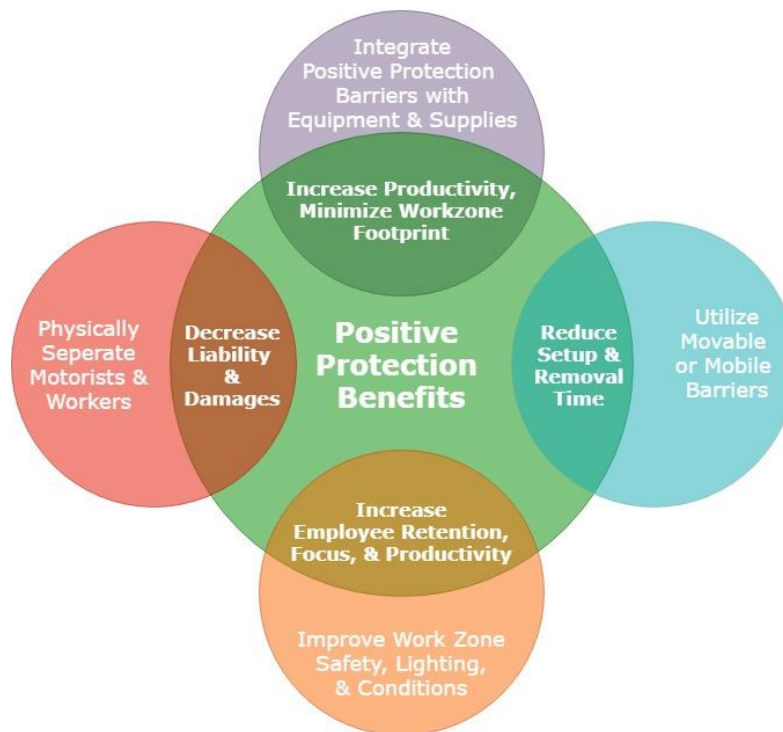
New types of Positive Protection Barriers have made work zone safety practical and cost-effective. California research found a cost benefit for highly mobile barrier of \$1.9 million per year, per barrier.<sup>14</sup>

## Examples of Positive Protection Devices

---

Innovative types of highway barrier such as Mobile Barriers, Movable, & Temporary Barriers are enabling managers to accelerate highway projects, physically separate moving traffic and workers, minimize work zone footprints, and provide practical cost-effective work zone safety. Benefits vary by product and application. For example, California research found a cost benefit for Mobile Barriers of \$1.9 million per year, per barrier.<sup>14</sup> Commonly cited benefits of using Positive Protection include:

- Safeguarding Workers Against Intrusions
- Reducing Project Duration & Cost
- Maximizing Roadway Capacity
- Increasing Productivity with Onboard Tools and Supplies
- Increasing Efficiency/Saving Time
- Increasing Employee Retention
- Decreasing Liability, and Damages
- Reducing Risk and Exposure to Dangers of Live Work Zone



## Highly Mobile Barrier

[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 & highway 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.



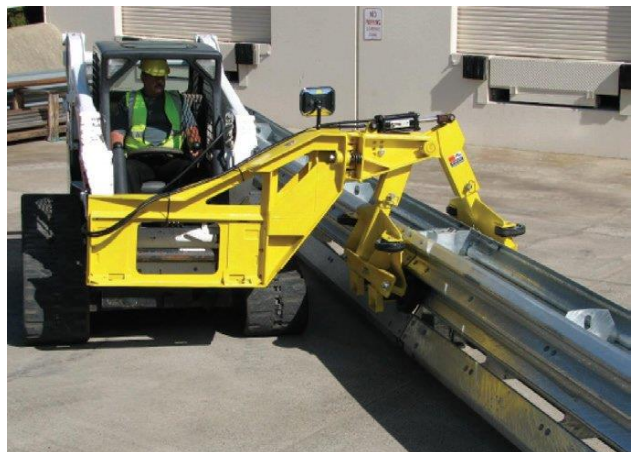
## Moveable Barrier – Concrete

[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

[Trinity Highway'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 Temporary 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. Commonly cited challenges of using concrete Jersey Barrier include installation/removal time & cost, safety risks of installation/removal in live traffic, and impracticality for Short-Term and Short-Duration Projects and/or where it is desirable to reopen lanes and relieve congestion for rush hour highway traffic.



## What are the Benefits of Positive Protection?

Improved road-user and worker safety is a proven benefit from using positive protection. New types of positive protection barriers can be used to meet regulations and standards, physically separate moving traffic and workers, and provide practical cost-effective work zone safety.

### Cost Benefits

California research found a cost benefit for highly mobile barrier of \$1.9 million per year, per barrier.<sup>14</sup> In 2016, USDOT set the value of a single life at \$9.6 million.<sup>13</sup> When comparing the cost of the life of a worker to positive protection's cost and 20 year expected term of use, the annual cost of using positive protection is minimal. Over 20 years of use, the barrier will most likely save one or more lives and help avoid even more injuries, accidents, and delays.

### Commonly Cited Benefits

Benefits vary by product and application. Commonly cited benefits of using positive protection include:

- Safeguarding Workers Against Intrusions
- Increasing Worker Focus on Tasks
- Reducing Setup
- Increasing Productivity with Onboard Tools and Supplies
- Increasing Efficiency/Saving Time
- Increasing Employee Retention
- Decreasing Liability and Damages
- Reducing Risk and Exposure to Dangers of Live Work Zone



## Benefits for Workers and the Public

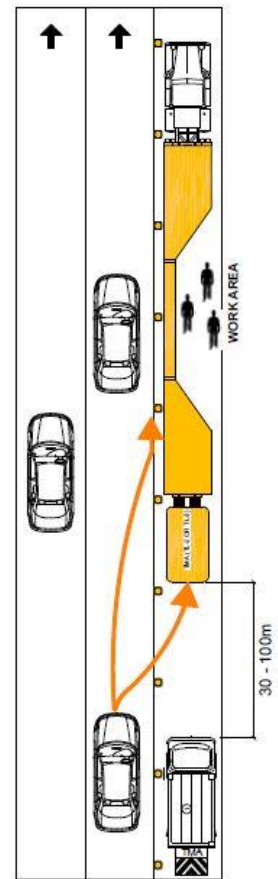
Positive protection benefits workers & the traveling public by both improving safety and mobility in and around work zones.

Truck or Trailer Mounted Attenuators (TMA) and warning devices (rumble strips, alarms, etc.) help but also permit motorists to veer around these devices and swerve back into the work zone. At 50 mph, errant drivers may have less than 1 second to realize and correct their mistakes. In an analysis of impacts in one work zone location, 30-40% of the incidents involved direct rear impacts, and 60-70% of the incidents involved lateral incursions (with relatively tight TMA spacing).<sup>15</sup> Drivers make mistakes, but mistakes need not be catastrophic – for drivers, workers, or others.

Positive Protection physically separates workers and motorists. Barriers are designed to prevent longitudinal and lateral crashes into work zone zones. Barriers help drivers better focus on the road ahead and help reduce the severity of mistakes and accidents. In many cases, errant drivers can regain control and continue on their way.

Extended lane closures with low work activity contribute to driver frustration. Traditional practices of taking buffer lanes are not needed and are becoming impractical with increasing traffic volumes. Positive protection helps reduce the number and duration of lane closures. Work and associated protection can be focused in one or more specific areas.

The highly mobile and movable types of barriers are designed to help reopen the roadway quickly to restore capacity. Roadways can be reopened daily to ease rush hour traffic otherwise congested behind work zones. Reducing congestion benefits both motorists & workers. Speed variance (i.e. congestion/slowdowns) is a significant contributor to accidents in and around work zones. Those accidents may cause additional crashes and/or spill over into work zones. Addressing congestion with positive protection can benefit workers, the public, and commerce by reducing accidents, injuries, fatalities, risk, delay, and interruption. These combined considerations accounted for much of the \$1.9 million savings per highly mobile barrier per year found by California DOT research.<sup>14</sup>



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

**Case Study: California Bridge Project**  
3 year/\$150-200 million project.

3x mobile barriers:

- 10-20% time savings per night.
- Lanes reopen daily.

1x movable barrier:

- Lane shifts improve traffic flow.

Benefits:

- Reduced project duration & cost.
- Optimal traffic flows.

An ongoing project in California illustrates even greater potential savings on projects and benefits for the public. Highly mobile barriers are saving an estimated 1-2 hours per night on setup/removal (a 10-20% savings in time and potential project duration). In one closed lane, they are using three barriers to work at different spots along that lane. On a three-year, \$150-200 million project, that amounts to substantial reduction in project duration and cost. For the public, benefits are increased even further by shifting lanes around the work zone using movable concrete barrier. Used together, the highly mobile and movable barriers better maintain traffic flows and reduce overall project duration.

## Why Use Positive Protection?

---

Work zone fatalities reached a 15-year high in 2019 and increased 42% between 2013 and 2019.<sup>27</sup> In 2019, over 115,000 work zone crashes were estimated to have occurred resulting in over 39,000 injuries and 842 fatalities.<sup>8,9</sup>

In 2020, during the COVID-19 pandemic, work zone crashes & fatalities climbed despite lower traffic volumes.<sup>20,21,22,23</sup>

More motorists and road workers are being killed in preventable work zone intrusions. In a 2021 survey, 60% of highway contractors reported crashes into their work zones and in an earlier survey, 89% think [positive protection](#) would help improve safety and prevent these horrific crashes.<sup>26,4</sup>

The rising number of accidents, injuries, and fatalities highlight the need for [positive protection](#).

## 2021 Contractor Reported Work Zone Crashes, Project Delays, Injuries, & Fatalities



The Associated General Contractors of America's (AGC) 2021 nationwide study on highway work zone safety reveals that **60% of highway contractors reported work zone intrusions** over the last year.

As a result of these work zone crashes, 35% of firms reported project delays, 4% reported worker fatalities, 19% reported worker injuries, 13% reported public fatalities, and 34% reported public injuries. 78% of highway contractors also reported that the risk of highway work zone crashes is greater now compared to a decade ago.<sup>26</sup>

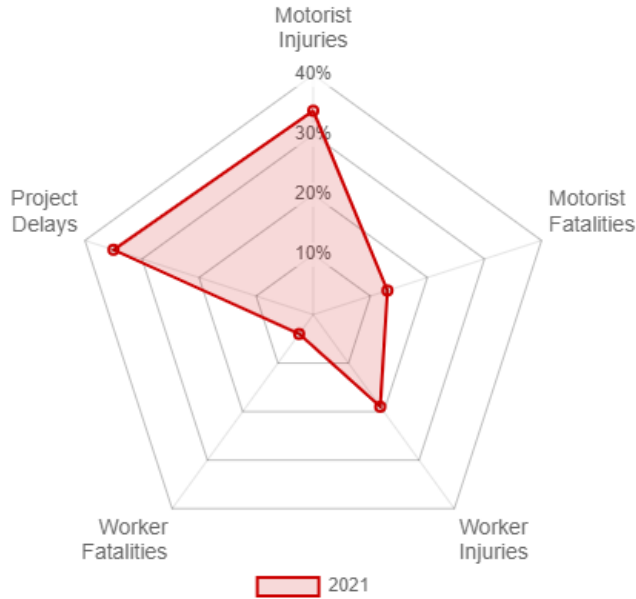
The 2019 AGC study revealed that an increasing percentage of contractors believe positive protection would improve safety on their projects.

- **89%** of contractors report that increased use of positive protection barriers would help reduce injuries and fatalities on their projects.<sup>4</sup>

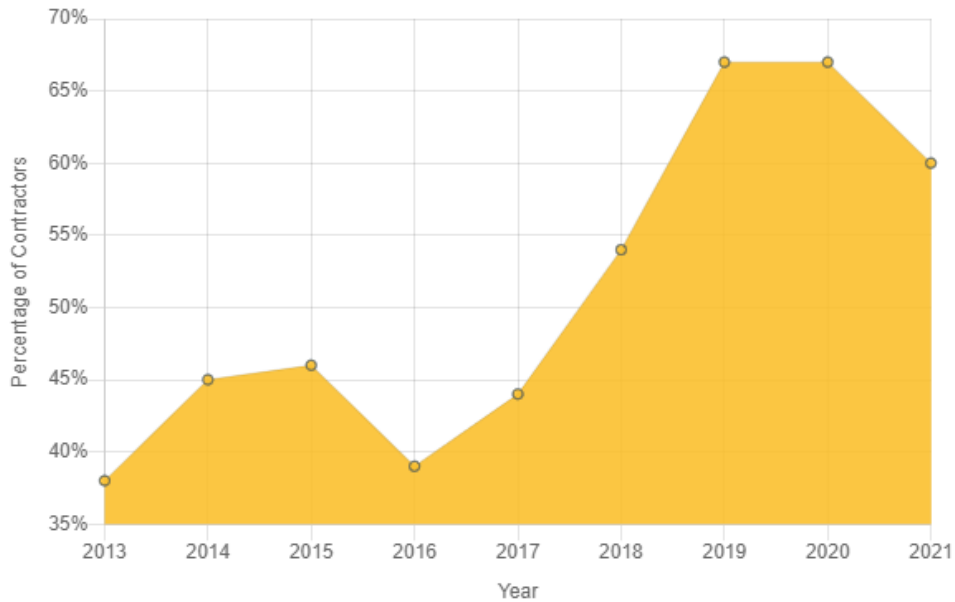


**AGC Study - Outcomes of Work Zone Crashes <sup>26</sup>**

(Mouseover data points for details.)



**AGC Study - Percentage of Highway Contractors Reporting Work Zone Crashes Over Time <sup>26, 25, 4, 5, 6, 7, 19, 18, 17</sup>**

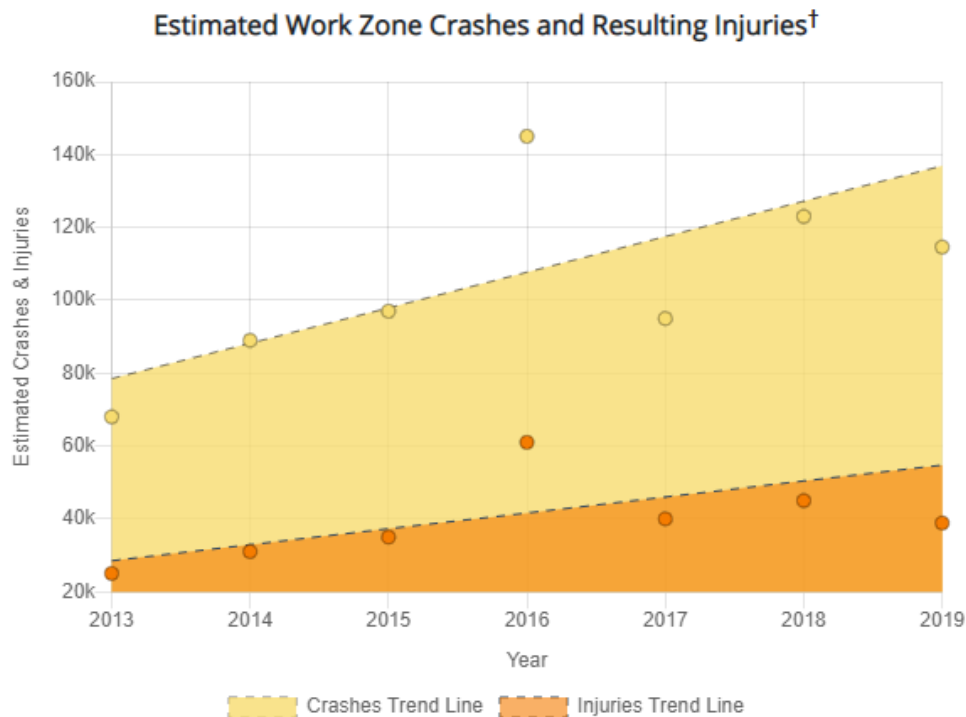


Highway Contractors reporting 1 or more crashes into their workzone in the last 12 months

## Estimated National Work Zone Crashes & Injuries <sup>8</sup>

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

- In 2019, an estimated 115,000 crashes and 38,900 injuries were estimated to have occurred in work zones.



<sup>†</sup> Estimated Work Zone Crashes & Injuries Data are obtained from NHTSA statistical models (NASS/GES & CRSS). The NHTSA statistical models under-estimate the subset of fatalities occurring in work zones by as much as 64% in 2019 (see Table 1 below).

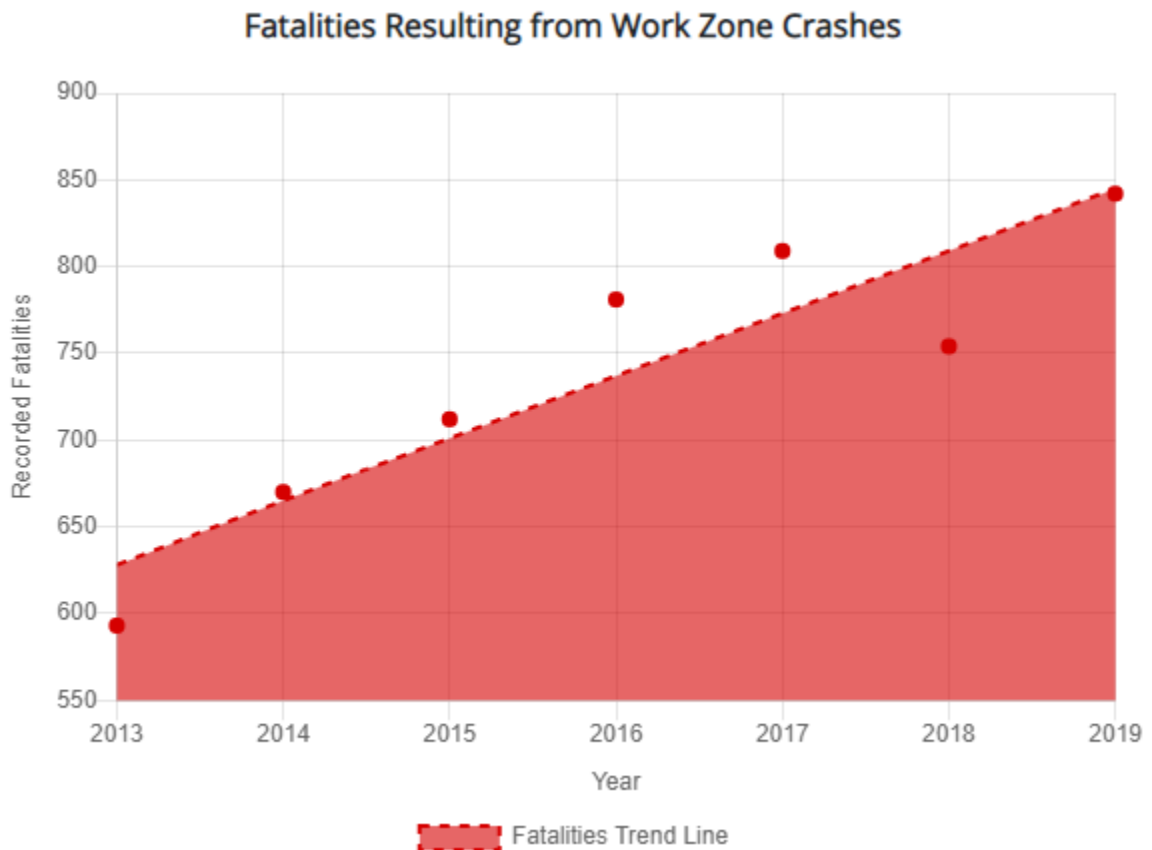
Table 1. NHTSA CRSS Statistical Model Estimates for Fatalities Resulting from Work Zone Crashes:

	2015	2016	2017	2018	2019
Recorded Fatalities (FARS)	701	781	806	754	842
Estimated Fatalities (CRSS Statistical Model)	349	525	597	636	298
Percent Error	-50%	-32%	-26%	-15%	-64%

## National Work Zone Crash Fatalities<sup>9</sup>

Work zone crash fatalities have been on the rise nationally.

- 42% increase in fatalities since 2013.



# When is Positive Protection Appropriate?

## Federal Law & Standards

- **2005 - Congress calls for Positive Protection**  
Under section 1110 of SAFETEA-LU, Congress enacted 23 USC 109(e)(2) and 112(g) which call for positive protection “between workers and motorized traffic”.
- **2007 - FHWA adopts Temporary Traffic Control Devices Rule ("Subpart K")**  
FHWA adopted Subpart K (23 CFR 630.1102 et seq.) pursuant to the mandate in SAFETEA-LU. 23 CFR 630.1108(a) of Subpart K lists 5 circumstances under which practitioners need to (“shall”) consider use of positive protection.
- **2010 - ANSI establishes National Standard for Work Zone Safety**  
ANSI Standard A10.47 (§4.4) provides that positive protection “shall be considered” in, at minimum, the 5 circumstances.

## Federal Law

The statutes and underlying regulations, read together, call for positive protection (barrier) “between workers and motorized traffic” which “contain and/or redirect” errant vehicles and meet applicable [crashworthiness criteria](#).<sup>1,2</sup>

Circumstances under which positive protection needs to (“shall”) be considered:

“At a minimum, positive protection devices shall be considered in work zone situations that place workers at increased risk from motorized traffic, and where positive protection devices offer the highest potential for increased safety for workers and road users, such as:

1. Work zones that provide workers **no means of escape** from motorized traffic (e.g., tunnels, bridges, etc.);
2. **Long duration** work zones (e.g., two weeks or more) resulting in substantial worker exposure to motorized traffic;
3. Projects with **high anticipated operating speeds** (e.g., 45 mph or greater), especially when combined with high traffic volumes;
4. Work operations that place **workers close to travel lanes** open to traffic; and
5. Roadside **hazards**, such as drop-offs or unfinished bridge decks, that will remain in place overnight or longer.”<sup>10</sup>

## Separate Pay Items:

Federal statutes require a “separate pay item” for positive protection. <sup>1, 11</sup>

## ANSI Standards

ANSI Standard A10.47 (§4.4) likewise provides that positive protection measures “shall be considered” when any of the following exist:

1. Work zones that provide employees **no means of escape** (e.g. tunnels, bridges, etc.) from external motorized traffic intruding into the work space.
2. **Long duration** work zones (e.g. two weeks or more) resulting in substantial employee exposure to motorized traffic.
3. Projects with **high anticipated operating speeds** (e.g.  $\geq 45$  mph, 72 km/h) especially when combined with high traffic volumes ( $> 20,000$  vehicles per day).
4. Work operations that place employees within **one lane width** to travel lanes open to traffic.
5. Roadside **hazards**, such as drop-offs or unfinished bridge decks, that will remain in place overnight or longer.

ANSI Standard A10.47 further notes that there might be other circumstances not listed that merit the use of positive protection.

## Funding for Positive Protection

---

### What Federal Funding is Available for Positive Protection?

#### NHPP, STBGP, and HSIP

FHWA recently clarified that States can now use federal funds to acquire Mobile Barriers MBT-1 and other construction and safety equipment. States can use NHPP, STBGP or HSIP funds (e.g. leftover or otherwise available funds from most projects). States may find it advantageous to first transfer funds from NHPP or STBGP to HSIP under 23 U.S.C. 126, and then purchase barriers under the HSIP program. Barriers purchased under the HSIP program can be used for maintenance and construction on federal and state roads. The State share under HSIP is 10% (federal funds can be used for 90% of the purchase). The FHWA also clarified that States can directly purchase barriers (i.e. they do not have to purchase them through separate projects).

### How Can Contractors Obtain & Use Positive Protection?

Contractors have options on how to pay for and use positive protection. Options vary for different products. As one example, Mobile Barriers MBT-1 are available to buy, lease or rent.

Federal law and the national 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.<sup>1, 11</sup> Contractors can urge States to include positive protection in their plans. States can spec in a separate pay item for positive protection, or otherwise, purchase it for their employees and contractors to use on these types of projects.

State personnel may not be aware of the recent changes in federal policy and may not realize they can directly purchase the barriers or that they can take the barriers back at the end of the contract for future use. Traditionally, that has not typically been allowed.

Under the new FHWA policy, states can directly purchase or spec-in and reclaim Mobile Barriers MBT-1 and other safety and construction equipment for use by their crews and contractors.

- **States can buy positive protection barriers directly, then allow their crews and/or winning contractors use them (i.e. buy and provide).** Direct purchases are specifically allowed under the new FHWA policy.
- **States can spec in barriers, allow winning contractors to use them, and then the States can take ownership and possession at the end of the term.** This allows all bidders to include them and later transfers the barriers back to the state for its own use and/or for use on the next contract.
- **States can spec in barriers, then allow winning contractors to rent or buy them at the end of the term.**

## Footnotes

---

<sup>1</sup> [Temporary Traffic Control Devices, 23 U.S.C. § 112\(g\).](#)

<sup>2</sup> [Definitions, Subpart K - Temporary Traffic Control Devices, 23 C.F.R. § 630.1104.](#)

<sup>3</sup> [Positive Protection Measures Defined, 23 U.S.C. 112\(g\)\(4\).](#)

<sup>4</sup> [2019 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#)

<sup>5</sup> [2018 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#)

<sup>6</sup> [2017 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#)

<sup>7</sup> [2016 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#)

<sup>8</sup> 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).

<sup>9</sup> Fatalities Data: NHTSA Fatality Analysis Reporting System (FARS) Encyclopedia. 2018 is the last year with available data.

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

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

<sup>12</sup> ["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 \(June 2016\).](#)

<sup>13</sup> [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," \(August 8, 2016\).](#)

<sup>14</sup> 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.

<sup>15</sup> Mobile Barriers LLC internal crash analysis for Washington D.C. located highly mobile barrier.

<sup>16</sup> Former Deputy Executive Director of the Texas Department of Transportation (TxDOT).

<sup>17</sup> [2013 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#)

<sup>18</sup> [2014 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#)

<sup>19</sup> [2015 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#)

- <sup>20</sup> [Work Zone Crashes Climb During Pandemic, Even as Traffic Ebbs, PEW Charitable Trusts, October 6, 2020.](#)
- <sup>21</sup> [Missouri work zone crashes double despite half the traffic, Better Roads, September 1, 2020.](#)
- <sup>22</sup> [Ohio DOT reports string of work-zone crashes despite less traffic, Better Roads, June 8, 2020.](#)
- <sup>23</sup> [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.](#)
- <sup>24</sup> [An Optimization Methodology to Improve Work Zone Safety within a Limited Budget in a Roadway Network, Promoths Saha, Ph.D., International Conference on Transportation and Development 2020 : Transportation Safety.](#)
- <sup>25</sup> [2020 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#) Study based on nationwide survey of approximately 224 highway construction firms.
- <sup>26</sup> [2021 Associated General Contractors of America \(AGC\) Highway Workzone Safety Study.](#) Study based on nationwide survey of approximately 292 highway construction firms.
- <sup>27</sup> [Work Zone Fatalities at Highest Level Since 2006, New Data Shows, Roads & Bridges, April 28, 2021.](#)