

Eradicating work zone danger



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New safety systems for highway work zones are helping to reduce deaths and injuries in the United States, while much work is being done in Europe to improve work zone safety. Guy Woodford reports

With more road building underway than at any one time in Texas history, the US Lone Star state's Department of Transportation (TxDOT) is introducing its first highway safety system with queue-warning technology and temporary rumble strips to cut work zone collisions.

Debuting along a central Texas stretch of the I-35, the system uses sensors to measure the speeds of approaching vehicles and then warns drivers through portable, electronic signs about upcoming traffic backups due to night lane closures in work zones. The rumble strips are spaced between sensors to send mild vibrations through oncoming vehicles to get the attention of distracted or drowsy drivers.

"We're proud to unveil this innovative, new safety technology and are hopeful we can expand the system in other areas of the state," said Phil Wilson, TxDOT executive director. "This technology represents the future of roadway safety as it uses a comprehensive approach to warn drivers of traffic backups, thereby decreasing the likelihood they will enter a work zone at an unsafe speed. Any technology that has the potential to simultaneously protect motorists and roadside maintenance workers is well worth pursuing."

Trinity Highway Products has a new temporary highway barrier said to offer both easy manoeuvrability and thorough protection to roadworkers.

At 460kg per four-metre section, the Vulcan Barrier can be easily loaded or unloaded from a trailer with a fork lift, small skid steer, boom truck or backhoe. The barrier sections are equipped with wheels and jacks that allow for placement and movement by hand within the highway work zone. The individual sections are connected with a single steel pin.





A lightweight galvanised portable steel barrier, the Vulcan Barrier meets the requirements for **National Cooperative Highway Research Program** (NCHRP) 350 TL-3 and TL-4 re-directive longitudinal barriers, as well as the European legislation EN1317-2



Highway Resource Solutions says its Intellicone roadworker safety system developed for them by New Wave Innovation is far more intelligent than some of its UK media portrayal



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With the use of a Vulcan Transfer Attachment (VTA) connected to a small skid steer or front end loader, the Vulcan Barrier can be moved laterally 3.6m at a rate of 8 km/h, allowing the opening or closing of a half a km-long work zone in about 20 minutes. This Vulcan Barrier's design is said to make the product ideal for work zones in highly congested areas where longitudinal barriers must be moved multiple times per day or weekend to accommodate peak and off-peak traffic volumes. When the work zone is inactive, the Vulcan Barrier is stored out of the way of traffic on the shoulder. When an active work zone is required, the contractor uses the VTA to quickly move the barrier out into the roadway to close the lane to traffic and secure the work zone.



MB said that the effectiveness of its MBT-1 barrier was perfectly demonstrated in a recent project completed on the Korean Veterans Highway in Staten Island, New York

the removal of the bridge rail without positive protection may have led to a catastrophic accident off the bridge. Additionally, the workers were fully shielded.

The original plan for the maintenance and protection of traffic called for the installation and removal of a 48.76m of concrete barrier wall on a daily basis. This would have required four hours of setup each day, along with a crane, two extra labourers and an operating engineer. The length of this project was set for 30 days.

Trinity Highway Products said that several highway contractors now use the Vulcan Barrier for short- and longer-term work zones. Superior Traffic Control-Memphis owns more than 1,000m of this product and a spokesperson for the company said, "We use the Vulcan Barrier as an integral part of our traffic control operations. It is lightweight and highly portable and allows our crews to quickly set up protected work zones for our customers. We use Vulcan for overnight and weekend work zones where we are only allowed to close a lane of traffic for a short period of time. Our crews are able to position the barrier by hand at the beginning of an evening and then quickly move it to the shoulder in the morning so that the lane is open to rush hour traffic."

Short-term day and night work zones pose significant challenges, said **Mobile Barriers** (MB). The American firm said that they they are becoming the norm rather than the exception, with incentives and disincentives to reduce the number and duration of lane closures, improve traffic flows and reopen roads more quickly increasingly being incorporated into work plans and contracts. MB said that its new barrier tool called MBT-1 is proving to be beneficial for both users and passing traffic alike.

Designed for safety, MBT-1 is also said to improve productivity and reduces the need for collateral equipment. This provides crews with more usable time along with additional space in which to work.

Instead of deploying multiple pieces of equipment (generator/light carts, flatbed trailers with supplies, utility trucks with power and tools, multiple TMA and other trucks), MB claimed that everything can be carried on the MBT-1 and simply pulled into place. Lights and tools run right off on-board power and air. Materials and supplies are carried on the decks.

MB said that the effectiveness of the MBT-1 was perfectly demonstrated in a recent project completed in Staten Island, New York. The scope of the repairs on the Korean Veterans Highway included removal and reinstallation of box beam bridge rail. The damaged bridge rail was positioned on bridges on a four-lane highway with a 9.14m median. MB said that

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In contrast, MB said that the use of the MBT-1 as specified not only protected the workers and the traveling public, it reduced the time of completion by almost half – to just 16 days. The configuration of the MBT-1 was set to 24.38m to not only accommodate a smaller turning radius, but to allow the contractor to store the 12.19m sections of guard rail on board the storage units and drive them on site. MB said that this not only reduced costs to the contractor and the state of New York but also reduced worker exposure time on the highway. The setup time on the project using the mobile barrier trailers was said to be 30 minutes including the traffic taper. The MBT-1 unit is equipped with an attenuator and an arrow board, making it self-contained as well as self-supported.

In a real and practical way, MB said the MBT-1 provides mobility, efficiency and total protection along with the functionalities of a utility truck, flatbed trailer, light/generator cart and multiple blocker/TMA trucks all in one.

Chris Sanders, senior vice president of business development at **Lindsay** Transportation Solutions, said that there was “great division” in work zone protection between positive protection systems and other systems focused on lower speed or some kind of warning signal for roadworkers.

“Our company is certainly focused on the positive protection side and has worked hard with our legislators and [US] DOT officials to require positive protection wherever possible,” said Sanders.

“We offer a suite of products that can provide cost-effective solutions to the DOT or contractor that can provide positive protection with flexibility for the contractor to work in larger, more efficient, work zones as well as congestion management for the motoring public.”

Sanders said that Lindsay’s Quickchange Moveable Barrier (QMB) combines the protection of a concrete or steel barrier with the flexibility of a cone. He said that compared to similar moveable barriers, the QMB is more reliable, faster to change, and more accurate when placed with one pass. The QMB is typically for projects that are over 305m, normally in place for longer than three months, and that require moving two to seven times a week.

“We also offer our Amorguard Barrier for short linear and short duration projects. These are typically work zones that are in place for a week to three months and less than a 1,000 feet,” said Sanders. “These jobs also require the movement of the barrier daily or weekly to manage congestion while opening and closing a work zone.”

When positive highway protection is desired but mobility and flexibility are less or not important, Sanders said that Lindsay offers its TL3 Steel Orion barrier. “It is a light weight and durable steel barrier available fully assembled or in kit form for the contractor to provide double and three beam panels to our easy-to-ship contractor kits. The kits allow a contractor to add value with local assembly and save freight on standard guardrail panels.”

For major city and rural road projects where a barrier is required, Lindsay’s Amorzone plastic barrier is MASH tested to TL 2. It is said to be easily moved and that it provides the positive protection that Sanders believes is never found in a cone.

“One of my personal concerns is that as the economy has suffered globally we have seen some of our important DOT customers compromise on positive protection because of cost,” continued Sanders. “I can cite examples in a couple of countries and while lower speeds do lower the overall carnage level in an accident, the crazy drunk on Saturday night is not obeying the lower speed limit, and unnecessary fatalities and accidents do occur. Our goal is to prevent this unnecessary loss of life.”





Safer driving around roadworks areas is being encouraged in the UK

Sanders said that, as an industry, highway safety system manufacturers need to ensure that the designers and owners of roads and highways factor in the cost of a life and the medical and property damage from an accident into the decision to use a cone versus a positive barrier device. "When all costs go into the equation, not just the additional cost of a device to a construction contract, society will be better served," he added.

On the other side of the Atlantic Ocean, the UK's **Highways Agency** is telling drivers to take extra care and to stick to speed limits at roadworks, to prevent deaths and injuries among both road users and road workers. There are also said to be many near misses, with members of the public driving through coned off areas or colliding with works vehicles.

The UK Government is investing additional funding in road improvements across the country in order to reduce congestion, boost economic growth and improve safety. Over the next two years this will mean more roadworks as the Highways Agency delivers the improvements. While Highways Agency planning is said to minimise wherever possible disruption caused by roadworks, there are large numbers of

road workers, traffic officers and other operatives working on live carriageways on England's motorways and trunk roads, often just a few metres from vehicles travelling at high speed. Roads minister Stephen Hammond said, "It is absolutely essential that all road users play their part when driving through roadworks, and keep within the signed speed limit. Those few seconds you might save by travelling too fast could cost lives."

Responding to what the company describes as an extraordinary amount of recent UK TV, radio and press coverage labelling Intellicone as a "screaming" traffic cone, Highway Resource Solutions (HRS) said that its roadworker safety system developed for them by New Wave Innovation is far more intelligent than some of its portrayal in the media.

HRS spoke out after reading and watching media reports last month on how the Highways Agency are planning to use the Intellicone on motorways and other critical roads.

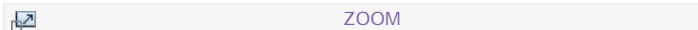
The system is based on a wireless sensor network that incorporates innovative impact sensors integrated into conventional cone lamps and other apparatus. The cone itself is a standard traffic cone. When vehicles come too close or another incident takes place, the sensor immediately transmits an alarm signal to the Intellicone Portable Site Alarm (PSA) that simultaneously activates a crew alarm where roadworkers are operating, alerting them to potential danger.

In addition, each alarm is equipped with a short-range radio frequency transceiver for two-way communication, a Global System for Mobile Communications (GSM) system to provide user text messages and a General Packet Radio Service (GPRS) to enable long-range communication between an unlimited number of alarms over any distance, creating a safer environment for the crews onsite. Finally, a GPS module provides accurate location information for database reporting.

The flexibility of the system is said to allow HRS to apply its technology platform to differing sectors for a variety of applications from the product portfolio.

Steve Jones, head of business development for HRS, said, "It is testament to our client partners, who through deployment of Intellicone are showing their commitment towards improving worker safety.

"Working closely with HRS, the industry is embracing the technology to combat health and safety challenges in a dangerous environment. In so doing we are helping to raise the bar with regards to important safety initiatives across the



road and construction sectors.”

The **European Union Road Federation** (ERF) Working Group on Work Zone Safety said that it is currently identifying synergies with other stakeholders and initiatives aimed at reducing accidents in road work zone areas.

The **EU** is composed of 27 member states and the ERF said that a common element is the lack of harmonisation of different elements used in roadworks. There is said to be a clear divergence both for conventional roads and motorways in the EU in the classification of work zones, speed limits, geometry, road marking and signalling.



An application of Amorzone plastic barrier on a highway in Perth, Western Australia

“As a general rule, there exists a general triple classification of work zones in most of the countries based on the duration of the works: long-, short-term and mobile roadworks,” explained an ERF spokesperson. “However, the time applied to long and short term is not identical and even other elements are used to classify work zones. Consequently, an initial task will be to create a common classification in order to implement a measure which fits all the countries.”

The ERF spokesperson said that speed is one of the main accident causes especially in work zones located in motorways. Although setting national speed limits are the responsibility of member states, a potential solution would be to find a common approach on a step-wise speed limit reduction adapted to different roadworks and conditions of the road.

Of the issue of motorway and conventional road geometry with regard to work zones, the spokesperson said, “There are divergences in lane width and length, also when merging the regular lane before and after the work zone area. This element should be analysed together with speed reduction and also adapted to the respective road type (conventional or motorway).”

The most non-uniform highway elements within the EU, said the ERF spokesperson, are the road markings and road signs that are already covered by the Vienna Convention. However, an increase in cross-border traffic across the EU, especially across TEN-T motorways, has created a need for further harmonisation, the ERF suggested. “The uniform use for road markings and signs would facilitate its recognition by foreign drivers,” said the ERF spokesperson.

BI and Trafikverket unite to cut Swedish work zone deaths

The Swedish Construction Federation (BI) and the **Swedish Transport Administration** (Trafikverket) are to work together to eliminate all fatalities among labourers working on roads or railways in Sweden. Five labourers were killed in 2010, four in 2011 and one in 2012, and the organisations are to continue working together to provide more information and training about the risks involved with working at these sites.

The Administration is to set up a safety year project for 2013-2014 offering training for key management personnel, and the Federation is to invest US\$ 7.87 million (SEK 50mn) in offering training, tools and advice to member companies.

Ohio's work zone safety woe

Deaths in highway work zones within the US state of Ohio doubled from eight in 2009 to 16 in 2011, according to data from the **National Highway Traffic Safety Administration**.

The disturbing figures are the most recent available and include both motorists and construction workers. Meanwhile, **Ohio Department of Transportation** (ODOT) is piloting a new programme aimed at reducing vehicle crashes and making construction work zones safer.

"ODOT tries to do all we can to ensure families and construction workers are safe on Ohio's highways," said ODOT director Jerry Wray. "Motorists can do their part too, by slowing down, driving the posted speed limit, staying alert and avoiding distractions – especially cell phone distractions."

ODOT discussed ways to improve work zone safety at the agency's official start of National Work Zone Safety Awareness Week in Columbus. The event was aimed at saving lives and preventing injuries in work zones and included a demonstration of a new piece of equipment that could help reduce the number of crashes in construction work zones. ODOT is piloting the new safety weapon, known as variable speed limit trailers. The portable devices come with technology that can be programmed to display a safer, slower speed, but only on the stretches of roadway where construction workers are present. Around the state, there are 10 construction projects this year that will pilot the use of variable speed limit signs.

An ODOT analysis revealed that 56,945 vehicle crashes occurred in Ohio work zones from 2003 to 2012. Of those crashes, 20,590 happened when construction workers were present. A person is more likely to be injured or killed in a work zone on a dry and sunny August afternoon than at any other time of year. The top causes of work zone crashes are speed, following too closely, failure to control and improper lane changes.



Deaths from vehicle accidents in the US state of Ohio's highway work zones doubled during 2009 to 2011, according to data from the National Highway Traffic Safety Administration

Versilis highway gates for emergency tunnel closure

Versilis is promoting the SwiftGate tunnel closure system to allow tunnel operators to stop traffic coming into a tunnel safely and quickly, as soon as an incident is detected. According to the Canadian firm, total closure time using the system can vary from one to three minutes depending on the configuration and the number of traffic lanes that need closing.

When an incident is detected, Versilis said that SwiftSigns (a pivoting warning sign) can be deployed in 30 seconds. A taper of SwiftGates (pivoting highway traffic gates) is then progressively deployed in one to two minutes. Fully dedicated to highway safety, Versilis uses the gates to safely and quickly reduce the number of incoming lanes, creating the necessary congestion that brings all vehicles to a safe stop. Highway gates are ideal for rapid tunnel closure during maintenance; for on-ramp, off-ramp control; and also to ensure quick and safe repetitive lane closures.

Crash tested to NCHRP 350 and accepted by the FHWA (**Federal Highway Administration**), the highway gates length varies from 0.6m to 5.48m. Longer gates are also available for multiple lane closures. SwiftSign and SwiftGate can be activated using any ITS infrastructure or a remote control. Increased visibility for the system is achieved with flashing LEDs.

Versilis insisted that its traffic control gate has been engineered to provide maximum highway safety. Its size is said to be large enough to provide a clear and highly visible message to motorists that a lane is closed. In case of head-on impact, the high-density polyethylene gate sections collapse, without damaging the vehicle or generating further accidents.

The solar-powered signs and gates are said by Versilis to have been rigorously tested and proven in the most adverse environmental conditions on various projects in Montreal over the last 10 years. Since 2012, the gates have been used in Auckland, New Zealand for on-ramp control to the Victoria Tunnel. More projects are under way in the US.

Companies in this article

<p>EU</p> <p>Europa.eu</p>	<p>National Cooperative Highway Research Program</p> <p>www.TRB.org</p>
<p>European Union Road Federation</p> <p>www.ERF.be</p>	<p>National Highway Traffic Safety Administration</p> <p>www.NHTSA.gov</p>
<p>Federal Highway Administration</p> <p>www.FHWA.dot.gov</p>	<p>Ohio Department of Transportation</p> <p>www.DOT.state.Oh.us</p>
<p>Highways Agency</p> <p>www.Highways.gov.uk</p>	<p>Swedish Transport Administration</p> <p>www.Trafikverket.se</p>
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