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Technology News.*



**Removable orange
rumble strips warn drivers
approaching a work zone.**
*Photos courtesy of
Eric Meyer, University of
Kansas, and Advance Traffic
Markings.*



**Direction indicator
barricades guide motorists
through work zones.** *Photo
courtesy of WLI Industries,
Inc./United Rentals Highway
Technologies.*

Work zone safety products

CHECK OUT the following products that may provide your agency with effective, relatively low cost, and convenient means for improving safety in work zones. These products are designed to give workers advance warning of and protection from inattentive drivers or errant vehicles, help motorists navigate confusing work zones, and alert drivers of changing traffic conditions.

Some of these products comply with National Cooperative Highway Research Program (NCHRP) Report 350 guidelines for crashworthiness, although you will need to check specific manufacturers. See "The importance of NCHRP Report 350" (page 6) for a brief reminder about how these guidelines affect you.

The Midwest Smart Work Zone Deployment Initiative (MwSWZDI) is investigating 20 different traffic control and management strategies and devices, some of which are featured here. For more information on MwSWZDI, see "Midwest states study work zone safety products" (page 5).

Temporary rumble strips

Temporary rumble strips, which can be orange in color, alert motorists to changing traffic conditions, such as the need to slow down for an upcoming work zone.

Developed through the Strategic Highway Research Program (SHRP), temporary rumble strips are cut to size and attached to the roadway with adhesive backing about 100 meters before the work zone begins. A limited crew can install and remove the strips quickly, and MwSWZDI testing shows that the rumble strips remain in good condition throughout the work period. Temporary rumble strips may be best suited for low-speed roads that carry few heavy trucks. The strips may also work best in an urban setting.

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employees with some helpful initial training. Upon returning from the Expo, employees share the information with other staff in the shop. For Stan, attending the Expos has resulted in a major change in the city's anti-icing practices. He has changed anti-icing materials because of what he's learned at the Expo and what the Iowa DOT has experienced in the Bettendorf area.

Plastic signs and sign supports

Cloth roll-up signs are becoming a common sight in work zones because of the need for portability and safety; however, windy conditions can adversely affect their visibility with some designs. Although stability may always be problematic, new plastic signs perform better in the wind while providing safer conditions for workers and motorists.

During crash testing, plastic signs and sign supports caused only minor windshield damage, no occupant compartment intrusion or deformation, and no dangerous debris, making these devices less hazardous in crashes than traditional road signs. In addition, the signs are easily portable.

Lighted raised pavement markers

Lighted raised pavement markers (RPMs) provide greater visibility in work zones than traditional temporary pavement markings such as pavement marking tape. Lighted RPMs are especially helpful in delineating crossovers in work zones, significantly reducing vehicle speeds, and increasing the number of passenger cars that stay in the correct lane.

Ground-mounted and illuminated, RPMs can be operated in flashing, racing, or steady-burn modes.

MwSWZDI research showed that installation and removal of RPMs is hassle free; however, extensive cabling required to power the lights could be problematic in some areas. Solar-powered units are also available and may solve this problem.

Direction indicator barricades

Direction indicator barricades direct traffic more clearly through a crossover. Arrows and lights make these barricades more visible than traditional drums, making needed lane changes more quickly apparent to motorists. The barricades are designed to collapse and lay flat when struck by a vehicle and

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Employees in Stan's shop particularly enjoy seeing new equipment at the vendor displays. Product and process demonstrations are also valuable. Demonstrations like the one of the Missouri Department of Transportation's scrub seal operation give Expo participants an opportunity to see the products and processes that have been developed in other parts of the country. Ron Johnston summed up his feelings about the Expo: "You're on the right track. Keep it up." •

will not bounce into traffic or the work zone, making them safer than traditional barricades.

MwSWZDI research showed that plastic direction indicator barricades provided better visibility, more positive guidance, greater portability, and improved recoverability than conventional barricades.

Flashing stop/slow paddles

Flashing stop/slow paddles grab drivers' attention, making them concentrate on the work zone they are entering and increasing the safety of the flagger. The flashing paddle, developed under SHRP, incorporates a high-intensity flashing light on the stop side of the paddle. The flagger activates this light when a driver does not appear to be paying attention to the sign. The light is strong enough to be seen on even the sunniest days.

New designs of the device are more durable and less cumbersome, resolving previous concerns about this product. In addition, the batteries now require less frequent recharging.

Highly visible worker apparel

The Iowa Department of Transportation now issues new style fluorescent yellow-green safety vests to road workers. The bright color increases workers' visibility in all lighting conditions.

Traditional orange construction clothing can blend in with orange machinery and signs in the construction zone. The new yellow-green clothing differentiates workers from the work site. Motorists are more likely to slow down once they recognize an object as a human being, creating a safer environment for road workers.

Portable traffic signals

Flagging is often required to control traffic in work zones, resulting in an increase in staffing and training needs and a decrease in worker safety. One potential alternative to flagging is user-friendly temporary traffic signals.

These units are mobile, wireless, rapidly deployable, and easily programmable. Since the units are solar and battery operated, no auxiliary power source is needed. Setup time from arrival on the job to operation can be as little as a few minutes.

For more information

Contact Tom McDonald, 515-294-6384, tmcdonal@iastate.edu. Additional information on work zone safety research and products is available from the National Work Zone Safety Clearinghouse website, wzsafety.tamu.edu/. •

Midwest states study work zone safety products

ACCORDING TO the Midwest Smart Work Zone Deployment Initiative (MwSWZDI) website (www.matc.unl.edu/project/), the goal of the study is to "develop better ways of controlling traffic through work zones, which improves the safety and efficiency of traffic operations and highway workers." The research determines the safety and operational effects of particular products and develops recommendations for the products' future use.

The MwSWZDI is a pool-funded study between the Iowa, Kansas, and Missouri departments of transportation, the Nebraska Department of Roads, the states' divisions of the Federal Highway Administration, and the Mid-America Transportation Center at the University of Nebraska-Lincoln.

Iowa, Kansas, and Missouri evaluated removable orange rumble strips and found them to be satisfactory because they reduced speed and the number of vehicles remaining in a closed lane. The researchers, however, recommended that the thickness of the strips could be increased to cause a greater effect on large trucks. All three states also determined that installation and removal of the strips were quick and easy.

Kansas evaluated the Lightguard System, lighted raised pavement markers (RPMs) used to accentuate crossovers in work zones. By more effectively delineating the crossover, the RPMs in this study resulted in improvements in lane-keeping and substantial speed reduction. The Kansas research recommends continued studies into the effectiveness of various flashing modes and effectiveness of the lighted RPMs in long-term situations.

The Kansas evaluation of the Vertical Safetycade direction indicator barricade showed that the positive guidance of the barricades was superior to traditional drums; however, the researchers observed no statistically significant speed reductions. The study recommends that the barricades be used with weighted boots in all characteristically windy or high-speed locations.

More information on MwSWZDI is available on the Mid-America Transportation Center website, www.matc.unl.edu/research/mwswzdi/. For information on the products listed here and the specific products tested, see the online version of the *MwSWZDI Year One Report*, www.matc.unl.edu/project/. •



Flashing stop/slow paddles grab drivers' attention more effectively than conventional paddles. Photos courtesy of Peter Hatzi, Federal Highway Administration.



Sign supports meeting NCHRP-350 crashworthiness guidelines are less dangerous to motorists in crashes. Photo courtesy of S-Square Tube Products.