



2006

Priority, Market-Ready Technologies and Innovations

Notch Wedge Joint Maker – Shoulder Wedge Maker – The Safety Edge

Problem:

Unsafe pavement edges and deteriorating road joints create unsafe driving conditions.

Keeping motorists safe means monitoring pavement conditions. Sharp drop-offs and potholes cause drivers to overcompensate and lose control and cost highway agencies millions of dollars every year to maintain.

Drop-offs

Pavement drop-offs have long been a safety concern for transportation departments, particularly on secondary roads. Vertical drop-offs of two or more inches are considered dangerous. When an errant vehicle leaves the lane, drivers can over-steer in an attempt to re-enter the roadway, losing control of the vehicle in the process. The presence of drop-offs can introduce tire scrubbing and loss of vehicle stability resulting in collisions with oncoming traffic or fixed objects such as trees or cause the vehicle to overturn.

Longitudinal Joints

Studies have shown that the number one cause of asphalt mat deterioration is the failure of the longitudinal joint. The two vertical lifts created when an asphalt mat is laid down using conventional techniques create voids, which allow water to seep into the joint, causing erosion. Over time, this erosion can lead to potholes, increasing maintenance needs and shortening pavement life.

Putting It in Perspective:

- In a study by Dixon et. al. (2005) it was estimated that in 38 of 69 (55%) non-state system fatal crashes in Georgia in 1997, edge rutting or edge drop-off was present. Of the 38 sites where drop-off was present, edge drop-off appeared to be one of the crash causal factors for 21 of the sites. *
- In a AAA report, it was found that potential pavement edge drop-off related crashes made up 17.7% of run-off-road crashes in Iowa and 24.5% in Missouri on rural paved roadways.**
- According to the Federal Highway Administration, it is estimated that 11,000 Americans are injured and 160 die every year in crashes related to unsafe pavement edges.
- Tort liability claims due to run-off accidents cost millions each year.

* Dixon, K. The Pavement Edge Drop-off Crash Problem in Georgia. (2004). Paper presented at the Federal Highway Administration Workshop, February 11, 2004.

** Hallmark, Shauna L., David Veneziano, Tom McDonald, Jerry Graham, Karin M. Bauer, Rushi Patel, and Forrest M. Council. Safety Impacts of Pavement Edge Drop-off. AAA Foundation for Traffic Safety. 2006.

Solution:

Shoulder Wedge Maker, Notch Wedge Joint Maker and The Safety Edge

The Shoulder Wedge Maker (SWM), which produces a pavement edge shape referred to as “The Safety Edge” (TSE) is a device that can be mounted onto a road paver to produce a pre-compacted extruded wedge on the shoulder edge of a paved mat, forming a horizontal angle of approximately 30 degrees. The SWM creates a fillet that enables vehicles to transition from the paved lane to the shoulder area and back with little or no loss of control, reducing accidents associated with road edge run-off.

Similarly, the Notch Wedge Joint Maker (NWJM) can be attached to the face of a paver’s screed extension against the endgate that produces what is commonly known as a Michigan Wedge Longitudinal Joint. The NWJM forms a tapered wedge at the centerline longitudinal joint area to provide a smooth transition from the unpaved to the paved lane. The NWJM also builds a ½ to 1 inch (depending on maximum stone size) notch or step to avoid a feathered joint that is susceptible to raveling. For closing the joint, the NWJM provides an extrusion configuration that compacts the joint for increased density.

Successful Applications

In New York, the SWM has been used primarily on secondary roadways where shoulders are gravel and drainage is poor. Currently, a 7 State pool-fund is evaluating the safety benefit of the SWM and will attempt to quantify the safety benefits and translate those benefits to cost savings. Nearly a dozen other States have used the SWM and have found it to be a very easy to use, cost effective way of making shoulders safer.

The NWJM has also been used in several States, including New York and Pennsylvania. It is estimated that the NWJM saves between 30-40% in paving costs as a result of less lane closures, reduced numbers of traffic pattern changes, and the reduction of non-productive movement of equipment, signage and personnel. In addition to the standard NWJM, a thin lift NWJM is available for agencies that are using thinner lifts because of budget constraints.

Both the Notch Wedge Joint Maker and the Shoulder Wedge Maker are manufactured by TransTech Systems, Inc. The Federal Highway Administration Office of Safety also has materials available documenting the cost, construction, and benefits of The Safety Edge.

Benefits

- Low cost – a Shoulder Wedge Maker has a retail cost of \$4,200 and a Notch Wedge joint Maker has a retail cost of \$6,200.
- Additional asphalt material costs are less than 1% of resurfacing budget.
- Allows lanes to be open while waiting for backfilling to be completed.
- The Shoulder Wedge Maker serves as back-up protection in the event of erosion of shoulder material.
- Reduces maintenance and extends pavement life.
- Reduces tort liability.
- Increases safety.

Additional Resources

Additional information about Shoulder Wedge Maker, Notch Wedge Joint Maker, and the Safety Edge is available at www.aashtotig.org

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