

IOWA DEPARTMENT OF TRANSPORTATION **RESEARCH**news

BUREAU OF RESEARCH AND TECHNOLOGY

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Longitudinal joint forming in plastic portland cement concrete (PCC)

Field research results of forming the longitudinal joint in a PCC pavement, as a part of the paving process, are very encouraging. The research is being conducted jointly between Iowa DOT Office of Materials and Fred Carlson Co., Inc. of Decorah.

Instead of the conventional method of sawing the hardened concrete to create a joint, the research method involves forming the joint in the wet concrete with a vibrating knife mounted

under the paver. The joint would be 1/8 inch wide by 3 inches deep. However, after finishing and texturing the PCC surface the joint becomes invisible. During the concrete maturing process, a longitudinal hairline crack develops along the weakened plane/path created by the knife.

This very low-cost method of putting joints in the concrete before it hardens is replacing both the expensive conventional longitudinal joint sawing and need for joint



sealing. Current costs for the conventional method of constructing the longitudinal joint, by sawing and sealing, are estimated to be from 50 cents to one dollar per linear foot, depending on variations in aggregate types and sealing material costs.

After the initial investment of several hundred dollars for materials and fabrication of the joint-forming knife, the actual joint forming costs are negligible.

The research method eliminates the conventional paving operations of joint marking, sawing, air-blast cleaning, backer rod material and installation, hot-pour sealing material and installation, and inspection time.

Cores taken from a formed joint

Construction cost savings estimated for a typical five-mile primary PCC paving project, using this research method, could be \$15,000 to \$25,000. Approximately 3,000 feet of joint was formed in 2001 and 150,000 feet in 2002.

This new method of longitudinal joint construction should also eliminate future maintenance joint resealing costs.

For more information, contact Bob Steffes, Assistant to the Research Engineer, 515-239-1392, E-mail: robert.steffes@dot.state.ia.us

Message from the Research and Technology Bureau Director

Welcome

This is the first edition of the Iowa DOT *Research News*. Its purpose is to share exciting research progress with transportation professionals and other interested entities throughout the state and nation. The Iowa Department of Transportation is committed to being part of the solution to meet our global transportation challenges through research and implementation of its findings.

This newsletter will be published on a quarterly basis. Each issue will highlight several current research projects. Highlighted projects will demonstrate both the depth and diversity of the overall Iowa research program. They are conducted by Iowa DOT staff, university researchers, the Iowa Highway Research Board and through pooled fund studies in association with other states.

Sandra Larson, Director
Bureau of Research and Technology

New parking option on Iowa's primary highways in small towns



"The diagonal parking option is an example of how research helps DOT staff be more flexible as we apply context sensitive design in communities. It's important to the districts as they work on primary urban extension projects and will become more so as we invest more in this type of work. We can consider the unique circumstances of each community," says Tom Welch of the Office of Traffic and Safety (OTS).

Iowa DOT's Design Manual has discouraged diagonal parking on primary highways due to safety concerns. The data seemed related mostly to metropolitan areas, so the OTS commissioned a study to find out how small towns are affected.

The Center for Transportation Research and Education at Iowa State University conducted a study of diagonal parking on primary highways in small Iowa towns. Parking-related crashes were studied for segments with diagonal or parallel parking on both sides.

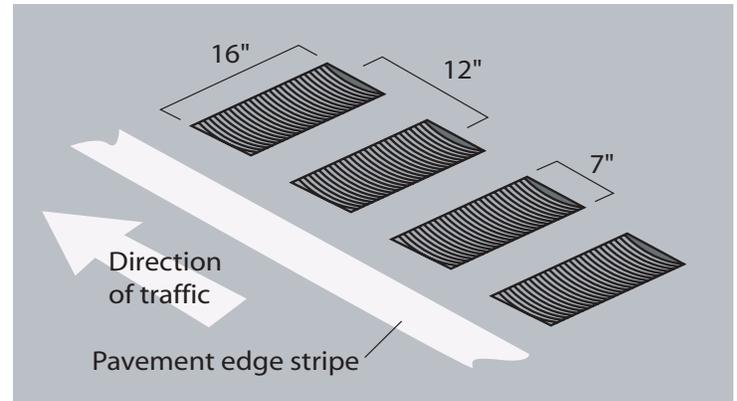
The parking-related crash rate was about 0.3 crashes per million entering vehicles (MEV) for each type of parking. Sight distance at intersections can be affected by parking. When intersection crashes were factored into the calculations, the rates did not show a significant difference.

These results indicate diagonal parking may be an acceptable parking alternative on a primary highway in some small Iowa towns. Each roadway should be evaluated individually. Does the road have an existing high parking-related crash rate? Will moving parking farther away from intersections and alleys mitigate those crashes? Flattening the angle of the diagonal parking is also an alternative to consider. Engineering judgment is required for each project.

For more information, contact Tom Welch, Office of Traffic and Safety at 515-239-1267.

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Milled shoulder rumble strips for increased safety



About one-third of traffic fatalities in the U.S. are a result of crashes where a single vehicle runs off the road. One of the most effective measures that can be taken to prevent vehicles from running off the road is the shoulder rumble strip. Shoulder rumble strips can alert sleepy or inattentive drivers that are leaving the roadway. They also provide additional delineation and warning when visibility is poor.

A new shoulder rumble strip design was constructed for the first time in Iowa on U.S. 20 in Buchanan and Delaware counties this fall. The new design is milled (cut) into hardened pavement. The department's current shoulder rumble strips are rolled or formed into the pavement before it has hardened.

The wider shape of the new design provides superior performance. A vehicle's tires drop slightly into the rumble strip pattern creating more noise and vibration. The wider shape also makes the rumble strips more noticeable to trucks and other vehicles with large tires.

Other states have discovered that, with benefit cost ratios between 30:1 to more than 60:1, rumble strips

proved more cost-effective than other safety features, including guardrail, culvert-end treatments, and slope flattening. See FHWA's Web site at <http://safety.fhwa.dot.gov/programs/rumble.htm> for more information.

Some states have experimented with centerline rumble strips to prevent head-on collisions. There have also been test projects with pavement markings installed down the center of the rumble strips, which slightly angles the markings towards the driver, making them more visible at night. Iowa's Transportation Commission has approved safety funding for a centerline rumble strip pilot project in Iowa.

For more information, contact Will Stein at 515-239-1402, E-mail Will.Stein@dot.state.ia.us

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The Bureau of Research and Technology enhances Iowa DOT's ability to deliver efficient and effective transportation services by actively promoting research partnerships, knowledge and technology transfer, Intelligent Transportation Systems (ITS) and information technology.

For more information, see www.dot.state.ia.us/research/index.html or call Carol Culver at 515-239-1208.

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