H-167

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: April 13, 1979

Forwarded to:

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Chairman
Kansas Turnpike Authority
Southeast Station
Box 18007
Wichita, Kansas 67218

SAFETY RECOMMENDATION(S)

H-79-25 and -26

On November 5, 1978, at 8:46 a.m., an eastbound 1974 Ford Pickup truck crossed the median and collided nearly head-on with a westbound 1973 Chevrolet Monte Carlo, which was towing a Chevrolet Vega, on the Kansas Turnpike (I-70) at Milepost 208 (approximately 1 mile west of the Lawrence Service Area) near Lawrence, Kansas. The truck driver and five persons in the automobile died as a result of the collision or the fire which ensued. A sixth occupant of the automobile was injured.

At the accident site, the roadway is a four-lane, divided highway separated by a 20-foot grass median. The eastbound lanes approaching the collision site have a 0° 45' (7,639-foot radius) curve to the left. The speed limit was 55 mph. During June and July 1978 the pavement in this vicinity had been sprayed with a fog seal, which is a maintenance aid used to prolong the life of the pavement surface. At the time of the accident, the pavement was wet.

Investigators noted that the pavement surface in the eastbound lane approaching the accident site appeared to be a dense mixture with few voids and that the surface was smooth and had a low texture depth, which could characterize a pavement with low skid resistance. An eastbound witness, who had been traveling in the outside lane, told investigators that he saw the immediate precrash events and that when he tried to stop his vehicle by applying his brakes, his vehicle immediately rotated 180° clockwise and skidded rearward off the right edge of the pavement. A modified sand patch test, as described in the American Concrete Paving Association Technical Bulletin No. 6, "Interim Recommendations for the Construction of Skid Resistant Concrete Pavement" was made by a Safety Board investigator in the outside lane near the edgeline at Milepost

208. The test indicated that the texture depth was almost nonexistent (approximately 0.0036 inch). Accident data made available to the Safety Board for this roadway from milepost 181 to 231 indicated that 12 percent of the accidents occurred on wet pavement during the first 10 months of 1978.

Currently there are no Federal regulations or guidelines regarding minimum pavement-texture depths. In 1975, Gallaway recommended a minimum surface-texture depth of 0.040 inch. 1/ In 1976, research conducted in France developed five categories of asphalt and concrete pavement based on a sand patch test. 2/ For pavements with texture depths of less than 0.007 inch, this research noted: "Very fine-textured pavements; these pavements are to be prohibited." This low texture depth would offer little resistance to prevent a vehicle from skidding on wet pavement at a speed in excess of 40 mph.

Additionally, in the area of the left curve, visual observations suggested that the eastbound lanes had a negative superelevation, i.e., left (median) edge line higher than the right (outside) edge line. Physical measurements taken by a Safety Board investigator at 50-foot intervals extending for 600 feet west from the point of impact confirmed this observation (-0.010 ft/ft superelevation). The American Association of State Highway and Transportation Officials (AASHTO) "Blue Book" 3/ indicates that a positive (+0.029 ft/ft) superelevation would be desirable on a high-speed facility of this type. The negative superelevation combined with a wet surface with a low skid resistance would increase the potential for vehicles to skid. The Safety Board believes that positive superelevation is not only desirable, but is needed.

About 1 month after this accident, the Kansas Turnpike Authority grooved the eastbound lanes from approximately Milepost 207 to 209, which should improve the surface condition at that location. However, it appears, through visual observation, that other segments of the Kansas Turnpike also have geometric and surface conditions similar to this location before it was grooved.

Currently, the most widely accepted method most highway agencies use to determine skid resistance of pavement is the use of a locked-wheel skid trailer. Results obtained from this device can be compared to guidelines in the Federal Highway Administration's Highway Safety Program Manual No. 12 to determine where analysis for corrective treatment may be necessary.

1/ "Tentative Pavement and Geometric Design Criteria for Minimizing Hydroplaning," Gallaway, et al, February 1975, FHWA-RD-75-11.

2/ "Pavement Characteristics and Skid Resistance," Elsenaar, Reichert, and Sauterey Transportation Research Record No. 622, 1976.

3/ "A Policy on Geometric Design of Rural Highways - 1965," AASHO (1966), pg. 169 (Using an 8-percent maximum superelevation and a design speed of 70 mph).

The Safety Board's investigation has not found evidence that would indicate the pavement surface condition contributed to either the cause or the severity of this accident. However, the Safety Board's accident investigations in the past have shown the potential hazard of highways with low skid resistance when wet. For this reason, we believe the potentially hazardous conditions identified in this investigation warrant correction.

Therefore, the National Transportation Safety Board recommends that the Kansas Turnpike Authority:

> Conduct an engineering study of this and all similar locations to fully evaluate the skid-resistance properties of the pavement as compared to the recommended skid values contained in Highway Safety Program Standard No. 12. (Class II, Priority Action) (H-79-25)
>
> Survey the existing superelevation on the curves of the Kansas Turnpike and compare these findings to currently accepted AASHTO standards to determine where corrective treatment may be necessary. (Class II, Priority Action) (H-79-26)

KING, Chairman, DRIVER, Vice Chairman, McADAMS and HOGUE, Members, concurred in these recommendations.

By: James B. King
Chairman