



Construction & Materials Tips

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Further Information on NRMs and DMS-11000

In an earlier issue of the Construction and Material Tips Newsletter, an article discussed recycling waste materials as substitutes for conventional roadway materials and Departmental Material Specification (DMS) 11000, *Guidelines for Evaluating and Using Nonhazardous Recyclable Materials (NRMs) in TxDOT Projects*. The department developed DMS-11000 as a guide to evaluate and confirm that liability risks posed by the use of an NRM are minimal. TxDOT requires that NRMs must be certified that they have undergone an evaluation in accordance with DMS-11000.

TxDOT exempted a number of NRMs from the certification requirements of DMS-11000, including crushed concrete, reclaimed asphalt pavement, fly and bottom ash from electrical utility plants, blast furnace slag, tire rubber, plastics, ceramics, and glass. However, DMS-11000 still requires certification of these materials if the inspector or engineer believe they have come in contact with hazardous materials. For example, recycled glass cullet from bottle recycling is more likely to be free of hazardous contaminants than glass generated from the recycling of florescent and high-intensity discharge lamps, which is often contaminated with heavy metals such as mercury. Crushed concrete from a known source such as a highway project may be free of hazardous constituents while crushed concrete originating from chemical facilities or spill sites may contain hazardous constituents. In addition, some crushed concrete manufacturers blend wastes (NRMs) into their crushed materials as "binder" materials. These "binders" must be evaluated in accordance with DMS-11000 because their presence affects the environmental quality of the crushed concrete product.

Source control of all materials is the key to identification of NRMs and their evaluation.

Does Smoothness Really Matter?

While safety is the most important indicator of pavement performance, roughness (the lack of smoothness) is the primary measure used to determine if a pavement has "failed" or is not performing as desired. Engineers often overlook the value of smoothness and focus on durability and strength. These are important characteristics, and they are needed to "keep a smooth pavement smooth" over time. However, if the pavement provides strength and durability at the expense of smoothness, the pavement has not met an essential customer requirement.

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Think about the last really rough road you drove over. You may remember where the road was (presumably not in Texas), but you probably did not consider how long the road had been there or the cost to build it. Ride quality makes a big impression. Rarely, if ever, does anyone say, about a highway in another state, that “their roads are really cost-effective,” or “their roads really last a long time.

In almost every survey about pavement performance, ride quality (smoothness) ranks as the number one priority. The traveling public values ride quality over every other pavement performance attribute.

TxDOT’s ride quality measurements consistently show that flexible pavements outperform rigid pavements in terms of offering very good ride quality. However, the ride quality of Texas’ flexible pavements is much too low. Ride quality data from several other states (examples: Arizona, Florida, and Georgia) show that these states achieved excellent ride quality on the vast majority of their hot mix pavements (International Roughness Index [IRI] values less than 60 inches per mile). These states report over 75% of their Rural Interstate have excellent ride quality. Currently, in Texas, only about 18% of our Rural Interstate system meets this standard, and only about 4% of our Urban Interstate system meets it (including both flexible and rigid pavements).

National ride quality comparisons indicate that pavements in Texas rank somewhere in the middle when compared to those of other states. While these numbers are subject to scrutiny, considerable improvement in ride quality is needed. TxDOT’s administration has repeatedly stated that improving ride quality in Texas is a priority.

However, ride quality alone should not be used to judge “who has the best roads.” As an example, in a recent national survey, truckers rated Texas highways among the best in the country, as shown in Table 1. This data reinforce what many Texans have always known - that Texas highways are good. Looking at the criteria used in this survey, it could also be stated that our roads are well maintained. Our pavement system is among the best in the country. However, improving ride quality would significantly increase public rankings of our system.

Table 1: Trucker’s Rating of Best and Worst Roads.

States With Best Roads	States With Worst Roads:	Most Improved State Over Last Year	Factors That Were Used For Rating
1. Florida	1. Arkansas	1. Pennsylvania	1. Potholes
2. Tennessee	2. Illinois	2. Louisiana	2. Patches
3. Texas	3. Pennsylvania	3. Texas	3. Cracks
4. Georgia	4. Louisiana	4. Illinois	4. Congestion and traffic
5. Pennsylvania	5. New York	5. Florida	5. Constant Construction
