USE OF THE SKID TRAILER IN DISTRICT 2 FOR THE EVALUATION OF ASPHALT PAVING AGGREGATES

DHT-12

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16. Abstract

District 2 has adopted a policy of skid testing the entire 3,000 miles of highways in its nine county area once every two years. This testing is done primarily to provide, to the planners, information on the condition of the highways within the District. The results are used in prioritizing the many proposed projects. A spin off from this testing is the ability to use the data for materials evaluation.

The results of the skid testing program in District 2 are discussed with conclusions offered.

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by

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District Materials Engineer
October 20, 1988

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USE OF THE SKID TRAILER IN DISTRICT 2 FOR THE EVALUATION OF ASPHALT PAVING AGGREGATES

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District 2 has adopted a policy of skid testing the entire 3,000 miles of highways in its nine county area once every two years. This testing is done primarily to provide, to the planners, information on the condition of the highways within the District. The results are used in prioritizing the many proposed projects. A spin off from this testing is the ability to use the data for materials evaluation.

This testing is done in the early spring: March, April, May. We have chosen this time of year for two reasons. First, by testing at the same time each year we avoid the problem of seasonal variance, a real phenomenon that does affect results. Second, by spring we have had a chance to update our records with the new surfaces placed the previous season.

In times past, there has been a reluctance to obtain skid data because of the legal aspects. Should a road be found deficient in skid value, the Department might be found liable.

We hope that this legal liability has been removed with a recent amendment to "Chapter 4 of Title 23, United States Code." This amendment adds a Section 409 which reads:

> "Notwithstanding any other provision of law, reports, surveys, schedules, lists or data compiled for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 152 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be admitted into evidence in Federal or State court or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists or data."

We, as well as the Attorney General, feel that skid testing is protected under this law.

The skid trailer used by the State Department of Highways and Public Transportation (SDHPT) is owned, controlled, maintained, and operated by regional centers set up throughout the state. In our studies, we have found it to eliminate one of the many variables if we use only one of these trailers. For convenience, we have used the trailer operated out of D-10 in Austin.

We have found that the two-year frequency of testing has worked well for us. During this time, we have received significant vehicle passes to indicate changes if they are going to occur. A four-lane roadway with a 60,000 ADT will experience approximately 5.5 million vehicle passes in each lane each year. A 20,000 ADT, four-lane road would have approximately 1.8 million vehicle passes per lane per year. This two-year cycle also provides an opportunity to place new surfaces into the system.

Our records are organized the same way as most of the state. We use the CSN method of filing information. Each CSN contains information that is peculiar to the surface of the roadway. The section might be one mile long or ten miles long, depending on the surface placed, the date, and the materials used. Organized this way, the data collected are usable by both the surface improvement planner and the materials analyst.

There was a time that the Hanson method was forced on some of the Districts. This method used a filing system that ignored pavement type, materials used, date placed, etc., much the same as our Pavement Evaluation System (PES) does today. We have found no way to use this filing system for materials studies.

The processed data, produced by the main-frame skid program, will contain the following:

A. Location

1. The control and section
2. Highway
3. A verbal set of limits
4. A unique Construction Section Number (CSN)
5. Length of section
6. Beginning and ending mile points

B. Construction data

1. Type pavement
2. Construction date
3. Materials used

C. Skid data

1. The date, direction of travel, and skid value
2. The accumulated ADT from date pavement placed
3. A listing of the last six sets of data

We have taken the data from the tests made in the spring of 1986 and plotted them – Skid Number vs Million Vehicle Passes. The Skid Number (SN) is read directly from the report. The ADT is divided by the number of lanes to determine the Million Vehicle Passes. A distribution factor is used for multi-lane highways outside the urban area.

Figure 1 gives an idea of the data that are generated by one year's skid results. Each of the data points shown represents the average of the individual tests taken on a particular CSN. One CSN may produce a maximum of six data points, depending on the number of times it was tested. This graph shows only data for asphaltic pavements.

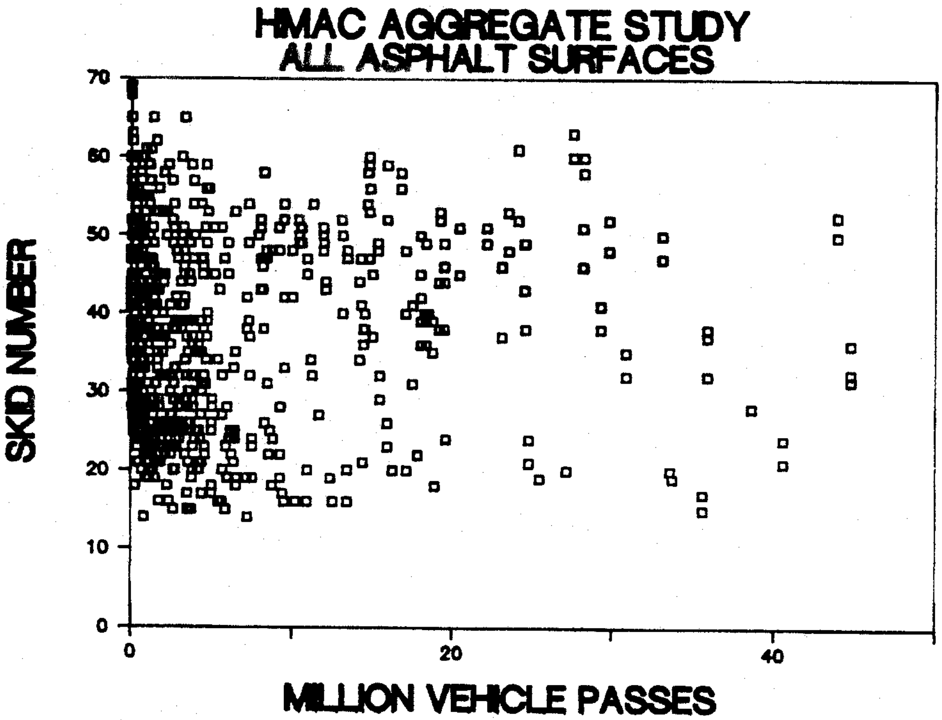

Figure 1

Figure 2 is a plot of hot mix pavements using our local North Texas limestones. These limestones have a polish value (PV) of approximately 26 to 29. The graph shows that under traffic the Skid Number will in time approach the Polish Value. In this case, it reduced to approximately 22.

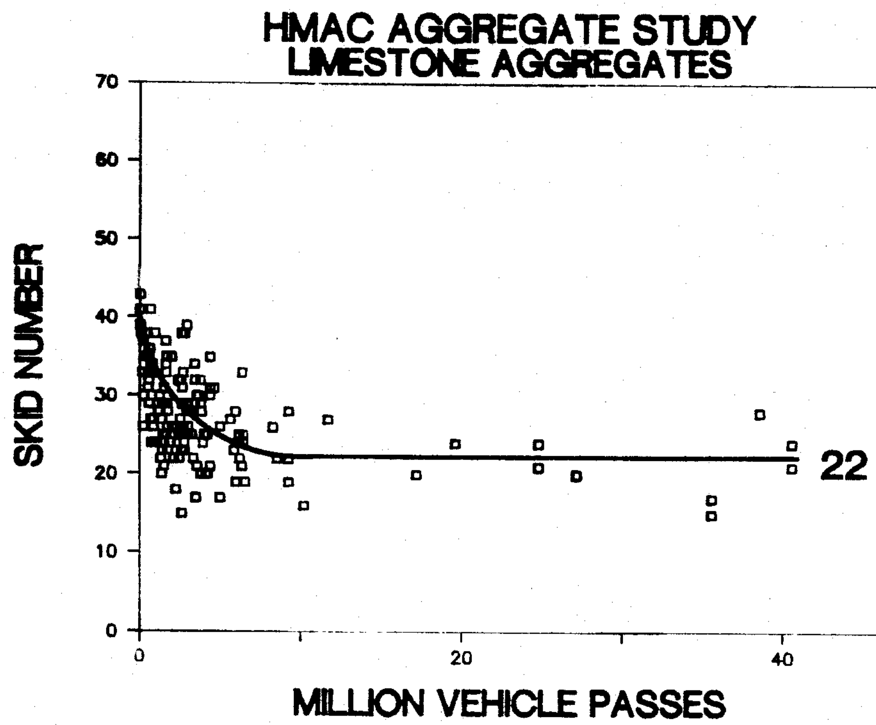

Figure 2

When the polish value requirement first became popular, we searched for anything that would give us the required value. In this search we discovered, the hard way, that PV alone did not describe the skid characteristics of the aggregate. Figure 3 illustrates examples of two aggregates that fit this category. Figure 3 also compares these high PV aggregates with the local limestones shown in figure 2. In time we found that we also needed to specify the magnesium sulphate soundness value to qualify acceptable aggregates. The high PV aggregates portrayed in figure 3 had a magnesium sulphate soundness value in excess of 30.

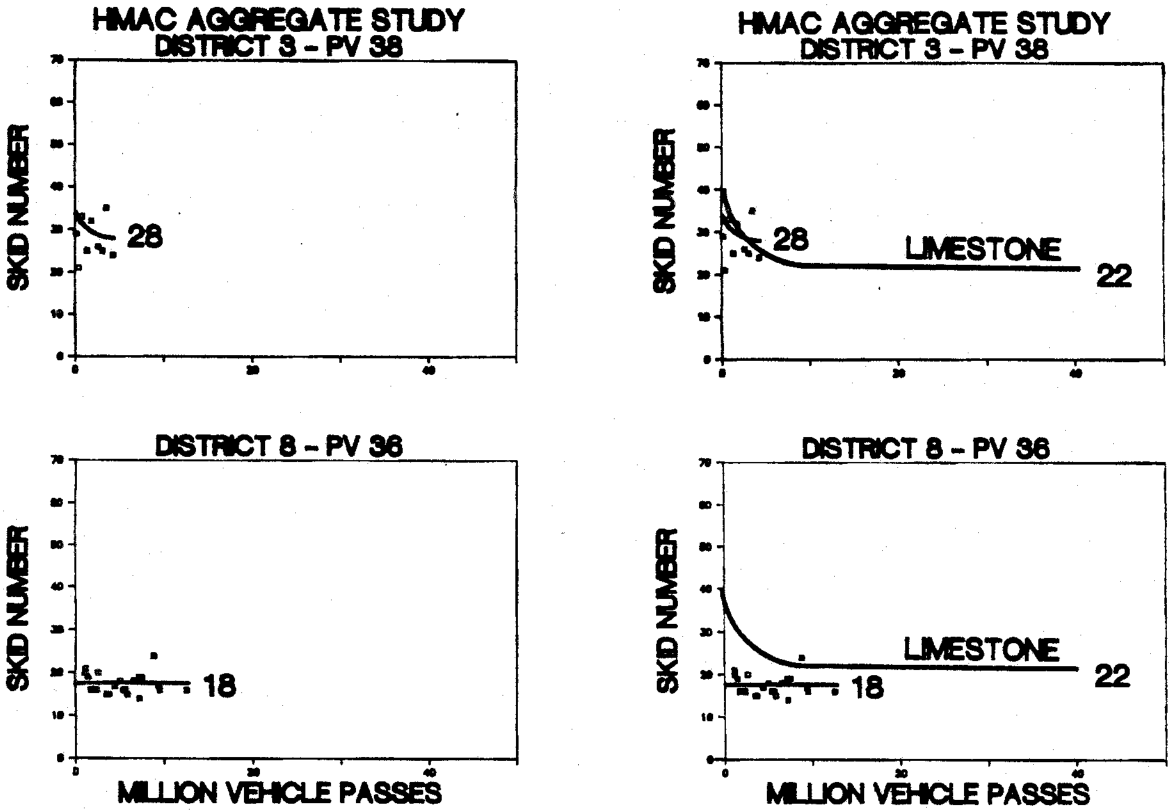

Figure 3

Figure 4 shows the results of using a single source aggregate with a good PV. The Skid Number has remained approximately 44 over its entire life. The PV of these aggregates ranged from 40 to 48.

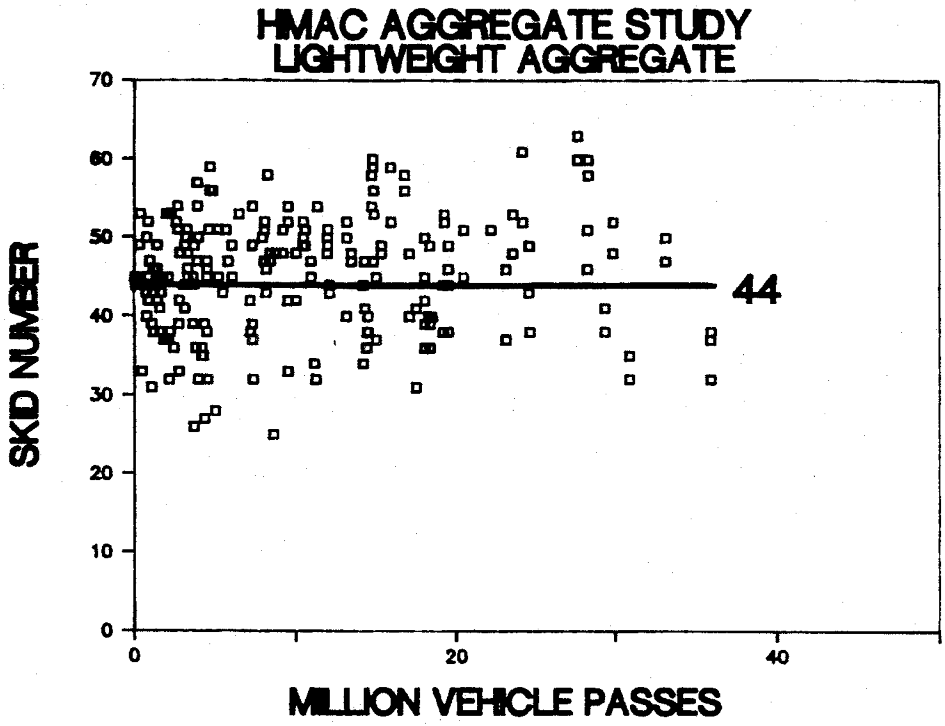

Figure 4

Blending of aggregates was thought to be a means to reduce the cost of this PV requirement. Common blends were a combination of limestone with a higher PV aggregate such as lightweight, rhyolite, and dolomitic limestone. A study of the actual cost savings of blending limestone and lightweight aggregate has shown a materials savings of only 3¢ per square yard per inch of mix (Figure 5). This translates to an approximate one percent overall savings for hot mix in Tarrant County. This savings is hardly worth the additional problems created by the blend.

Apparent Cost Savings with Blended HMAC (Tarrant County)

	Cost / SY	Cost / Ln Mi
Lightweight HMAC	$1.72	$12,108
Aggregates Savings by Blending	$0.03	$176
Apparent Savings		1%

Figure 5

From a production standpoint, blends are quite difficult to control. In blending a lightweight with a limestone, the tendency is to cut back on the lightweight. Inadequate blending of these two materials is normally detectable in the specific gravity of the daily test molds. It is also seen on the road in the form of fat and lean mixes. When blending aggregates of the same specific gravity, the only control of the blending rates is in the cold feed settings.

In time the blends take on the skid characteristics of the lesser stone, the limestone, as shown in figures 6 & 7. The Skid Numbers are approaching that of the limestone and significantly less than those shown for the single aggregate in figure 4.

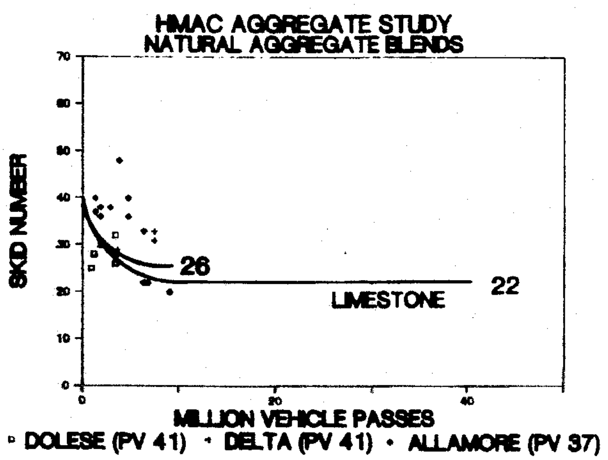

Figure 6

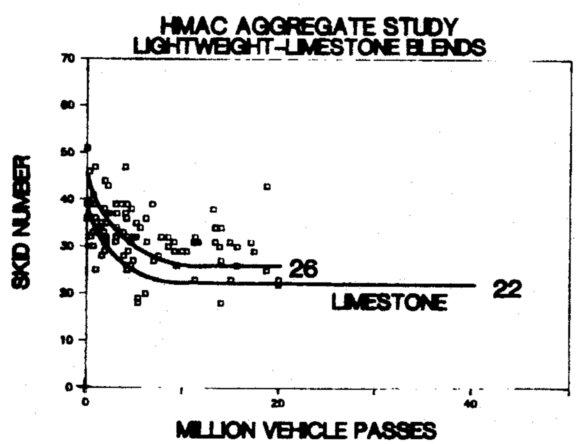

Figure 7

Figure 8 depicts the history of Plant Mix Seals (PMS) in our area. We have been using them with a single source aggregate since 1973. They have worked well and have held a high Skid Number. We have had our longest experience with a rhyolite aggregate from near Allamore, Texas. This pavement is still in service today, just outside the District 2 office. It has been down for about fifteen years with an ADT of 60,000 vehicles per day.

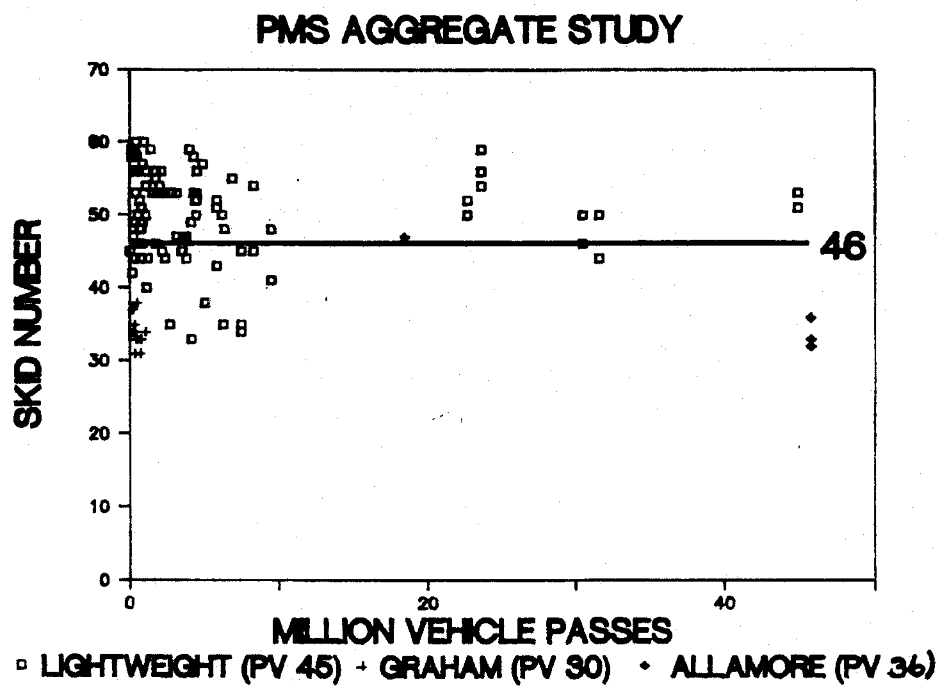

Figure 8

Figure 9 shows the small savings that might be realized by blending aggregates for PMS.

Apparent Cost Savings with Blended PMS (Tarrant County)

	Cost / SY	Cost / Ln Mi
Lightweight PMS	$1.28	$9,011
Aggregates Savings by Blending	$0.04	$265
Apparent Savings		3%

Figure 9

Seal coats are also tested for their Skid Number. Figure 10 depicts the results of this testing. The data show the long time results to be somewhat better for the high polish value material. The Skid Numbers are, however, a good deal lower than for hot mix with the same number of vehicle passes. This difference is probably due to factors other than the PV of the aggregate.

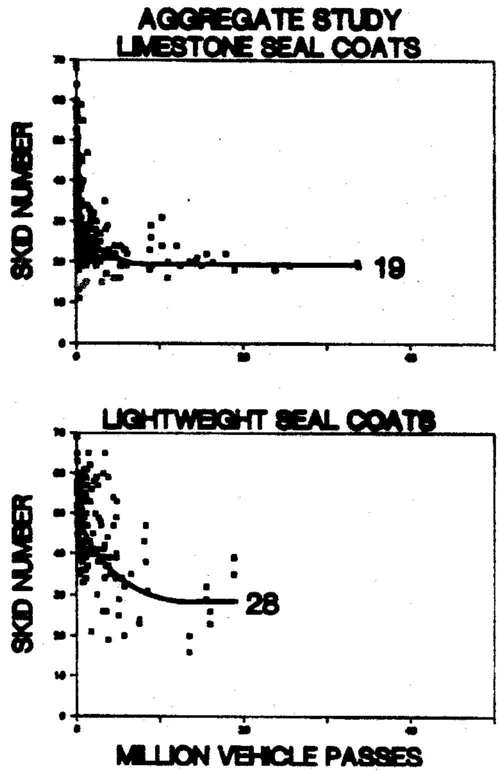

Figure 10

From the results of our skid testing program in District 2, we would offer the following conclusions:

1. Skid testing should be done on a regular basis. It should cover all roads, not just select pavements.
2. Testing should be done with the same machine and at the same time of year.
3. Results of skid testing should be made available to those responsible for planning surface improvements.
4. Polish Value alone is not sufficient to describe the anti-skid quality that is needed in an aggregate. A magnesium sulphate soundness requirement is also necessary.
5. Blending of aggregates, to increase the overall PV of a mixture, is a poor practice from the standpoint of economy and value to the road. Each individual aggregate should be required to meet all quality tests.
6. For seal coats, factors other than the PV cause the SN to reduce to a level less than that of hot mix. The higher polish value aggregates give substantially higher skid values.