FEATURE ARTICLES

SEAL COAT EVALUATION PROCEDURE

The Subcommittee "Evaluating Surface Treatment Performance" of the "Bituminous Surface Treatment" Committee has reported on the development of a quick and inexpensive (no mechanical equipment needed) method of measuring the condition of seal coats. This method can be readily adapted to determining the time when a pavement needs to be resealed. This report is being circulated in order that the committee might learn if similar procedures are being used. If the following procedures or any other procedure is used this summer for determining the condition of seal coats and surface treatments, the committee would appreciate being notified of the work and of the results. Information should be sent to the originator of this procedure, Robert A. Crawford, Research Engineer, South Dakota Department of Highways, Pierre, South Dakota.

The purpose in making a condition survey of seal coats is to determine to what degree the seal coat is performing the task for which it was intended. Before it is possible to evaluate the performance of a seal coat, it is necessary to know just what these intended tasks are. In general, bituminous surface treatments should perform the following functions:

1. Prevent entrance of moisture and air into the underlying road surface.
2. Develop a surface texture more resistant to skidding than the existing surface.
3. Enliven an old dry or weathered surface with fresh bituminous binder.
4. Reinforce or build up (to a limited extent) a weak or inadequate pavement.
5. Improve the luminosity of the pavement or the night-driving characteristics of the road.
6. Provide demarcation between road segments, especially between driving surface and paving shoulders.
7. Improve surface irregularity and overall appearance of the pavement surface.
8. Provide an abrasion-resistant surface.

In addition to these eight purposes it appears that seal coats are frequently placed primarily for improving the appearance of the pavement surface, especially on surfaces that have been extensively patched.

With these purposes in mind this procedure was written to establish a system of rating seal coats through visual inspection only. It is an attempt to

evaluate the success of a seal coat in performing the major functions for which it was intended by rating five factors independently. The factors are as follows: (a) chip retention, (b) skid resistance, (c) uniformity of application, (d) cracking, and (e) bleeding.

Through the evaluation of these factors it is not only possible to determine how well a seal coat is performing its major functions but also to determine in which of these five categories various types of seal coats excel.

To rate a seal coat it has been found that better agreement between raters can be obtained if small sections of highway are rated separately and an average of these values is taken as the rating for the project. The length of section can be varied depending on the length of the project and the time available for rating. A length of one mile has been selected as a practical rating length in South Dakota for ordinary projects. Experimental projects are usually shorter, hence, shorter rating lengths are used. However, for projects constructed using standard materials and standard construction practices a length of one mile is used. The rater drives over one mile of road, stops and assigns numerical rating to that mile of road. This procedure is than repeated for the second mile, third mile, etc., until the entire length of the project has been covered. If the last section of the project is over one-half mile in length it is considered to be a full mile for rating purposes; however, if the last section is less than one-half mile in length its rating is included in the rating of the last full mile rated. Numerical ratings are assigned to each one-mile section based on the following descriptions:

1. CHIP RETENTION

Rating	Description
16-20 Excellent	Surface has an even distribution of chips; however, a slight, evenly distributed loss of chips may be evident. Figure 1 shows a project with excellent chip retention which would rate 20 unless an evenly distributed loss of chips is evident as in Figure 2. In this case the rating would be lowered to 18 or 19 and if the loss of chips is more pronounced a rating of 16 or 17 should be assigned.
11-15 Good	Some chip removal is evident by lighter chip coating in the center of the road, in wheel lanes, or a generally evenly distributed loss is apparent (Fig. 3).
6-10 Fair	Loss of chips is evidenced by a considerable loss of chips in the wheel lanes or other short sections. Ridging may be noticeable (Figs. 4 and 5).
0-5 Poor	Entire areas of the surface are void of chips for all practical purposes (Fig. 6).

2. SKID RESISTANCE

Rating	Description
16-20 Excellent	Chips are adequate to provide a satisfactory skid resistant surface. Figures 1, 2, and 3

Figure 1.

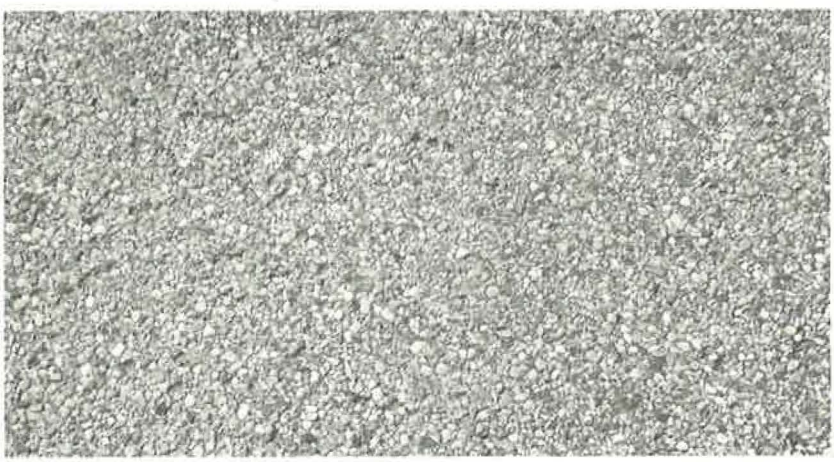

Figure 2.

Figure 3.

Figure 4.

Figure 5.

Figure 6.

2. SKID RESISTANCE
(Continued)

Rating	Description
16-20 Excellent	show pavements which would provide adequate resistance to skidding.
11-15 Good	Chips are adequate to provide a satisfactory non-skid surface except in short areas of bleeding or where there has been a loss of chips. Figures 4 and 5 show chip loss conditions which may result in a loss in skid resistance. Figure 7 shows an area of bleeding in the wheel lanes which would reduce skid resistance.
6-10 Fair	Loss of chips, polishing of aggregate or bleeding has resulted in sections of the surface being slippery. If the conditions shown in Figures 4, 5, and 7 are more extensive as in Figures 6 and 8 or if aggregate polishing occurs as shown in Figure 9 the resistance will rate in the fair category.
0-5 Poor	Lack of chips, extensive bleeding, or polishing of aggregate has resulted in extensive sections where little or no skid resistance is attributed to the surface treatment. These conditions are much like those in the fair category but may be more severe or extensive.

3. UNIFORMITY OF APPLICATION

Rating	Description
16-20 Excellent	Surface texture is uniform both transversely and longitudinally, but a few instances of plugged nozzles on the distributor, a few poor laps or other minor faults may be apparent (Fig. 1).
11-15 Good	Surface texture varies slightly due to changes in application rate, uneven distribution, bleeding or irregular loss of chips (Figs. 10 and 11).
6-10 Fair	Surface texture varies considerably due to changes in application rate, uneven distribution, uneven loss of chips, bleeding or poor laps either longitudinal or transverse. Longitudinal ridges may occur which influence steering control of an automobile. (Figs. 3, 4, and 7).
0-5 Poor	Application was so spotty as to make the surface rough or uneven, longitudinal ridges may exist which seriously affect steering

Figure 7.

Figure 8.

Figure 9.

Figure 10.

Figure 11.

Figure 12.

Figure 13.

Figure 14.

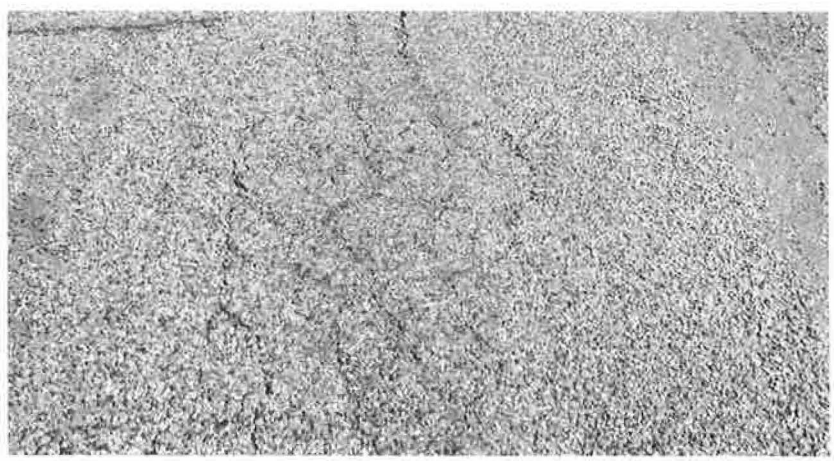

Figure 15.

Figure 16.

Figure 17.

Figure 18.

Figure 19.

Figure 20.

Figure 21.

Figure 22.

CHIP SEAL CONDITION

Job Description_____

Project No._____

Type Oil_____ Rated by_____

Year Sealed_____ Date_____

SECTION	1	2	3	4	5	6	7	8
CHIP RETENTION								
SKID RESISTANCE								
UNIFORMITY OF APPLICATION								
CRACKING								
BLEEDING								
TOTAL SECTION RATINGS								

Figure 23.

SECTION	9	10	11	12	13	14	15	16
CHIP RENTENTION								
SKID RESISTANCE								
UNIFORMITY OF APPLICATION								
CRACKING								
BLEEDING								
TOTAL SECTION RATINGS								

Sum of Section Ratings_____

Number of Sections_____

Average Project Rating = $\left(\frac{\text{Sum of Section Ratings}}{\text{Number of Sections}}\right)$= _____

3. UNIFORMITY OF APPLICATION
(Continued)

Rating	Description
0-5 Poor	and/or there was considerable variation in day to day application (Figs. 6, 12, and 13).

4. CRACKING

Rating	Description
16-20 Excellent	Cracks are either non-existent or consist of a few disconnected longitudinal and transverse hairline cracks with few or no interconnections. Little or no crack filling has been necessary (Fig. 1).
11-15 Good	Transverse and longitudinal cracking has progressed to the point where there are interconnections; no cell development has yet taken place. Crack filling is required (Figs. 11 and 14).
6-10 Fair	Spalling at the edges of cracks has developed and interconnections of cracks have caused cell development (Figs. 15 and 16).
0-5 Poor	Cells have become numerous and are rocked or displaced under traffic (Figs. 17 and 18).

5. BLEEDING

Rating	Description
16-20 Excellent	Bleeding is not noticeable or shows only slight backening in a few small areas (Figs. 1 and 19).
11-15 Good	Bleeding is evident in a few localized areas. Skid resistance has not been materially affected except in these small areas (Figs. 10 and 20).
6-10 Fair	Bleeding is extensive enough in the wheel lanes or short sections to cause some reduction in skid resistance (Figs. 8 and 21).
0-5 Poor	Bleeding is extensive and has practically nullified the purpose of the chips.

Figure 22 shows a road which has been sealed and has subsequently been patched so extensively that much of the seal coat has been covered. In cases such as this the rating should be discontinued.

It has been found that when the rating drops to about 50 some sort of maintenance is usually necessary. If the surface is in good shape a reseal would probably be recommended. However, if the road has cracks (Figs. 17 and 18) it is obvious that other measures are necessary. Likewise, if the road is

obviously unstable and requires frequent patching (Fig. 22) a seal would probably be covered over with patches in a year or two and overlaying or rebuilding may be recommended rather than sealing.

Figure 23 shows the form used in rating all seal coats.