Sudanese Standards & Metrology Organization (SSMO)


Prepared By

Dr. Magdi M.E. Zumrawi, University of Khartoum
Magdi.zumrawi@yahoo.com

April 2013
Contents

1. Scope
2. Objectives
3. Pavement Information
4. Evaluation Stages
5. Experimental Work
6. References
1. Scope

This specification has been prepared to guide pavement maintenance personnel (i.e., engineers, supervisors, and technicians) in the evaluation procedures used to assess distresses in highways surfaced pavements. If a particular distressed pavement appears to be in need of some sort of maintenance, a relatively quick assessment can be made to ascertain the need and, more important, to help in determining the appropriate action. Such an assessment requires an evaluation of existing pavement conditions and a knowledge of future rehabilitation plans.

The information contained herein is based on the most recent research, obtained through literature reviews and current international and local practices.

2. Objectives

All highway surfaces must be kept in a condition suitable for safe travel at the design speed limit. Keeping the surface of all roads in a safe condition is the main priority item. Regular inspections of all paved road surfaces will be carried out by the staff of highway authorities and the maintenance contractor. These inspections will ensure that all areas of pavement failure have been properly identified, signed and repaired.

Breaks or distortions that occur on the pavement’s surface can pose a hazard to traffic and drivers safety; these areas must be inspected and identified immediately. Until the necessary repair work is done, warning signs must be placed on each side of break or distortion area. The hazard must be monitored until repaired. The repair of all serious pavement break areas and distortions must be completed as quickly as possible.

In addition to the daily/weekly routine inspections, all pavements on the highway network will be subjected to a detailed Surface Condition Rating (SCR) every two years. As part of this process, all types and severity of pavement distresses will be identified for the purpose of programming proactive and in some cases reactive treatments.

Cracking, pavement joint separation and potholes, are examples of distresses which if left unattended, will eventually develop into more serious pavement failures. The department and the Contractor will work together to identify these areas for proactive maintenance planning.
Pavement Distresses that would require treatment would such as pot holes, alligator cracking, transverse cracking, wheel path cracking, rutting, raveling, asphalt bleeding and depressions.

3. Pavement Information

While maintenance engineers or supervisors are normally quite familiar with the roads they maintain, a quick review of construction, maintenance, and other records will provide important general information regarding the following:

- Pavement age
- Pavement and geometric design
- Pavement section boundaries
- Traffic
- Climate
- Type and extent of previous maintenance treatments
- Condition rating

After these records are reviewed, a survey should then be performed on a small representative sample of the pavement section, about 150 m, to determine the amount, type, and condition or severity of distresses, as well as the condition or effectiveness of any previously applied distress treatments. A sample survey form for recording pavement and distress information is provided below.
# Pavement/Distress Survey Form

1. **Location and Geometrics**

   - **Highway/road:** ______________
   - **Station of section:** _____________
   - **Number of lanes:** _____________
   - **Length of section:** _____________
   - **Lane widths:** _______________
   - **Shoulder type and width:** ______

2. **Design, Construction and Rehabilitation**

   - **Year of original construction:** ______________
   - **Type and year of most recent rehabilitation:** ______________
   - **Future rehabilitation planned:** ______________

3. **Climate, Traffic and Highway Classification**

   - **Average annual precipitation (mm):** _____________
   - **No. days below 32°F (0°C):** _____________
   - **No. days above 100°F (38°C):** ______
   - **Functional classification:** ______________
   - **Most recent 2-way ADT:** _____________

4. **Pavement Condition**

   - **Type of Distress:** ______________
   - **Density (in 150m section):** ______
   - **Edge deterioration (%):** _____________
   - **Previous treatment?**  Y  N
     - **Material type:** ______________
     - **Effectiveness (%):** _____________
   - **Other distress type:** ______________
   - **Density (in 150m section):** ______
   - **Edge deterioration (%):** _____________
   - **Previous treatment?**  Y  N
     - **Material type:** ______________
     - **Effectiveness (%):** _____________
   - **Other Significant Distresses**
     - **Type:** ______________
     - **Density:** ______________
     - **Type:** ______________
     - **Density:** ______________
4. Evaluation Stages

This specification provides both general and specific information for carrying out each of four primary phases associated with a distress evaluation program. These phases are as follows:

Table (1): Steps in a distress evaluation program

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | Obtain and review construction and maintenance records.  
     | - Pavement age, design, repairs, etc. |
| 2    | Perform pavement/distress survey.  
     | - Record distress types, amounts, and severities. |
| 3    | Field and Laboratory Testing |
| 4    | Determine appropriate type of maintenance for damaged pavement based on density and condition of distresses.  
     | - High density of distresses with moderate to deterioration of pavement surface.  
     | - Moderate density of distresses with moderate to low.  
     | - Low density of distresses with slight effect to pavement. |
| 5    | Select materials and procedures for maintenance operation based on the following considerations:  
     | - Climate (dry or wet).  
     | - Traffic (high, medium, low).  
     | - Distress characteristics (width, level of severity).  
     | - Available equipment.  
     | - Available manpower.  
     | - Cost-effectiveness (anticipated treatment cost and performance). |
| 6    | Conduct and inspect maintenance operation. |
| 7    | Periodically evaluate maintenance performance. |
5. Experimental Work

5.1 General
Field and laboratory testing should include sufficient sampling, testing, and observations to determine the pavement layers conditions and engineering properties of the layers materials. Field work consists of performing field tests such as DCP and taking representative samples of pavement layers. The field and laboratory investigations shall be conducted in accordance with ASTM, BS standards or other accepted procedures.

5.2 Field Work
The field work program includes borings, sampling and field testing. Borings should extend sufficient depth to identify layers of pavement that may be significantly affected by traffic loads. Sampling should be performed at suitable intervals based on road length or road surface conditions, 150m interval is recommended. Disturbed samples of pavement materials should be taken to represent the layers materials. Subgrade of cohesive soils should be sampled using thin-wall Shelby tube samplers. Samples should be sealed and packaged to preserve their integrity, and handled and transported in a manner to minimize disturbance. Samples should be labeled with the following: job number, boring number, sample number, sample depth, and any information regarding sample disturbance.

Field testing with Dynamic Cone Penetrometer (DCP) or any other recognized in-situ tests may be used to determine physical properties of layers materials. The testing procedure shall be in accordance with ASTM standards or other accepted procedures.

5.3 Laboratory Testing
Laboratory testing should be conducted on representative samples to determine physical characteristics of the pavement materials. Testing should be in accordance with ASTM or BS standards. Soils should be classified in accordance with the Unified Classification system. Laboratory tests include Atterberg limits, grain size analysis, compaction and California Bearing Ratio (CBR). Swelling Potential tests for subgrade of expansive clays should be considered.
6. References


