Analysis of Traffic for the Development of Existing Pavement Conditions - A Review

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Abstract: Roads are constructed to perform a service to the road user. In this context, the road needs to provide good traffic ability/possibility under all weather conditions with maximum comfort and at minimum cost and with the highest possible degree of safety. This is defined as the functional performance of the road. The functional performance includes aspects such as the riding quality, the skid resistance and the effective drainage of water from the pavement. The concepts of analysis period and design period require careful consideration during the pavement design phase. The analysis period is a planning period during which full reconstruction of the pavement is undesirable and is a function of the road category but is also frequently related to the roads’ geometric life.

Keywords: Analysis period, Design period, Functional performance

1. Introduction

All roads are designed with a finite life, usually defined by the traffic that the road can carry in terms of the cumulative number of equivalent standard axles. Once this design traffic has been carried, or as a result of premature distress caused by some environmental influence, the road usually needs to be rehabilitated. Prior to any rehabilitation design being carried out, it is necessary to fully assess and evaluate the condition of the road pavement and to identify the reasons for the distress. The time and resources required for these types of investigation are generally limited and costly and thus it is essential that the appropriate information be gathered and that it is presented in a systematic and complete manner.

Traffic flow pattern appears to be random in distribution, as it reflects people’s motivation in terms of different composition of vehicles on different types of roads under varying environmental conditions.

The concepts of analysis period and design period require careful consideration during the pavement design phase. The analysis period is a planning period during which full reconstruction of the pavement is undesirable and is a function of the road category but is also frequently related to the roads’ geometric life. Where the traffic situation on a road is likely to change considerably in the short term, a short analysis period will be used.

A. Typical pavement structures

B. Types of pavement distress

The structural failure of a pavement is usually manifested as rutting, cracking, ravelling and/or shear failure in the pavement. The process is often self-perpetuating in that the development of distress allows the ingress of water into the pavement exacerbating the conditions that may have initially led to the cracking.

The typical distress types associated with functional and structural performance are given as

<table>
<thead>
<tr>
<th>Performance</th>
<th>Distress type</th>
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<tbody>
<tr>
<td>Functional</td>
<td>1. Riding quality</td>
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<td></td>
<td>2. Skid resistance</td>
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<td>3. Surface drainage</td>
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<tr>
<td>Structural</td>
<td>1. Deformation</td>
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<tr>
<td></td>
<td>2. Cracking</td>
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<td></td>
<td>3. Surface disintegration</td>
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</tbody>
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C. Deformation

Deformation often results from subgrade and construction deficiencies and is frequently associated with culverts and embankments. Other typical forms of deformation include depressions and mounds, displacements, corrugations and undulations, all manifested as deviations of the road surface from a uniform flat condition and having a detrimental effect on the riding quality.

D. Cracking

Different forms of cracking can be due to different fundamental causes, so it is vital in the visual evaluation to identify the types of cracking.
of the field evaluation. It is
the most costly component
C. Test frequency
Survey and test pitting and sampling.
Detailed assessment
Pavement deterioration.

3. Results and Discussion
A. Parameters obtained from analyses
Once all the field and laboratory data have been gathered,
they should be compiled into a format that the rehabilitation
design engineer can use with both confidence and minimal
referral to the pavement evaluators.

B. Sensitivity analyses
It is recommended that pavement analyses and rehabilitation
designs should be based on a number of methods using a
range of appropriate parameter values. The parameter values
should reflect conditions that are expected to apply to
seasons other than that during which field-testing was
carried out (particularly if field work was carried out in a dry
season). The reliability of parameters such as traffic and E-
moduli should also be considered.

4. Conclusion
A thorough assessment of structural adequacy makes use of
the following key evaluation activities.

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