CHAPTER 1 - INTRODUCTION

For many years highway engineers and administrators in Brazil have relied on pavement performance models developed mainly in North America and Europe for planning, designing, building and rehabilitating pavements. This is largely a result of the extensive general transportation development and paved highway networks built on those two continents, along with a number of outstanding pavement research projects conducted in those regions.

However, such models have some inherent limitations and are not necessarily directly transferable. Performance prediction models must reflect the conditions to which they are applied and must either be developed from local data or modified and verified based on such data. Brazil represents an excellent example of this need. It has different climatic conditions than the Northern Hemisphere, different subgrade soils and other distinctive factors which affect pavement performance and must therefore be reflected in any useful performance prediction models.

Pavement surface condition, as measured by its roughness, is a major factor influencing road user costs. It is thus important to predict pavement roughness from alternative construction and maintenance standards, so that user costs can be evaluated for each alternative. Maintenance is primarily performed as a response to excessive pavement roughness, cracking and rutting. The latter is related to roughness and has been assigned limiting levels by highway agencies because of the safety hazard it represents to vehicles, especially under wet conditions. Pavement cracking is a risk to the capital invested and, if high levels of cracking are allowed to develop, pavement reconstruction may be required, in lieu of routine maintenance. Therefore, the amount and consequently the cost of timely maintenance will depend on the potential evolution of pavement roughness, cracking and rutting. On the other hand, this potential evolution of pavement attributes depends on the pavement structure, which, in turn, is related to construction costs. Therefore, pavement performance prediction models are an essential technological tool for economic analysis of highways.

The lack of models to predict the performance and behavior of unpaved roads is also apparent (Visser, 1981). A need therefore exists to develop models that predict the deterioration of unpaved roads. These roads are highly susceptible to environmental influ-

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ences such as rainfall, and different material types perform differ-
ently under these influences. Furthermore, performance is also de-
pendent on the strength of the materials.

This volume describes the analysis conducted to develop de-
terioration prediction models for both paved and unpaved roads. The
dependent variables in the paved road analysis are roughness, crack-
ing and rutting, whereas in the unpaved road analysis predictive
models were developed for roughness, rut  depth, and gravel loss.

A number of details regarding methods and organization of
the experiments are described in Chapter 5 of Volume  2 of these 1981
Reports and are therefore not repeated in the present volume.