

ASPECTS OF LOW-VOLUME ROAD RESEARCH IN SOUTH AFRICA

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The Division of Road and Transport Technology of the Council for Scientific and Industrial Research (CSIR) in South Africa has been involved in research and implementation of findings on all aspects of low-volume roads for four decades. It is from this work that the Division has acquired a vast base of knowledge on the unique conditions of the African continent both in terms of the use of materials under different climatic conditions and socioeconomic problems associated with road construction.

The following is a brief outline of the type of work which has already been done and is now being done within the region, both on paved and unpaved low-volume roads along with some examples of each.

UNPAVED ROADS

At the lowest level, techniques are being developed for the provision of acceptable means of communication for the less privileged communities within informal and semi-formal settlements, using, as far as possible, in-situ materials.

Research into unpaved roads constructed with imported gravel wearing courses has resulted in the development of specifications for the optimum use of these gravels, the structural design and maintenance procedures and management systems for unpaved roads. A computer program for the economic optimization of the construction and maintenance of unpaved roads has been developed. Other ongoing research is involved with the protection of unpaved roads against surface erosion, optimum techniques for the palliation of dust and investigations into criteria for the passability of unpaved roads. In order to quantify the dust emissions from unpaved roads an electronic dust monitor has been developed and calibrated with the public acceptability criteria for dustiness.

Maintenance management techniques for unpaved roads have been developed and a computer program to prioritize the management of maintenance of unpaved road networks has been developed. Investigations into the performance and predicted usefulness of proprietary stabilizers and dust palliatives are also being carried out.

A computer program for analyzing economic warrants for upgrading unpaved roads to a sealed standard is also available.

PAVED ROADS

Research into low-volume paved roads is being actively pursued at present. This involves primarily the study of existing roads constructed with light pavement structures and/or marginal materials and low cost surfacings. It is anticipated that this research will result in significant relaxations of current pavement designs and material specifications with concomitant cost savings and the ability to design appropriate and cost-effective roads for very light traffic. Problems with the chemical stabilization of marginal materials are also being investigated.

The application of recent research findings to the rehabilitation of paved roads is currently a high priority.

THE FUTURE

With the rapid urbanization presently occurring, the necessity to provide large lengths of access streets and commuter routes (primarily taxi and bus) is going to increase dramatically. These need to be provided with the following constraints:

- Minimize cost: As much of the funding should remain within the community as possible.
- Optimize social impact: Minimize dustiness during dry season and muddiness during wet season for health and safety reasons.
- Minimize environmental disturbance: Use in-situ and waste materials as far as possible and reduce dustiness to acceptable standards.
- Minimize maintenance.
- Maximize creation of employment: Utilize labor intensive construction and maintenance.

In the rural context it is considered that the existing road networks will, in the main, provide an adequate transportation system but will need to be carefully

maintained and rehabilitated at the optimum times to retain their asset value. The quality of these roads must not be allowed to deteriorate to such an extent that the road user costs and safety aspects are detrimentally affected.

Many of the existing unpaved roads in rural areas will, in the next decade, need upgrading to a paved standard in order to retain the maintenance and road user costs at acceptable levels. In addition, the roads in many agricultural areas where dust generation affects the quality of the product may need to be dust-proofed in order to maximize exportable products.

Environmental aspects will need to be investigated further with careful attention being paid to dust generation from roads, borrow pits, construction sites, etc., and the pollution of rivers (and hence sedimentation of dams) through erosion from roads and associated structures.