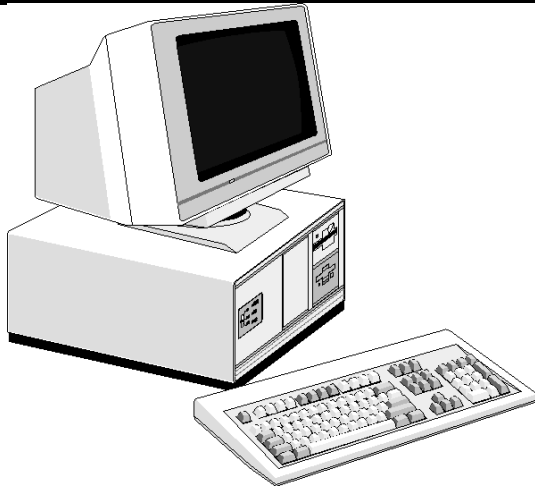


HMIS News

A NEWSLETTER FROM THE PLANNING BRANCH



LATEST NEWS

Code for Annual programming and budgeting revised

A systematic approach was needed to be developed for proper annual programming and progress monitoring, and to develop a computer based progress monitoring system. Once the data of the progress of the various projects could be entered

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DATABASE

Pavement Management Information

Independent of how well a road is built and to what standards, the pavement will deteriorate over time due to environmental effects and traffic. As the pavement deteriorates the road surface becomes rougher and this has a direct influence on vehicle operating costs (VOC). Above traffic levels of 250 ADT, VOC constitute around 75%-95% of total road transport costs, it is therefore important to introduce some form of pavement management in order to reduce these costs. The aim of pavement management is basically to provide a reasonable level of service to the road user at the lowest life-cycle cost. The key element in successful pavement management is implementing a programme of **planned maintenance** on the roads.

As for any management exercise, reliable information is needed to prepare and monitor a planned maintenance programme. This information is derived from data concerning road inventory, pavement condition, pavement history, traffic volumes, road closure risk and construction and maintenance costs all of which are being collected, processed and stored on the central HMIS computer. Pavement condition data is essential for maintenance

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PAVEMENT MANAGEMENT INFORMATION(Cont'd from page

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Pavement Management Information

HDM III - A Tool for Planning

Code for Annual programming & Budgetting

RMP - Bridge Management Component

Data available in HMIS

D)

planning and comprises measurements of the road surface roughness and surface distress (cracks, ravelling, potholes etc). Roughness is important for the relationship with VOC. It is measured using a vehicle mounted Bump Integrator which registers the movement of the back axle and is regularly calibrated against a MERLIN profilometer. Measurements are recorded in terms of the International Roughness Index (IRI-m/km). Surface distress provides an indication of the need for maintenance intervention. It is assessed visually by a walk-over survey on a 10% sample (100 m/km) and recorded in terms of a visual surface distress index rated 0-5 where:

0.0 - 1.7 indicates a road in Good condition;

1.8 - 3.0 indicates a road in Fair condition;

3.1 - 5.0 indicates a road in Poor condition.

By definition planned maintenance cannot be implemented on roads in poor condition and these roads must first be brought to a maintainable state through the very costly operations of rehabilitation or reconstruction.

How can we present and use the pavement management information available from the HMIS? The information should be clearly presented in a manner that suits management needs. Possible formats appropriate for DOR are as follows.

- Charts showing percentage length of road in good, fair and poor condition by year. These will assist in determining trends.
- Charts showing vehicle travel (vehicle-km) on good, fair and poor roads by year. These can be used to set maintenance and rehabilitation priorities.
- Charts showing vehicle travel by roughness from which an assessment of VOC can be made to determine the economic effectiveness of maintenance strategies.

The charts can be prepared for individual road links, for divisions and regions and for the network as a whole.

Presented in this way, there are two main areas of use by DOR for the information:

- i) to provide a framework for making planning decisions to improve the level of service offered to the road user;
- ii) to monitor the effectiveness of maintenance strategies and the performance of DOR in providing this service.

The information will support planning decisions chiefly at the network level, however, performance monitoring will be enabled at network, region and division levels. Account can then be taken of the performance and hence capability of divisions in the allocation of budgets and projects to achieve the best return on the resources involved. A more detailed Discussion Paper on Pavement Management is in preparation and will shortly be issued by the Department.

systematically in the project monitoring database various information needed for the project planning purposes could be easily obtained. As a first step Code numbers for the annual programming were developed in FY 2050/2051. At the same time development of the project monitoring software with the help of external consultant was also started. b - version of the software and the code number was implemented for making annual programme and progress monitoring in FY 2051/52. The use of the software was later abandoned when the engineer working with the software was transferred from the planning branch. Besides the further development of the software according to the plan had to be abandoned as the National Planning commission had curtailed the budget heading in FY 2051/52. A few problems were also encountered while implementing the code numbers as many personnel in DoR were not quite familiar with the new codes and also the codes had some short comings. After one year of existence the code has been recently revised through a wide discussion. Now it has been made mandatory to fill the annual programme and progress reporting format using the revised codes.

Data Available in HMIS

1. Description of Roads, its length depending upon the pavement type.
2. Description of links, beginning & ending chainage & locations; Administration responsible for the section of road(region,district,DoR division & region). Traffic data of some of the links for FY 1992/93 , FY 1993/94 & FY 1994/95.
3. Location of different reference points (permanent objects) along the road.
4. Pavement condition (roughness & SDI data) of the most of the roads in strategic Road Network for FY 1992/93, FY 1993/94 & FY 1994/95.
5. Information about the committed sections, sections under construction and rehabilitation.
6. Pavement structure data of some of the major roads.
7. National average unit cost rate for major items of works on construction & maintenance for planning & budgeting purposes
8. Information on the availability heavy equipment in regions and projects.
9. Information on DoR project & division office location.

LATEST NEWS

Following talk programme and presentations were arranged by RSSDU and Design Branch at DoR headquarter on July 1995 :

- Development and Worldwide application of Reinforced Earth
- CREDO software for survey, Data processing, design of site plans and transport objects

Road Maintenance Project - Bridge Management Component

Background

The Bridge Management Component is a part of the Road Maintenance Project within the main Road Maintenance and Rehabilitation Programme. It operates from the Bridge Unit in the Design Branch of the Department of Roads at Babar Mahal.

Established in July 1994 the Bridge Unit responsibilities include design and maintenance related activities. The Bridge Unit works closely with the Maintenance and other branches on maintenance and design aspects of bridgeworks.

Maintenance of the main road network according to planned procedures is the ultimate goal of the Main Project. The Bridge Management Component is concerned with establishing the capacity to carry out the necessary works, together with the systems for planning the annual maintenance programme and for managing its implementation. Inspections, institutional strengthening, the development of maintenance and repair specifications and contract procedures all support this goal. Full use will be made of the resources of the DOR, Local Consultants and local contractors.

The sectoral objectives of the Bridge Unit, defined within a workshop organised by MRCU in May 1994, were stated as:-

- develop, establish and update a Bridge Data Base
- develop and programme a budget for bridge works
- develop and establish a Maintenance Management System
- develop National standards for bridge design and specifications
- develop bridge expertise within DOR and the private sector
- undertake bridge designs and pilot projects (new and rehabilitation)

The Bridge Data Base

Routine and cyclic maintenance programmes are required to be developed on the basis of inventory surveys and condition inspection surveys.

The knowledge of the strategic network was limited prior to the start of the Project. Few records were available in DOR headquarters and routine bridge inspections did not take place. The primary task of the Bridge Unit was to assemble a Bridge Data Base from Inventory and Condition Surveys. The Inventory and Condition Surveys represent the major activity from which the bridge management capability will evolve.

The Department pursued a fast-track option to assemble the data base by:

- Undertaking the basic inventory to set up the data base record cards.
- Following up with the more time consuming bridge condition survey inspections. These inspections commence with selected structures.

The advantage of this is to give a data base of the entire bridge stock in the shortest possible time. The main problem areas will be identified sooner, facilitating better comprehension of the likely scale of technical and fiscal requirements for rehabilitation measures.

Three local consultants were appointed to assimilate the bridge stock inventory and one local consultant to carry out the condition survey. The Inventory Survey is substantially complete

and reports on over 200 bridges will be filed in the first stage of the condition survey. The programme of work for the Condition Survey will be accelerated to completion in the next financial year, 1995/96.

Future annual routine inspections will be the responsibility of the Divisional staff after training this year, whereas Principal Inspections, on average of every 8 years on each bridge, will be the responsibility of the Bridge Unit.

The initial Bridge Database is a card based system. The Department has confirmed that a computerised data base will benefit the objectives of the project and is a logical progression of the card based system.

Develop and Programme a Budget for Bridge Works

The interpretation of the results of the condition survey will form the most critical processes of the project, establishing the programmes for maintenance. The analysis of the results will identify, and budget for those routine, recurrent and periodic maintenance activities that can be prioritized and programmed into the recurrent budget by the Planning Branch. Major rehabilitation will be required in some areas with the work programmed as a project for funding. Some bridge maintenance will be incorporated into current Projects

Maintenance Management System

The maintenance work will be carried out by the DOR Maintenance Directorate and/or local contractors. Manuals will be prepared to schedule the maintenance operations. Guidelines for the Routine Maintenance of Bridges were issued to assist the Maintenance Divisions for works starting in July 1995, funded from the DOR Maintenance Budget. Further guidelines will address Minor Repair Works of Bridges. These operations will call for greater investigation and training. These guidelines are likely to be developed from contract based specifications such that applied techniques can be progressively proven within field trials or demonstration projects.

National Standards for Bridge Design and Specifications

Appropriate documentation will be developed with the assistance of the project for contracts and specifications. The maintenance and repair specifications and contract procedures are initiated in demonstration contracts and are developed by practical review of the results and operations. Appropriate documentation development, training and instruction will be required to implant these skills within the Divisions and within the private sector. Bridge Design Standards will follow a longer term evolutionary process.

Bridge Expertise within DOR and the Private Sector

Local capability will be enhanced and developed by specialist advisers, long term and short term, both from overseas and in-country and by training of all the sectors. The Roads Sector Skills Development Unit (RSSDU), will coordinate the human resource development strategy.

The establishment of an Emergency Maintenance provision is one of the objectives stated within the Bridge Management Component Project Framework that will be developed. The question of safe operations must not be neglected in all bridge operations, inspection, maintenance, design and construction.

Bridge Designs and Demonstration Projects (new and rehabilitation)

The Bridge Management Component will assist design for maintenance. Demonstration Contracts for maintenance repairs to develop skills in bridge repair works and establish set procedures will be undertaken with funding from the Project. They will be the first in a series of such contracts, within the limits of RMP funding, to establish the cyclic maintenance procedures. Similar larger projects will be funded within the RMRP.

HDM III - A Tool for Planning

To construct and maintain the road network highway authorities must choose from a wide range of options, involving the initial standards of the pavement and roadway alignment and the frequency and standards of subsequent routine and periodic maintenance, pavement strengthening and geometric improvements. Closely related public policies on vehicle size and weight limits must also be determined. These choices, in turn, have a strong influence on the cost of vehicle operating and thereby the cost of the freight and passenger transport.

Highway Design and Maintenance(HDM) model can predict total life cycle costs: construction, maintenance and road user costs - as a function of the road design, maintenance standards and other policy options which may be considered. Although the model doesn't provide a formal mathematical optimization, it does provide the results of economic analysis. For the optimization *DTIMS* software could be used (Details in next issue). The other model, with which HDM may be interfaced, is Expenditure Budget Model(EBM), which selects optimal combination of projects and maintenance policies under budget constraint.

The broad concept of the HDM model is quite simple. Three interacting sets of cost relationships are added together over time in discounted present values, where costs are determined by first predicting physical quantities of resource consumptions which are then multiplied by unit costs or price.

Construction cost = f1{ Terrain, Soils, Rainfall, Geometric design, Pavement design, Unit costs}

Maintenance cost = f2{ Road deterioration(pavement design, climate, time, traffic), Maintenance standards, Unit cost}

Road User costs = f3{ Geometric design, Road surface condition, Vehicle speed, Vehicle type, Unit costs}

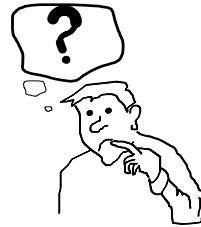
The operation of HDM Model take place in three phases:

1. Data input and diagnostic phase, in which the input data are examined for possible format & numerical errors and internal consistencies.
2. Simulation of the traffic flows and of the changes in the roads as they go from initial construction through annual cycles of use, deterioration and maintenance, with possible construction projects to upgrade them.
3. Economic analysis and comparisons of alternative construction and maintenance policies for selected groups of road links. Reports are generated to give differences between the financial, economic and foreign exchange costs of pairs of alternatives.

The coefficients used in the functions of the HDM

models varies on local conditions. To establish those coefficients, a trend in road information is essential. In Nepal, the data collection and its storage are very much in a preliminary stage. It will take another 4 or 5 years to

establish a trend and corresponding customization of the model can take place. The application of the model is limited to the individual project as per the project requirements. For this purpose, a working calibration of the model is carried out by N.D.Lea for the RMRP rehabilitation projects. The calibrated HDM III is now installed in MRCU/DoR and detail information could be obtained from them.



Do You Know ?

- Total Annual Budget allocated for the Dept. of Roads in FY 2052/53 is Rs. 3,62,80,08,000.
- Foreign components in the budget is Rs.2,08,56,12,000. HMG counterpart fund allocated for the foreign aided projects is Rs.33,88,58,000.
- World Bank with Rs.96,23,75,000 is the largest foreign contributor to the budget.
- The total number of project heads under Dept. of Roads in the "Red Book" is 154.

Letter to the Editor

This newsletter is being produced for the benefit and interest of DoR staff, as well as informing you of news and development relating to Highway Management Information System. It is also a way for you to express your views or aspect about the proper management of the relevant data.

Write to us about anything you wish related with HMIS. Try to keep your letters short (less than 300 words) and to the point. In every issue of HMIS news we will publish the most interesting and relevant letters we receive at editor's discretion.

Address your letters to :

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