

No. RW/NH-33013/5/88-DO.II

Dated the 11th March, 1992.

To

The Chief Engineer of State PWDs/UT dealing with National Highways & Centrally aided Road Projects,
Director General Border Roads, Director General (Works) CPWD.

Subject: Strengthening of existing flexible road pavements - Guidelines on design of overlays.

Please refer to Ministry's circular letter of even number dated the 31st March, 1989 wherein it has been decided that for deriving the overlay thickness for existing road pavements, the method prescribed in IRC : 81-1981 alone should be followed.

2. As you may be aware, IRC : 81-1981 gave only tentative guidelines for overlay design on the basis of limited information that were available in the country at that time. In view of these limitations Ministry had sponsored the Research Scheme R-6, (Development of methods such as Benkleman Beam for evaluation of structural capacity of existing flexible pavement), the first phase of which is now completed. A Committee constituted by the Ministry to review pavement design procedure in the light of R-6 Phase I findings has also submitted its interim report recommending certain modifications in the overlay design procedure.

3. On the basis of the recommendations of the Committee the Ministry has tentatively decided to incorporate the following modifications in the overlay design procedure given in IRC : 81-1981 so far as overlay design for National Highways are concerned.

- 3.1 For measuring pavement deflection for Benkleman Beam, only C.G.R.A. procedure based on testing under static load shall be adopted.
- 3.2 Correction for temperature variation on deflection values measured at pavement temperature in the range of 20°C to 55°C for flexible pavements with bituminous construction of thickness 40 mm or more shall be 0.005 mm per degree centigrade change from the standard temperature of 35°C.
- 3.3 Correction for seasonal variation shall depend on type of subgrade soil, its field moisture content at the time of deflection survey and average annual rainfall in the area. For this purpose, subgrade soils have been divided into three broad categories, namely sandy/gravelly, clayey with low plasticity ($PI \leq 15$) and clayey with high plasticity ($PI > 15$). Similarly, rainfall has been divided into two categories, namely low rainfall (annual rainfall ≤ 1300 mm) and high rainfall (annual rainfall > 1300 mm). Moisture correction factors (or seasonal correction factors) shall be obtained from Figs.1 to 6 (enclosed) for given field moisture content, type of subgrade soil and annual rainfall. The determination of subgrade type and its field moisture content shall be made below the pavement at a distance of 60 cm from the pavement edge, if the lane width is less than 3.5 m and 90 cm when the lane width is more. For this purpose test pits shall be dug approximately every 250-500m depending on the uniformity of subgrade, topography of the area and road profile. Care should be taken to test the soil sample for field moisture content determination at the earliest possible time with due precaution to avoid loss of moisture from the sample. After collecting samples from the test pit and obtaining other data (such as pavement layers and their thickness) the pavement should be made good immediately.
- 3.4 Characteristic deflection for all design purposes should be taken as the mean deflection plus two time standard deviation.
- 3.5 The following values of allowable deflection for different traffic conditions shall be adopted.

Design traffic intensity in terms of Equivalent standard Axles in Million	Allowable deflection in mm
Upto 2	1.0
2 - 10	0.8
10 - 30	0.75
More than 30	0.70

- 3.6 The following layer equivalency factors in terms of granular base (WBM/WMM) may be adopted:

Built up spray grout	1.0
Bituminous macadam	1.5
Dense Bituminous macadam	2.0
Bituminous Concrete/Semi-dense bituminous concrete.	2.0

4. It may please be noted that henceforth proposals for strengthening of existing flexible pavements of National Highways should be based on Benkleman Beam Deflection Technique as given in IRC : 81-1981 but after incorporating the modifications indicated above.

5. It is requested that the above instructions may be communicated to all concerned for immediate adoption as regards future NH projects. Pavements designed and constructed on the basis of above procedure shall be monitored for at least five years and annual performance reports sent to the Ministry to serve as feedback for review of the suggested modifications. The Ministry would, therefore, welcome any possible feedback on application of the revised procedure.