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No. RW/NHVI-67(6)/86 *Dated the 1st July, 1986*

To.

Secretary to the State Govts/UTs
(dealing with National Highways and other Centrally aided Road Works).

Subject : Guidelines for providing profile corrective course (Levelling Course) on existing flexible road pavement prior to strengthening/resurfacing course.

Prior to laying strengthening/resurfacing course on the existing pavement, its profile has to be prepared to specified lines, grades and cross section as per the final road profile. This is normally done by providing a Profile Corrective Course, as envisaged under Clause 501 of this Ministry's Specification for Road and Bridge Works (First Revision) under the title Levelling Course.

2. Based on the feedback from the field, the existing guidelines on the subject have been reviewed and in supersession of all the earlier circulars on the subject, the fresh guidelines for providing Profile Corrective Course (earlier termed Levelling Course) over the existing flexible pavement prior to laying the strengthening/resurfacing course are enclosed *vide* Annexure 'A'.

3. The Clause No. 501 of Ministry's specification shall be treated as modified to the extent it pertains to levelling course provision. The Ministry's specifications which are presently under revision shall incorporate the modified item.

4. The estimate for the work of widening/strengthening of the existing pavement shall include the requirement of profile corrective course alongwith adequate investigatory details for proper appreciation of its provision. Efforts shall also be made to provide for Profile Corrective Course prior to resurfacing under Periodic Renewal Programme, SR & FDR (where the existing pavement is structurally adequate and is being treated for renewal in a continuous long lengths of five kilometre or more).

5. Requirement of Profile Corrective Course projected subsequent to sanction of estimate shall not be normally entertained.

6. It is requested that the aforesaid requirement and the guidelines may please be brought to the notice of all the concerned officers in the Department with instructions to strictly adhere to the same.

ANNEXURE-A

GUIDELINES FOR PROVIDING "PROFILE CORRECTIVE COURSE" (LEVELLING COURSE) ON EXISTING FLEXIBLE PAVEMENT BEFORE LAYING STRENGTHENING/RESURFACING COURSE

1. INTRODUCTION

Where the existing flexible road pavement is to be overlaid for either strengthening or renewal purposes, its surface has to be prepared to specified lines, grades and cross sections in advance of laying the strengthening/resurfacing course. This is done as per procedure prescribed under Clause 501 of Ministry of Shipping and Transport (Roads Wing), Specification for Road & Bridge Works (first revision) (Hereafter reference is given to the concerned clause by number only without repeating the reference to specification book). It is stated in Clause 501.3.3. that after filling the pot holes, the base on which the levelling course is to be laid shall be thoroughly swept and scraped clean of dust and any other extraneous material. This, obviously, presupposes that the existing road pavement is not distressed to the extent requiring rebuilding but its profile has only been deformed which should be reshaped to design requirement prior to overlay course(s), of course, after making good the pot holes in the existing pavement, if any. Since, this supposition has not been explicitly spelt out in the specifications thereby sometimes leading to provision of levelling course on distressed pavements also which eventually results in the failure of the overlay after certain period depending on the total thickness of overlay course(s). It is, therefore, necessary that a clear distinction should be made between a structurally distressed road pavement and a deformed road profile. In fact, levelling course is no solution to make good the deficiency of a structurally distressed pavement including its use as reflection crack preventive course, where special measures are called for. It is essential to take suitable remedial measures to take care of existing distressed pavement prior to providing profile corrective course (levelling course) and/or overlay course(s). However, if the road profile is only deshaped, either in transverse direction or in longitudinal direction or both, or it is not in agreement with the designed profile, it should be reshaped to designed profile. The pavement material course used for this purpose alone shall be termed as Profile Corrective Course (herein after abbreviated as PCC so far as these guidelines are concerned). This new term is being introduced to provide a clear understanding from terminology itself as to for what specific purpose it is used. PCC shall be provided prior to strengthening/resurfacing course as per site requirement.

2. DEFINITION

Profile Corrective Course is a layer of pavement base course materials of variable thickness intended to reshape the existing deshaped pavement profile to specified lines, grades and cross sections or to bring the existing pavement profile to the designed shape prior to laying any strengthening/resurfacing course on it.

3. SCOPE

A profile corrective course is essentially a pavement base material course for correcting the existing pavement profile which has either lost its shape or has to be given a new shape to meet the requirements of design lines, grades and cross-section.

It shall be differentiated from the strengthening course or other type of structural pavement course provided as a remedial measure against inherent deficiency or inadequacy of design.

4. TYPES OF PCC MATERIAL AND THEIR APPLICATION

The type of material for PCC shall be decided based on the thickness requirement for the profile correction and/or the type of pavement surface over which it is required to be placed for its suitability to work in conjunction with the existing material.

4.1. PCC is classified under the following broad categories of materials :

Type A — Premixed bituminous material corresponding to Clause 507, Open-graded premix carpet.

Type B — Premixed bituminous material conforming to Clause 503 with binder content of 3.5 per cent by weight of total mix. The aggregate may conform to grading B in tables 500-2 and 500-3 of Clause 503 depending upon the thickness requirement.

Type C — Water bound macadam corresponding to grading 3 of Table 400-6(Clause 404)

Type D — Wet mix macadam (premixed macadam) conforming to Ministry's tentative specifications circulated *vide* Ministry's letter No. RW/NH.VI-86(9)/85 dated 15.11.1985 with the material grading as given below :

Sieve Designation (IS 460)	Per cent by weight passing the sieve	
	Max. nominal size 40 mm	Max. nominal size 20 mm
50mm	100	Percentage by weight passing
40 mm	95-100	the sieve
		(maximum numerical)
25 mm	—	100
20 mm	60-80	90-100
10 mm	40-60	—
4.75 mm	25-40	35-55
2.36 mm	15-30	—
600 μm	8-22	10-30
75 μm	0-8	2-9

Note : No other material shall be used for PCC, particularly Built Up Spray Grout (BUSG — Clause 505) and Bituminous Penetration macadam base/binder course (Clause 504)

4.2. Application

(a) Over existing bituminous surfaces

(i) Type A mix shall be used normally where the irregularities to be made up are of non-uniform character and of thickness between 20 mm to 40 mm making the use of Type B mix impracticable. However, where PCC thickness works out to be less than 20 mm and the overlay course consists of a plant-laid bituminous material no separate PCC shall be prescribed and the requirement shall be met as the integral part of the overlay course.

(ii) Type B mix shall be adopted where the thickness of PCC is more than 40 mm. The mix shall usually be hot mixed and hot laid with mechanical paver in accordance with Clause 503, except in isolated locations or where the work is to be carried out in narrow widths where laying by other means may be permitted by the Engineer-in-charge.

(b) Over granular surface

Type C/D mix shall be provided over existing WBM or any other granular surface. The mix should preferably be of the same material as that of existing surface or having superior engineering properties. The thickness of Type C/D PCC shall be 75mm (compacted) in a single lift.

4.3. Normally, the requirement of PCC exceeding 75 mm thickness should not arise nor the requirement in excess of 75 mm should be catered for under PCC save in exceptional circumstances where the requirement is for specific purpose such as making up the super elevation of the horizontal curves, existing two lane road to be provided with uni-directional camber to form a part of 4 lane highway localized short sags or depressions as described subsequently under para 6.3.2. These requirements varying from zero thickness to over 75 mm, should preferably be met using type A/B mix depending on site requirement. Normally, the loss of profile to such a large extent i.e. in excess of average 75 mm may not take place unless there is some sort of a basic deficiency or design inadequacy in the road structure, materials used in it or in its construction for which PCC is not the right answer. The remedy lies in establishing the causes for such a situation through investigations and providing suitable and adequate remedial measures to overcome the deficiency.

However, where it is conclusively established that the irregularity needing more than 75 mm is not due to any structural deficiency, PCC requirement may be split into two layers, treating the top layer of uniform thickness as structural layer and the bottom layer of varying thickness as PCC wherever applicable. The PCC could be of any type A to D, but where it is of type C/D, it would be ensured that the top layer of bituminous surface, if existing, shall be completely removed prior to laying PCC and also the underneath disturbed existing WBM base course duly rectified and also the pavement layer drainage requirement duly provided for.

If isolated high spots (humps/bumps) projecting over pavement surface do exist, the same shall be cut to minimise the PCC requirement.

5. ASSESSMENT OF PCC

Assessment of PCC shall be done by plotting the existing road profile by taking levels at close interval, the actual interval for levels required for the purpose may be decided by the Engineer-in-charge keeping in view the site situation in each individual case, as stipulated in Clause 106.3 and superimposing over it the PCC profile which is derived from the final road profile, which is decided and fixed from other considerations independent of PCC, after accounting for the thickness of the stipulated superimposed course(s) over PCC. A judicious and cautious work back of PCC profile is essential. PCC profile shall not normally be fixed first and the final road profile decided thereafter.

6. CONSTRUCTION OPERATIONS

6.1. Specifying Existing Bituminous Surface and Providing Type C/D PCC

The existing bituminous surface shall be removed, where it has been envisaged so, by method(s) approved by the Engineer-in-charge. After removing it, the underneath aggregate base which would have been disturbed in the removal process, shall be loosened to a depth of 50 mm or so. The resulting material shall be removed and screened to salvage coarse aggregate for use in the PCC type C/D along with the fresh material. Local high spots on the exposed surface, if any, shall be corrected. The salvaged aggregate mixed with requisite quantities of fresh aggregate shall be spread on the prepared exposed surface and compacted as water bound macadam or provided as wet mix macadam to a thickness of 75 mm in accordance with relevant specifications for these types.

6.2. Patching of Pot Holes

Before providing PCC on the existing pavement, pot holes if any, shall be drained of water, cut to regular shape with vertical sides, upto the affected depth and slightly beyond the limits of affected area, and dried. All loose and disintegrated material from it shall be removed. The pot hole shall then be filled with (i) course aggregate and screenings conforming to Clause 404, where the pot hole depth extends in the WBM base course, and compacted with heavy hand rammers/approved mechanical tampers. Alternatively type D could also be used upto WBM base course surface and the balance depth with premixed material to Clause 507 after painting the sides and bottom of the pot holes with a thin application of hot bitumen and compacted with roller or other approved means or (ii) premixed material to Clause 507 only where the pot hole depth lies within the bituminous course itself, after painting the sides and bottom of the pot holes with a thin application of hot bitumen and compacted with roller or other approved means.

All loose and/or surplus materials on the surface after making good the pot holes shall be removed.

6.3. Laying of PCC

6.3.1. After filling the pot holes as described in 6.2 above, the surface on which PCC is to be laid shall be thoroughly swept and scraped clean of dust and any other extraneous material. The specified type of PCC shall then be laid and compacted to the requirements of the respective specifications. In case of type A/B a tack coat conforming to Clause 502 shall be applied prior to laying PCC and to the desired levels, grade and cross fall (camber).

6.3.2 In specific situation of short sags or depression in the pavement, it may become necessary to provide corrective course in the form of flat wedges. Normally layers in maximum thickness at any point more than 75 mm should not be provided. In placing multiple lifts, the lift of shortest length (at the lowest portion of the sag/depression) should be provided first, with successive lifts extending over and fully covering the underneath layer. This will preclude development of a series of joints on the top surface, in case lifts are provided in reverse way i.e. the shortest at the top, which otherwise would cause roughness in riding besides a weak structural composition.

For proper appreciation of what is stated above, two illustrative sketches are given in the enclosed appendix.

6.4. Covering the PCC

Work of PCC shall be so planned that it shall be covered by the designed base/wearing course at the earliest, before opening to traffic.

7. ARRANGEMENT FOR TRAFFIC

During the construction operations, flow of traffic shall be maintained to Clause 105

8. MEASUREMENTS FOR PAYMENT

8.1. The work of filling pot holes shall be considered incidental to the construction of PCC for which the existing pavement surface is prepared.

8.2. Scarifying and relaying the aggregate base course shall be measured in square metres. Fresh course aggregates and screenings used in the work shall be measured in stacks in accordance with Clause 512.

8.3. PCC type A/B shall be measured as volume compacted in position in cubic metres. The volume shall be worked out as per para 5-assessement of PCC — by plotting the exact profile as built up at site on the existing profile.

9. RATES

9.1. The contract unit rates for PCC shall be payment in full for carrying out the required operations including full compensation for:

(i) making arrangements for traffic to Clause 105 except for initial treatment to shoulder and construction of diversions.

(ii) scarifying the existing bituminous surface loosening of existing WBM surface to specified depth and relaying after salvaging the material and mixing it with fresh course aggregates and screenings as envisaged.

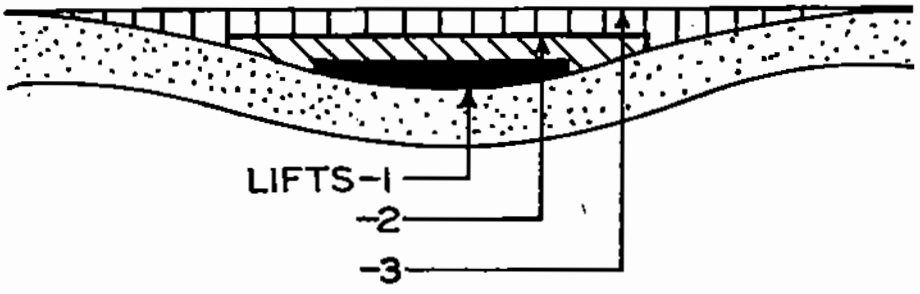
(iii) Providing all materials to be incorporated in the work including any royalties, fees, rents where applicable and all leads and lifts unless the contract specifically excludes any item of material required for the work or provides for separate payment in accordance with Clause 512.

APPENDIX

PROFILE CORRECTIVE COURSE

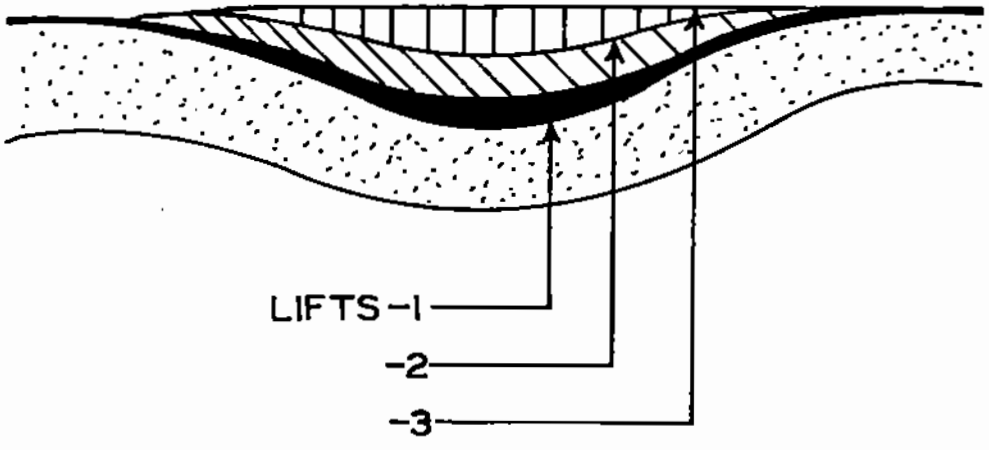
METHODS FOR PROVIDING CORRECTIVE COURSE FOR SHORT SAGS AND DEPRESSIONS:

(A) CORRECT METHOD



NOTE: PROFILE CORRECTIVE COURSE MATERIAL TO BE IN ACCORDANCE WITH THE LIFT THICKNESS.

(B) INCORRECT METHOD



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(iv) Preparation of the exposed surface/existing surface including filling of pot holes, all cleaning operations and application of tack coat.

(v) All labour, tools, equipment and incidentals necessary to complete the work to the specifications and

(vi) Carrying out the work in part width of road pavement where directed.