

NO. NHI-41 (18)/70

Dated 12th August, 1970

To

The Chief Engineer of all State PWDs, and Union Territories (dealing with roads).

Sub : Ensuring fluent grade lines at culverts on National Highways

One of the various deficiencies that exists, at present, on the National Highways is that there are sudden undesirable humps in the vertical profile of the road at locations where there are culverts or other similar structures which cause lot of discomfort to fast traffic and are thus highly irksome. At most of the places, the road level over the culvert is either higher or lower than the general highway profile resulting in humps or dips, generally the former, which are not only hazardous to traffic, but are also aesthetically unpleasant. Such deficiencies in the road profile could be avoided at little extra expense by paying proper attention during the initial design and construction phase or subsequent maintenance operations.

2. Keeping in view the need for having smooth road profiles at culverts and other similar structures, it is necessary that, henceforth, greater care should be exercised in fixation of deck level in the design and construction of culverts and the design of flanking road sections. In this connection the following measures need to be given particular attention.

(A) EXISTING CULVERTS

- (i) Suitable shock free vertical curves conforming to the standards laid down in this Ministry's letter No. NHI-37 (2)/70, dated the 2nd April, 1970 be provided, where necessary, on the approaches to culverts in cases where the deck level has to be higher than the road profile.
- (ii) In the case of slab culverts with C.C. wearing course having flatter camber than that of the flanking road, the difference in the two cambers should be adjusted suitably over a transition length of at least 10 metres on either side of the culvert and the carriageway splayed in this much length to prevent wearing and deepening of the earthen shoulders close to the edge of the C.C. deck slab which can be extremely hazardous.
- (iii) At locations where the culverts lie on horizontal curves/longitudinal grade, necessary super-elevation/longitudinal slope as on the flanking road sections be provided over the culvert deck after ensuring that the culvert is capable of carrying the additional dead load on this account, so that the culvert is in complete harmony with the designed longitudinal and cross road profile in that stretch.
- (iv) All settlements of back-fill at culverts be corrected during maintenance operations.

(B) NEW CONSTRUCTION/RECONSTRUCTION OF CULVERTS :

- (i) The culvert deck should follow the same profile as that of the flanking road sections without any break, whether the same is in level, grade or in a curve. In cases where it is essential to have the culvert deck higher than the adjoining road level, suitable vertical curves should be provided.
- (ii) At locations where the culverts lie on horizontal curves, necessary super-elevation in the road should be provided by laying the deck slab of the culverts to the required cross slope.
- (iii) The camber to be provided over the culvert deck should conform to the camber of the flanking road sections. For achieving this, the deck slab should be laid to the required camber and grade, and the bed blocks laid to suit.

For the operations under (i) to (ii) above the construction must be carried out with requisite care observing designed levels at all stages from foundation laying to the laying of deck.

- (iv) The wearing course over the culvert deck should be of bituminous construction, instead of the rigid C.C. wearing course being sometimes provided, at present.
- (v) The back-filling at culverts should be done with proper soil or other material in accordance with the specifications laid down in this Ministry's letter No. LP 9 (3)/67, dated the 9th June, 1970.

3. It is requested that the above suggestions be strictly adhered to, in future, and necessary instructions in this regard issued to the staff responsible for the execution, of construction works and maintenance of National Highways. Since under the already launched programme of development of National Highways and removal of deficiencies therein and addition of National Highways to the system in future we would be attending to so many culverts for upgrading or improvement or construction it is highly imperative that the above points receive earnest attention. Further, even as part of routine maintenance operations such improvement of bed culvert deck situations should receive serious attention.
