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No. NHIII/P/30/77 *Dated the 25th Feoruary 1978*

To

All State Chief Engineers (dealing with National Highways)

Sub : Requirement for integrated project planning for construction of bridges on adjacent streams with over-lapping catchments and approaches to the same

Various circulars have been issued by the Ministry from time to time and some guidelines have also been given in the IRC codes about the preparation of project estimates for NH road and bridge works. In this Ministry's circular No. NH III/P-30/77 dated 19th Oct. 1977, the need for simultaneous submission of estimates for bridges and approaches to the same was also emphasised. The idea underlying this circular was to ensure that both the bridges and approaches could be commenced and completed simultaneously and thrown open to traffic, to avoid a situation of the bridges being completed without approaches or *vice versa*. Besides this essential requirement, the preparation of a combined project will also help avoiding discrepancies in design data such as HFL's, freeboard/clearances above HFL's, Bench marks, etc., which are likely to crop up if the projects for the bridge and approaches are prepared separately and at different times, and may go unnoticed during their preparation or even during further checks exercised at different levels by two independent organisations exclusively dealing either with bridges or roads, for want of proper coordination. In a particular instance that has recently come to the notice of the Ministry, there are two rivers in close proximity with overlapping catchments separated by a flood bank, and two bridges have been constructed across the same, adopting two different HFL's differing by about 2 metres. The approaches to these bridges were, however, based on HFL's with a difference of only 0.2 m and the reference bench marks were also different. After a few years of their construction, during one flood season, the flood bank developed some breaches in the upper reaches, the flood waters in the two catchments got merged, and caused heavy damages to the approaches due to overflows, and one or two minor bridges provided in the approaches were also severely damaged. Although the damages could be attributed to the unexpected breaching of the flood bank, the damage could perhaps have been minimised, had the bridges and approaches been designed for the correct HFL's without any discerpancies, and if proper enquiries had been made about the stability and dependability of the existing flood bank. In the absence of coordinated effort, estimates sanctioned on the basis of faulty data may lead to unsatisfactory performance of the road alignment as well as cross drainage structures. With a view to avoiding such situations in future, it is suggested that in case of bridges and approaches thereto across rivers or streams not having well defined and independent catchments which may get overlapped, the following additional data/information should be furnished along with the project estimates :—

(1) If the 2 (or more) streams branch off a single river in the upper reaches, the total discharge in the parent river, the discharges to be apportioned between the differnt branches, their HFL's at the proposed bridge sites etc. should all be ascertained from the irrigation or the flood protection authorities in that area.

(2) The vulnerability or the stability of the existing flood banks (dividing the catchments) based on their past performance to be ascertained from the irrigation authorities, and duly taken into account, for deciding upon suitable free board for the approaches, clearance under the bridge deck, depth of foundations for the bridge etc., so that in the event of occurrence of discharges of HFL's higher than the designed figures, the bridge and the approaches could remain in tact, with minimum damage, if any.

(3) Irrigation and other multipurpose river projects undertaken in the area, their operational modes and their controlling abilities on the discharges of the river, as well as their influence on the scour or silting up of bed in the different branches.

(4) Irrigation/Flood Control projects undertaken/proposed to be undertaken by the concerned authorities on some other river system in this area which may have repercussions on the flow as well as the levels in the streams proposed to be bridged.

(5) The road net work in the area, the existing major and minor openings through them, the flow pattern, the submergence records etc., of the same and hydraulic details of existing bridges for a considerable length u/s and d/s of the proposed bridge sites.

(6) Any Railway bridges in the area if located close by within the influence zone of the streams proposed to be bridged, the existing waterways through them, the HFL etc. recorded on the concerned structures, and other hydraulic particulars.

(7) Probability of occurrence of parallel flow along approaches, and if so, suitable remedial measures;

(8) Nature of fill materials and their availability for the purpose of construction of approaches. (No borrowing of earth in Khadir portion of rivers should be proposed);

(9) The need for any training works in the form of guide bunds or groynes, and the desirability or otherwise of providing cross-drainage openings in the approaches to be substantiated if necessary, by model tests conducted in river research institutes.

(10) Necessity of protective measures, if any, along the approaches including the immediate approaches of the culverts proposed

in the approach alignment;

(11) Other miscellaneous factors like inter section with local traffic, social and economic considerations, etc.,

Various alternatives may be outlined for bridge crossings and approaches thereto in such cases, keeping an eye on economy as well, and the project reports for the various components of the scheme should be furnished in an integrated manner so as to arrive at a comprehensive solution. These project reports should also be in conformity with the guidelines/circulars/codal requirements and should inter-alia cover the points mentioned above. This may please be noted for future guidance.