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Dated the 10th September, 1974

To

**Chief Engineers of
all State Public Works Departments
and Union Territories dealing with roads**

Subject : Special steps to prevent soil erosion in hilly areas in the context of overall soil conservation measures in the country

The need to conserve and build the country's land and soil resources, so that these serve the present, as well as, future generations, has assumed paramount importance in the wake of developing shortage of tillable land and water resources. Unplanned road construction in hilly areas has been identified as one of the causes contributing to loss of these resources.

2. By its very nature, road construction in hills is a destructive process for the strata of the hill side, at least in the initial stages. Road cuttings through areas otherwise not susceptible to land slides normally disturb the natural inclination of the soil in such a way as to create conditions for large scale landslides in the first few years after construction. Even dense forests are not immune from this problem. With the removal of vegetative cover, destructive action of water gets further pronounced and accelerates the process of soil erosion and formation of deep gullies. End result of this is that enormous quantities of soil and rock move down the rivers, lakes and finally to the sea.

3. It is, therefore, necessary that utmost care is taken during road construction, as regards planning of works and treatment of the catchment area of drainage, so that soil erosion is prevented as far as possible. To combat this problem, the following measures are especially commended, for adoption on National Highways as well as State roads :-

- (i) Roads should not be located through geologically unstable strata if this can be avoided;
- (ii) Road alignments should avoid large scale cuttings and fillings, and follow the lie of the land as far as possible. Use of tunnels to avoid deep cuts should be considered where feasible as also economical;
- (iii) Where necessary provision of breast walls of suitable design should be considered to help achieve stability of the hill cuttings;
- (iv) To the extent feasible, roads should be aligned away from streams and torrents except where these are to be crossed. Since the greatest damage always occurs along water courses, special attention is necessary to create protection belts of forests on both sides;
- (v) Drainage of water from the roadside must be given top attention and necessary system of drains constructed to lead the runoff to natural water courses. In particular, suitable interceptor and catch water drains must be provided above the cut slopes for speedy and safe disposal of rain water;
- (vi) Excavated material should not be thrown haphazardly but dumped at suitable places where it cannot get easily washed away by rain. It is otherwise expected as a normal requirement of hill road design that the cross-section is either wholly in cutting, or partly in cutting and partly in filling, so that with the adoption of retaining walls of a suitable type the cutting spoils can be utilised to the extent possible, guided of course by considerations of economy and best road stability;
- (vii) Depending on the availability of land and other resources, afforestation of roadside land should be carried out to a sufficient distance on either side of the road. The selection of plant species will depend on climate, altitude and soil conditions, but preference should be given to deeprooted trees and plants. For preparing the detailed scheme of afforestation, persons having knowledge of soil conservation or forestry should desirably be associated;
- (viii) Vegetative cover should be established on all cut/fill slopes through any one of the techniques described in I.R.C. Standard "Treatment of Embankment Slopes for Erosion Control" (under print). The activity of establishing vegetation on barren slopes should be treated as part of the regular maintenance operations on all hill roads.

4. It is requested that necessary action may be taken on the above suggestions under intimation to this Ministry. This circular may please be brought to notice of all officers in your department engaged on road works in the hilly terrain, as also to other State institutions dealing with road construction such as Zilla Parshads, Rural Engineering Works Organisations, Forest Departments, Irrigation and Power Project Authorities, etc.