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(सड़क परिवहन और राजमार्ग मंत्रालय)  
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(Ministry of Road Transport and Highways)

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**Sub: Guidelines for preparation of Detailed Project Reports (DPRs).**

Manuals of specifications and standards for four-laning and six-laning of highways published by Indian Roads Congress (IRC) vide IRC:SP:84-2014 and IRC:SP:87-2013, respectively are generally followed in preparation of DPRs for the projects being undertaken by NHAI. However, with the experience gained in the implementation of NHDP and the need for safety enhancement, it is felt in NHAI that these Manuals need to be reviewed. Pending the requisite changes in the Manuals, immediate need has been felt to incorporate certain provisions in the DPRs in order to take care of future requirements and to improve road safety. These are detailed as under:

**1. ROW / land and related aspects:**

- (i) The land for any Expressway will be acquired with a RoW of 100 mtrs.
- (ii) As for the four-lane / six-lane Highway Road Projects, experience shows that all the existing two-lane Roads requiring upgradation to 4/6-lane involve acquisition of land, shifting of utilities, felling of trees and other statutory clearances etc. As such, keeping in view a futuristic approach, it has been decided that the land for any 4/6 lane Highway Road will be acquired with a RoW of 60 mtrs irrespective of the width of the carriageway.
- (iii) Land (minimum 5 acres, length and depth preferably in the ratio of 3:2) shall also be acquired for establishment of Way-side amenities at suitable locations at distances varying between 30 to 50 kms on both sides of the Highway.
- (iv) All efforts shall be made to avoid any road alignment through National Parks and Wildlife Sanctuaries, even if it requires taking a longer route / bypass. However, where it becomes absolutely unavoidable and necessary to keep the alignment through such reserve forest / restricted areas, land would be acquired with RoW of not more than 30 mtrs. The cross-section in such areas may be kept as 3.25m, (shoulder / Utility Corridor) + 10.5m (three-lane one side carriageway) + 2.5m (Median) + 10.5m (2<sup>nd</sup> three-lane carriageway) + 3.25m (shoulder / Utility Corridor).
- (v) Similarly, though it may be difficult, while determining the alignment for any bypass, efforts be made to see if these could be along the revenue boundaries of two revenue estates thereby minimizing the compulsions of land owners / farmers for cross-overs to the other side. In case such an alignment is not found feasible, it should be ensured that access to common facilities for the local people (e.g. schools, Healthcare facilities etc.) is maintained only on one side of the alignment, thereby minimizing the need for cross-over for day-to-day life.

- (vi) Protection of the acquired RoW against any possible encroachments is extremely important. Boundary stones be provided at the end of the RoW as per Clause 9.8 of IRC:SP:84-2014 and also supplemented as per Circular dated 08.12.2015 issued by NHAI. The boundary pillars alone, which are subject to removal with passage of time, may not be enough to save against encroachments. As such, the typical cross-section of a Highway Road is being re-visited separately with the intention of providing permanent features in this behalf. For a typical RoW of 60 mtrs, starting from one end, these will require the following:
- (a) Use barricading of the RoW with plantation of hedge-like species (Ficus / Poplars) within a 3.0m wide strip area, dug up to 0.6 to 0.9m, of which 2.0 mtrs to serve as a Utility Corridor.
  - (b) Provision of a Service Road (along the inhabited area) with its drainage slope towards the drain / area reserved for Strip Plantation, for a width of 9.0 mtrs.
  - (c) Earmark width of 1.5 mtrs for construction of a drain so as to be able to capture the rainwater flow from the Service Road (wherever provided) and the main carriageway.
  - (d) Three lane with paved shoulders: Main carriageway - 10.5 mtrs, paved shoulder - 1.5 mtr and earthen shoulder - 2.0 mtr (Total - 14 mtr).
  - (e) Median - 5.0 mtrs (effective width 4.5 m), and
  - (f) A Mirror Image on the other end.

## 2. Approach to the provision and specifications for Structures:

- (i) The structures on roads viz. Bridges, ROBs (Road Over Bridges, and Flyovers), RUBs (Road Under Bridges) etc. are designed for more than 50 years. It is difficult to increase the width of the structures at a later date which may also have larger financial implications apart from construction related issues in running traffic. Therefore, it has been decided to keep provision for all the structures including approaches comprising of retaining structures as 6-lane (length of such approaches shall, in no case, be less than 30m on either side) on all the four-lane highways except in the following cases (i) Reserve Forest (ii) Wild life Areas (iii) Hilly Areas (iv) Urban Areas where site conditions do not permit this.
- (ii) Wherever elevated sections are designed through any inhabited areas, these should be six-lane structures supported on single piers so that the road underneath serves as effective service roads on both sides.
- (iii) Highway projects shall be designed for separation of local traffic especially for Vulnerable Road Users (VRUs), for longitudinal movements and crossing facilities through viaduct(s) located at convenient walking distance. Provision of PUPs and



CUPs with size of 7.0m x 3.0m, as specified in para 2.10 of the IRC specifications, has proved to be insufficient keeping in view the increased use of mechanization in agriculture practices. These structures do not support the easy passage / crossing for the tractors with trolleys so often used for agricultural operations. As traffic on cross roads is increasing day-by-day, it has been decided to substitute the provision of Pedestrian Underpass (PUP) / Cattle Underpass (CUP) [for para 2.10 of IRC specifies the dimensions of 7.0m x 3.0m] with a VUP Grade-II with a minimum size of 12m (lateral clearance) x 4m (vertical clearance). Out of 12m lateral width, 2.5m width on one side shall be raised for pedestrian sidewalks with grills to make pedestrian movement convenient and safe. These structures shall be located at the most preferred place of pedestrian / cattle / day-to-day crossings. Depending on the site conditions, feasibility of clubbing the crossing facilities through service roads shall also be explored. Further, the bed level of these crossings shall not be depressed as any such depression, in the absence of proper drainage facilities becomes water-logged rendering the same unusable. Ideally, the bed level of the crossings should be a bit higher with proper connectivity to a drain, which could serve the drainage requirements of the main carriageway, the underpass and the service road as well.

- (iv) Wherever the alignment of 4-lane Highway road project is retained in-situ while passing through inhabited areas (e.g. villages), it should be ensured that Service Roads are provided on both sides of the carriageway, connected underneath with a cross-over structure (VUP/PUP/CUP). Thus each habitation should preferably have crossing facility at the highways with a vertical clearance of 4 mtrs.
- (v) To ensure that bypass once constructed serves the intended purpose during its life, all the bypasses shall be well designed and access controlled. The entry / exit from / to side roads shall be controlled such that they are grade separated at major roads or at spacing not less than 5 kms. Side roads at closer spacing shall be connected to the service roads on either side and taken to major roads for provision of grade separated interchange.

### **3. Embankments, Drainage and rain-water harvesting**

- (i) The provision of embankments shall be kept minimum so as to save land as well as earth which are scarce resources. This can be decided on case to case basis with due deliberations. However, economic considerations may also be given due weightage before deciding the issue.
- (ii) The project highway shall be designed to have well designed efficient drainage system, which shall be subsurface, as far as possible. While constructing the underpasses, the finished road level shall be determined so as to ensure that the accumulation of rain water does not take place and run-off flows at the natural ground level. The drains, wherever provided shall be constructed with proper gradient and connected to the existing outlets for final disposal.



- (iii) The locations of the culverts should be planned in such a way that the proposed culvert covers optimum catchment area & the location shall be decided on the basis of topographical survey, local rainfall data, gradient of natural ground and enquiry from the local habitants. All culverts should preferably be box culverts as pipe culverts get filled up with silt, which is rarely cleared.
- (iv) The rain water harvesting requirements be assessed taking into consideration the Ministry of Environment & Forest Notification Dt. 14.01.1997 (as amended on 13.01.1998, 05.01.1999 & 06.11.2000). The construction of rainwater harvesting structure is mandatory in and around water scarce / crisis areas notified by the Central Ground Water Board. The provisions for rainwater harvesting be executed as per the requirements of IRC:SP:42-2014 (Guidelines for Road Drainage) and IRC:SP:50-2013 (Guidelines on Urban Drainage).
- (v) All the bridge structures having a length of 100m or less can be used for tapping of water for serving dual purpose i.e. to cross the water body and to store water, if technically feasible. Therefore, such structures should be designed as bridge cum barrage structures (bridge cum bandhara). Ministry's guidelines in this regard issued vide letter no. RW/NH-34066/59/2015-S&R(B) dated 18.04.2017 may be referred.

#### **4. Road Safety features, Road markings and signage**

- (i) Road safety shall be the focus of design. The roads shall be forgiving, having self-explaining alignment, safe designed intersections / interchanges segregation and safe crossing facilities for VRUs with crash barriers at hazardous locations.
- (ii) Road markings and proper signage constitute another important aspect of the Road safety. The DPR shall contain a detailed signage plan, indicating the places, directions, distances and other features, duly marked on the chainage plan. It shall specify the suitable places where FoBs are to be provided. Road marking and signage plan shall be included in DPR and shall be specifically approved by the NHAI.
- (iii) As availability of suitable sight distance has a large effect on road safety, the alignment of all the NHs should be finalized in such a way so as to have double the stopping sight distance available to the road users at all locations.
- (iv) Advanced Traffic Management System (ATMS) shall be in place for all 4/6 lane roads of NHAI being put to tolling. This would provide real time information, guidance and emergency assistance to users. ATMS would include outdoor equipment including emergency call boxes, variable message sign systems, meteorological data system, close circuit TV camera (CCTV) system in addition to any other equipment required to meet the objective. Indoor equipment would include large display board, central computer with Network Management System, CCTV monitor system and management of call boxes system with uninterrupted



power supply, all housed in a central control centre. In this connection, NHAI's policy circular no.11041/218/2007-Admn dated 15.09.2016 may be referred.

- (v) DPR shall undergo the exercise of Road Safety Audit through the Road Safety Auditor (separate from design team) and recommendations mentioned be incorporated.

## 5. Noise Barriers

Provision should be made for Noise Barriers wherever (especially where project highway passes through dense habitation) required as a mitigation measure against noise pollution and nuisance. Their location, dimension, type, material and shapes should be determined and defined in environment impact assessment studies forming part of DPR.

## 6. Toll Plazas

- (i) The minimum number of toll lanes at the toll plazas should be carefully designed taking into consideration the projected peak hour tollable traffic, permissible service time, adopted toll collection system and the capacity of service lanes. The number of lanes at any toll plaza would, however, be not less than four times the number of lanes for which the highway has been designed. Eventually, all the lanes have to be designed / equipped with Electronic Toll Collection (ETC) systems and one lane at the extreme outer side for Over Dimensioned Vehicles (ODV) should be earmarked in each direction.
- (ii) Car lanes and lanes for commercial vehicles shall be earmarked at the toll plaza with outer lanes earmarked for the commercial vehicles. At least 50% of the total lanes on each side shall be equipped with weigh-in-motion facility for dedicated use by commercial vehicles followed by a static weigh bridge on either side. Number of lanes with weigh-in-motion facility may be suitably increased depending on proportion of commercial vehicles in total traffic. Provision should be kept for acquisition and earmarking of about one acre area for parking of the overloaded vehicles.

## 7. Use of Technology

- (i) The use of technology, particularly environment friendly technology viz. recycling of bituminous mixes, warm mixes and soil stabilization etc. should be adopted wherever feasible. Clause 519 of the "Specifications for Road and Bridge Works" (Fifth Revision) covers specifications for recycling of existing bituminous pavement materials to upgrade the pavements. These provisions notwithstanding, recycling of existing bituminous materials is yet to be implemented in most of the NHAI projects. The reclaiming and reprocessing of pavement materials involve both design (how the pavement should be designed using reclaimed materials with the given properties) and technology (the

methods to reclaim and reprocess, equipment, knowhow and quality) issues. After addressing these issues, the recycling of pavements will be environmentally and economically better option for rehabilitation, repair or reconstruction compared to the use of fresh or virgin materials. Indian Roads Congress has published IRC:120-2015 on “recommended practice for recycling of bituminous pavements” giving a detailed procedure for its implementation.

- (ii) The use of LiDAR, ROMDAS, Drone surveys or similar or any advanced Technologies has to be built in the DPR for proper monitoring of the Road maintenance works. The monitoring of maintenance condition of any road stretch shall require use of the technology / system at least twice a year i.e. once in the months of March / April i.e. before the Monsoons and the second round being post-monsoon i.e. during the months of October - November every year.



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To:

All officers and employees of HQ/ROs/PIUs/CMUs/Site Offices