

No. RW/NH-33044/14/99/S&amp;R

Dated, the 19th November, 1999

To

The Secretaries/Chief Engineers of States/UTs of States/Union Territories, PWDs (dealing with NHs and centrally sponsored schemes); Secretary, BRDB; Chairman, National Highways Authority of India; Director General Border Roads

Subject : Need for Road Safety Audit of NHs in respect of existing roads and improvement plans - checklist regarding

The increasing problem of road accidents and the losses due to the same in terms of injuries, impairments and fatalities have become an issue needing utmost consideration in the country in the context of continuous increase in the length of road network and the rise in the vehicle population.

2. While the current trends of road accidents on the NHs in the country give enough cause for concern the limited resources position compels us to ensure that the available allocations are used most effectively so that the most appropriate safety measures are introduced for maximum benefit. In India, at present there is no model or mechanism developed to evaluate the degree of safety of road sections on a road network. The 'Manual for Safety in Road Design' published by the MOST highlights appropriate design principles for promoting safety conscious road design and should be used as a guide by the highway engineers and planners to make our roads more safe. Chapter 6 of the Manual highlighting the procedures and code of good practice for safety audit, contains a checklist to serve as a guide to ensure that important safety aspects do not get overlooked.

3. A copy of the above checklist is enclosed for ready reference. As may be seen the checklist provides guidelines on the principal issues that need to be examined at various stages viz;

- (i) during feasibility study;
- (ii) completion of preliminary design;
- (iii) completion of detailed design;
- (iv) completion of construction; and
- (v) existing roads

4. It is requested that all out efforts may be made to ensure that the checklists are appropriately used at the various stages as mentioned above and duly filled checklist should invariably be enclosed with every proposal for development of NHs in future.

5. Any difficulty in the use of the checklist as observed at your end may be reported to the Ministry for clarifications/guidance. It is requested that a report in this regard be furnished to the Ministry to serve as a feedback for further refinement of the checklists.

[Enclosure to Ministry's Circular No. RW/NH-33044/14/99/S&R dated 19th Nov., 1999]

#### 6.4. Checklists

The use of checklist is highly recommended as they provide a useful "aide memoire" for the audit team to check that no important safety aspects are being overlooked. They also give to the project manager and the design engineer a sense of understanding of the place of safety audit in the design process. The following lists have been drawn up based on the experience of undertaking systematic safety audit procedures overseas. This experience indicates that extensive lists of technical details has encouraged their use as "tick" sheets without sufficient thought being given to the processes behind the actions. Accordingly, the checklists provide guidelines on the principle issues that need to be examined during the course of the safety audits.

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Table 6.4.1. Stage F - During Feasibility Study

1. The audit team should review the proposed design from a road safety perspective and check the following aspects.	
CONTENTS	ITEMS
Aspects to be checked	<ul style="list-style-type: none"> <li>A. Safety and operational implications of proposed alignment and junction strategy with particular references to expected road users and vehicle types likely to use the road.</li> <li>B. Width options considered for various sections.</li> <li>C. Departures from standards and action taken.</li> <li>D. Provision for pedestrians, cyclists and intermediate transport.</li> <li>E. Safety implications of the scheme beyond its physical limits, i.e., how the scheme fits into its environs and road hierarchy.</li> </ul>
A1 : General	<ul style="list-style-type: none"> <li>➤ Departures from standards</li> <li>➤ Cross-sectional variation</li> <li>➤ Drainage</li> <li>➤ Climatic conditions</li> <li>➤ Landscaping</li> <li>➤ Services apparatus</li> <li>➤ Lay-byes</li> <li>➤ Footpaths</li> <li>➤ Pedestrian crossings</li> <li>➤ Access (minimise number of private accesses)</li> <li>➤ Emergency vehicles</li> <li>➤ Public Transport</li> <li>➤ Future widening</li> <li>➤ Staging of contracts</li> <li>➤ Adjacent development</li> </ul>
A2 : Local Alignment	<ul style="list-style-type: none"> <li>➤ Visibility</li> <li>➤ New/existing road interface</li> <li>➤ Safety aids on steep hills</li> </ul>
A3 : Junctions	<ul style="list-style-type: none"> <li>➤ Minimise potential conflicts</li> <li>➤ Layout</li> <li>➤ Visibility</li> </ul>
A4 : Non-motorised Road Users Provision	<ul style="list-style-type: none"> <li>➤ Adjacent land</li> <li>➤ Pedestrians</li> <li>➤ Cyclists</li> <li>➤ Non-motorised vehicles</li> </ul>
A5 : Signs and Lighting	<ul style="list-style-type: none"> <li>➤ Lighting</li> <li>➤ Signs/Markings</li> </ul>
A6 : Construction and Operation	<ul style="list-style-type: none"> <li>➤ Buildability</li> <li>➤ Operational</li> <li>➤ Network management</li> </ul>

Table 6.4.2. Stage 1 - Completion of Preliminary Design

1. The audit team should review the proposed design from a road safety perspective and check the following aspects.	
CONTENTS	ITEMS
Aspects to be checked	A. Safety and operational implications of proposed alignment and junction strategy with particular references to expected road users and vehicle types likely to use the road. B. Width options considered for various sections. C. Departures from standards and action taken. D. Provision for pedestrians, cyclists and intermediate transport. E. Safety implications of the scheme beyond its physical limits, i.e., how the scheme fits into its environs and road hierarchy.
B1 : General	➤ Departures from standards ➤ Cross-sectional variation ➤ Drainage ➤ Climatic conditions ➤ Landscaping ➤ Services apparatus ➤ Lay-byes ➤ Footpaths ➤ Pedestrian crossings ➤ Access (minimise number of private accesses) ➤ Emergency vehicles ➤ Public Transport ➤ Future widening ➤ Staging of contracts ➤ Adjacent development
B2 : Local Alignment	➤ Visibility ➤ New/existing road interface ➤ Safety aids on steep hills
B3 : Junctions	➤ Minimise potential conflicts ➤ Layout ➤ Visibility
B4 : Non-motorised road users Provision	➤ Adjacent land ➤ Pedestrians ➤ Cyclists ➤ Non-motorised vehicles
B5 : Signs and Lighting	➤ Lighting ➤ Signs/Markings
B6 : Construction and Operation	➤ Buildability ➤ Operational ➤ Network management

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Table 6.4.3. Stage 2 - Completion of Detailed Design

1. The audit team should satisfy itself that all issues raised at Stage I have been resolved. Items may require further consideration where significant design changes have occurred. 2. If a scheme has not been subject to a Stage I audit, the items listed in Checklists B1 to B6 should be considered together with the items listed below:-	
CONTENTS	ITEMS
Aspects to be checked	A. Any design changes since Stage 1. B. The detailed design from a road safety viewpoint, including the road safety implications of future maintenance (speed limits; road signs and markings; visibility; maintenance of street lighting and central reserves).
C1 : General	➤ Departures from standards ➤ Drainage ➤ Climatic conditions ➤ Landscaping ➤ Services apparatus ➤ Lay-byes ➤ Access ➤ Skid-resistance ➤ Agriculture ➤ Safety fences ➤ Adjacent development
C2 : Local Alignment	➤ Visibility ➤ New/Existing road interface
C3 : Junctions	➤ Layout ➤ Visibility ➤ Signing ➤ Lighting ➤ Road markings ➤ T.X. Y- junctions ➤ All roundabouts ➤ Mini roundabouts ➤ Traffic signals
C4 : Non-motorised road users Provision	➤ Adjacent land ➤ Pedestrians ➤ Cyclists ➤ Non-motorised vehicles
C5 : Signs and Lighting	➤ Advanced direction signs ➤ Local traffic signs ➤ Variable message signs ➤ Other traffic signs ➤ Lighting
C6 : Construction and Operation	➤ Buildability ➤ Operational ➤ Network management

Table 6.4.4. Stage 3 - Completion of Construction (prior to opening)

1. The audit team should check that the design drawings have been accurately translated into the scheme as constructed and that no inherent safety defect has been incorporated into the works.	
2. Particular attention should be paid to design changes which have occurred during construction.	
CONTENTS	ITEMS
Aspects to be checked	A. That previously agreed recommendations have been incorporated. B. That there are no previously unidentified problems, so far as is possible (signs obscuring visibility, misleading information conveyed to motorists/pedestrians, etc.) C. Check to be carried out in daylight and at night.
D1 : General	➤ Departures from standards ➤ Drainage ➤ Climatic conditions ➤ Services apparatus ➤ Access ➤ Skid-resistance ➤ Safety fences ➤ Adjacent development ➤ Bridge parapets
D2 : Local Alignment	➤ Visibility ➤ New/existing road interface
D3 : Junctions	➤ Visibility ➤ Road markings ➤ Mini roundabouts ➤ Traffic signals
D4 : Non-motorised road users Provision	➤ Adjacent land ➤ Pedestrians ➤ Cyclists ➤ Non-motorised vehicles
D5 : Signs and Lighting	➤ Signs ➤ Variable message signs
D6 : Operation	➤ Maintenance ➤ Network management

Table 6.4.5. Existing Roads

1. The audit team should check the existing road from a road safety perspective and check the following aspects.	
CONTENTS	ITEMS
Aspects to be checked	<ul style="list-style-type: none"> <li>A. Safety and operational implications of alignment and junctions, with particular reference to road users and vehicle types currently using road</li> <li>B. Departures from current standards</li> <li>C. Provision for pedestrians, cyclists and intermediate transport</li> <li>D. Road safety implications on maintenance</li> <li>E. Check to be carried out in daylight and at night</li> </ul>
E1 : General	<ul style="list-style-type: none"> <li>➤ Departures from standards</li> <li>➤ Drainage</li> <li>➤ Climatic conditions</li> <li>➤ Landscaping (maturity)</li> <li>➤ Services apparatus</li> <li>➤ Access</li> <li>➤ Skid resistance</li> <li>➤ Safety fences</li> <li>➤ Adjacent development</li> <li>➤ Bridge parapets</li> </ul>
E2 : Local Alignment	<ul style="list-style-type: none"> <li>➤ Visibility</li> <li>➤ New/existing road interface</li> <li>➤ Safety aids on steep hills</li> </ul>
E3 : Junctions	<ul style="list-style-type: none"> <li>➤ Layout</li> <li>➤ Visibility</li> <li>➤ Road signs markings</li> <li>➤ T, X, Y-junctions</li> <li>➤ All roundabouts</li> <li>➤ Mini roundabouts</li> <li>➤ Traffic signals</li> </ul>
E4 : Non-motorised road users Provision	<ul style="list-style-type: none"> <li>➤ Adjacent land</li> <li>➤ Pedestrians</li> <li>➤ Cyclists</li> <li>➤ Non-motorised vehicles</li> </ul>
E5 : Signs and Lighting	<ul style="list-style-type: none"> <li>➤ Lighting</li> <li>➤ Signs</li> <li>➤ Variable message signs</li> </ul>
E6 : Operation	<ul style="list-style-type: none"> <li>➤ Maintenance</li> <li>➤ Network management</li> </ul>