ROAD SAFETY AUDIT REPORT
PROPOSED NEW JUNCTIONS AT HATIKAMRUL AND BONPARA
(NALKA – HATIKAMRUL – BONPARA ROAD)

Background
The need to do an audit was discussed when the Road Safety Engineering Advisor met the Project Director, Mr Nurul Azan Khan on Wednesday 11th August.

Drawings of the proposed Hatikamrul junction (dated 27/8/99) and the proposed Bonpara junction (dwg. no. NHB/JUCN./MAHL-) were provided by the consultant. Junction turning movement data for Hatikamrul was also provided.

The persons undertaking the audit were:
Mr Habibur Rahman, EE, Road Safety Division, RHD
Mr Allan Jones, Road Safety Engineering Advisor, RHD
Md. Shahabuddin, AE, Road Safety Division, RHD
Md. Aminul Hoque, SAE, Road Safety Division, RHD

It was not possible for the audit team to inspect the site in the time available.

A meeting took place on 30/8/99 with Mr D. Hansen of DHV Consultants to obtain information on what is proposed.

Presentation of the audit findings

HATIKAMRUL JUNCTION

1. Problem
The safety of a roundabout is very much dependent on being able to keep the speed of motor vehicles down to about 40 km/h. The proposed layout has several features which permit, and may encourage, much higher speeds. These include: the wide entries and exits (2 lanes plus shoulder), the large radius of the entries and exits, and the wide circulatory carriageway. Also, the size of the central island relative to the layout of the entries does not provide sufficient deflection to keep entry speeds down to the required safe level. These problems are most obvious in the left turn from the Bogra road into the Nalka road.

Recommendation
It is recommended that motor vehicle speeds through the junction be constrained by: providing single lane entries and exits; smaller entry and exit radii, and much greater deflection on entry.

2. Problem
NMVs are at risk of being hit by motor vehicles, especially at the entries and exits. The volume of NMVs (currently about 300 per hour) is such that it is worth considering segregating the NMVs from the MVs to avoid the dangerous conflicts.

Recommendation
There are various ways of segregating NMVs but the best would be to build a two-level roundabout with the NMVs circulating at approach road level and the MVs above. This would entail raising the roundabout and letting NMVs circulate on paths below it – using culverts to get under the roundabout approach roads – see Figure 1.

The junction should be fully signed in accordance with the new RHD standards.

BONPARA JUNCTION

1. Problem
The safety of a roundabout is very much dependent on being able to keep the speed of motor vehicles down to about 40 km/h, and this is especially important where there is a mix of NMV and MV traffic. The proposed layout has several features which permit, and may encourage, much higher speeds. These include: the wide entries and exits (2 lanes plus shoulder), the large radius of the entries and exits, and the wide circulatory carriageway. Also, the size and positioning of the central island relative to the alignment of the entries does not provide sufficient deflection to keep entry speeds down to the required safe level. This last problem is most obvious with the entry from the Pabna
direction, which has no deflection; consequently vehicles will enter the roundabout at too high a speed and either collide with circulating traffic or fail to negotiate the roundabout and run off the road.

**Recommendation**

It is recommended that motor vehicle speeds through the junction be constrained by: providing single lane entries plus shoulder for NMVs; smaller entry and exit radii, reducing the width of the circulatory carriageway, increasing the size of the central island, and moving the island to the west by a few metres so that its centre is on or near the centreline of all the approach roads. Figure 2 illustrates one way in which this could be done, but other layouts could be devised which would meet the safety objectives.

2. **Problem**

The volume of NMVs in the junction is such that they need to be guided into following a safe path through the junction. Otherwise there will be too many dangerous conflicts with motor vehicles. The proposed design does not make any provision for NMVs other than a shoulder.

**Recommendation**

There are various ways of providing for NMVs in roundabouts and the option recommended here is to provide a lane for NMVs around the outer edge of the circulatory carriageway – see Figure 2. This design has been adapted from that commonly used in Holland and Denmark at junctions which are well used by cyclists. The NMV lane markings must be in thick thermoplastic screed which will be more durable and better respected than a paint marking.

3. **Problem**

The lack of access control, together with the wide circulatory carriageway, will lead to various safety problems. Buses may park in the junction to load or unload passengers. Pedestrians and NMVs may gather in the junction where they will cause congestion and be at risk of being hit by motor vehicles. Pedestrians will also walk on the shoulder in the absence of footways and cross the junction using the central island.

**Recommendation**

The paved area should be kerbed throughout and footways provided. Pedestrian guardrail should be installed to keep pedestrians out of the junction (and discourage vehicles from stopping) and channel them to crossing points opposite the splitter islands. Building development should be discouraged by creating earth mounds, with suitable landscaping, on the perimeter of the roundabout.

The junction should be fully signed in accordance with the new RHD standards.

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**Modified Design for Hatikamrul Roundabout**

Scale: 1:500

- Central island diameter is 30m
- Circulating carriageway is 10m wide of which the outer 2m is a lane for rickshaws
- Entry and exit radii are 20m
- Minimum entry and exit width is 6m of which the outer 2m is a lane for rickshaws
- Approach road section is a 7.3m carriageway plus 2 x 1.5m wide shoulders
- Limits of paved area should be kerbed and pedestrian guardrail installed
- Junction should be fully signed in accordance with new RHD standards
Road Safety Audit

**Modified Design for Bonpara Roundabout**

Scale: 1:500

- Central island diameter is 32m
- Circulating carriageway is 9m wide
  - of which the outer 2m is a lane for rickshaws
- Entry and exit radii are 20m
- Minimum entry and exit width is 6m of which the outer 2m is a lane for rickshaws
- Approach road section is a 7.3m carriageway plus 2 x 1.5m wide shoulders
- Limits of paved area should be kerbed and pedestrian guardrail installed
- Junction should be fully signed in accordance with new RHD standards
Sketch design for two-level roundabout at Hatikamrul – plan and cross-section of entry from Naika
Plan

Cross-section

To Nalka
To Bonpara

To Hatikamrul

To Natore