9 Designing Safer Roads

9.1 Road Accidents and Their Causes

Bangladesh has a serious road accident problem. In 1998 over 3,000 people were killed in road accidents, and the rate of death per 10,000 vehicles is one of the highest in the world. Apart from the human suffering involved there is a heavy cost to the nation’s economy. About half of all the injury accidents occur on RHD roads. Road accidents are complex events and, although road user error is a major cause, there are almost always other contributory factors, including defective vehicles and problems with the road or the road environment. Road problems are rarely the principal cause of accidents, but it is very often the case that, if they had not been present, the accident would not have happened.

The National Road Safety Council is spearheading efforts to improve the skills and attitudes of drivers and other road users, but it will inevitably take a long time for these to produce results. Improving the engineering of our roads is much easier and in the short-term may be the quickest and most effective way of reducing the accident toll. The Roads and Highways Department is committed to this, and all highway designs produced for RHD must take full account of safety concerns. Moreover it is now RHD policy that all major projects be submitted to its Road Safety Division for a road safety audit prior to being finalised (see Section 9.3).

9.2 Safety Principles

Designing safer roads is not technically difficult but it does require a different approach and emphasis from that of traditional road design practice. There are five design principles to be followed:

- Design for all road users
- Reduce conflicts
- Encourage appropriate speeds and behaviour by design
- Avoid surprises and confusion
- Create a forgiving road

9.2.1 Design for All Road Users

In the past road designers have tended to concentrate on providing for motor vehicles to travel along the road as fast as possible. The needs of other road users including pedestrians, cyclists, and rickshaw riders were largely ignored – as were the needs of bus drivers and their passengers, and people who needed vehicle access to roadside property. This was short-sighted because the congestion and other problems caused by failing to provide for all road users meant that the benefits of constructing a good road pavement were partly lost. Designers are now taking a wider view but there is still not enough attention being given to how everyone will use the road.
9.2.2 Reduce Conflicts

Conflicts, whether between vehicle streams, or vehicle types, or vehicles and pedestrians, are always associated with accidents. Conflicts can often be reduced or designed out. Examples include:

- providing shoulders suitable for use by NMVs and stopped vehicles
- providing NMV lanes and service roads separate from the main carriageway
- substituting a roundabout or a staggered junction for a cross-roads
- using pedestrian guardrail to channel pedestrians to safe crossing points
- providing roadside space for markets, bus parks, etc.

9.2.3 Encourage Appropriate Speeds and Behaviour by Design

One of the biggest failings in past road projects has been the way in which roads have been improved through towns and villages without considering the safety implications. Speeds have increased because of the much better pavement, and this has resulted in more accidents. Local people on foot or in rickshaws are the main victims. In future all projects that improve roads through towns and villages must incorporate traffic calming measures. This might involve nothing more than altering the way the road looks as it enters the town or village. Where we want drivers to slow down we must give them clear visual clues, such as changing the shoulder treatment, providing a footway, and installing highly conspicuous signing and road marking. These measures can be supplemented by more aggressive traffic calming measures such as rumble strips, carriageway narrowings and, if absolutely necessary, road humps.

Speed control should also be a primary objective in junction design. This means keeping the amount of paved area to a minimum, using minimum corner radii, and limiting the number of lanes. Roundabouts must be designed so that vehicles are forced to slow down on entry.

9.2.4 Avoid Surprises and Confusion

Good highway design will result in a road which can be easily read and understood by the driver and presents him or her with no surprises. This is a particularly important consideration when designing the alignment – a sharp bend after a long straight or just beyond a crest curve is sure to produce accidents. The consistency check (see Section 3.6) should help prevent these problems. Junctions should be designed so that approaching drivers are faced with a clear, simple, familiar routine for getting through them. Avoid over-complicating the junction with too many islands, lanes and markings.

Traffic signs have a very important role in helping road users to make good, safe use of the road system. Drivers can be warned of difficult or potentially confusing situations and be guided through them. The general standard of traffic signing in Bangladesh is quite poor, but it should improve now that the Bangladesh Road Transport Authority (BRTA) has introduced a new modern traffic sign system. It is essential that the signs be used in a consistent way, and this can be ensured by following the technical advice contained in the BRTA Traffic Signs Manual.

9.2.5 Create a Forgiving Road

A safe road is one which recognises the realities and human limitations of the road user. To say that drivers are wholly to blame for their accidents is not helpful or constructive. Where possible we must build roads that allow for a margin of error – a forgiving road. This is of particular relevance for the design of the roadside, as many severe accidents happen when
drivers lose control and the vehicle leaves the road, hits a roadside object, or overturns down a steep embankment. More needs to be done to reduce the severity of these loss-of-control accidents. This includes removing roadside hazards and, where this is not possible, shielding them with safety barrier and signing them. Bridge parapets and traffic islands need to be designed so as to minimise the consequences of vehicles hitting them.

9.3 Safety Audit

It is the policy of the Roads and Highways Department to undertake a safety audit of all its major road schemes prior to completion. A safety audit is a systematic check on the safety of a road scheme done by an independent team of safety experts. It is essential that the audit starts at an early stage in the design process when it is still easy to change things. The key stages for auditing a scheme are:

- the feasibility study – for checking the route, junction location and the road standard
- the engineering design – for checking the detailed design
- pre-opening - for checking signs and markings etc.

The audit procedure is broadly as follows:

- Project Director asks for a safety audit and provides a full set of drawings and reports
- Audit team examines the drawings to check for safety problems and is guided in this by established safety and traffic engineering principles
- Audit team visits the route / site and tries to imagine how the various road users will cope with the proposed road
- An audit report is produced which lists each safety problem together with the recommended solution
- Audit report is submitted to the Project Director who then decides whether to amend the design.

The Road Safety Division is responsible for road safety audits and they have staff with the necessary skills and experience. The schemes that have been audited so far were all about to go to tender, so the scope for changes was rather limited, but nevertheless in every case it has been possible to make worthwhile improvements. If just one injury accident has been prevented then the audit will have more than paid for itself.

The value of doing road safety audits is now being recognised by the donor community and it is probable that they will become a mandatory requirement for foreign-aided projects.