

B. Case study 2: A Detailed Design Stage Audit of the Reconstruction of a 300-km Section of a National Highway

(i) Title

146. The complete technical title of the audit, including its location and aims.

(ii) Audit team

147. The name and the role of the team leader and each audit team member

(iii) Project background

148. Currently this highway is a category III/IV road with two lanes (one in each direction). It is in poor

condition and, due to the amount of heavy traffic, bridges and culverts are failing. A proposal exists to upgrade a 300-km section of the road to Category II standard on the existing alignment. The highway passes through rural areas and traffic speeds are high (observed to be up to 120 km/h during the site inspection). Most of the highway is quite straight and flat, with only a few short undulating sections.

(iv) Audit details

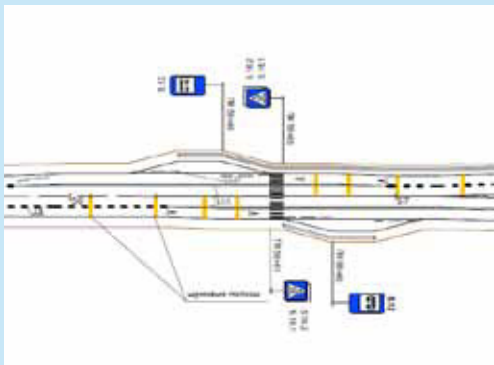
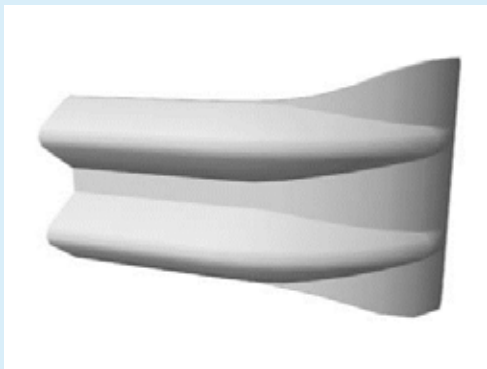
149. The road safety audit was undertaken by a team of two accredited auditors. It included a daytime and a nighttime site inspection on Wednesday, 15 June. The weather during the inspection was fine, sunny, and warm or hot.

150. The audit findings are provided in table 9.



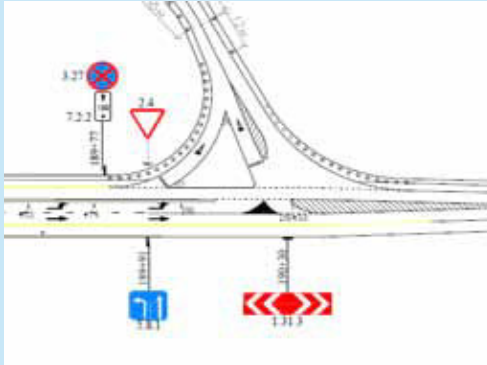

An intersection on a recently rehabilitated section of A-27, 25 km north of the start of the proposed works.

Table 9: Case Study 2–Findings of a Detailed Design Stage Audit of the Reconstruction of a 300-km Section of a National Highway

Km	Safety Concern	Risk	Photo	Recommendations	Client Response
Safety Concerns with the Proposed Reconstruction of the National Highway					
General	<p>Throughout the scheme, pedestrian crossings have been proposed to link communities with bus stops. In most locations, these crossings straddle four lanes with no refuge for crossing pedestrians. Users of the crossings will effectively have to cross with no control in a single phase. The presence of the second lane will encourage overtaking in the vicinity of the crossings and potentially higher speeds. These combined factors will increase the risk of conflict between pedestrians and vehicles.</p>	Very high	 <p>Source: TOP Geodezia, Almaty.</p>	<ul style="list-style-type: none"> • Reduce the carriageway from four to two lanes at these locations. • Provide appropriate lengthened entry and exit tapers to negate the need for extra lanes. • Any acceleration lanes for adjacent junctions should terminate in advance of the bus stops, not continue through the bus stop location. 	
General	<p>The standard drawings show the crash barrier terminals to be provided throughout the scheme will be the “fish tail” type. These terminals, when facing oncoming traffic, are a considerable roadside hazard and a “spearing” hazard. They cause injury to vehicle occupants should an errant vehicle strike them.</p>	Medium	 <p>Source: Matthew Chamberlain.</p>	<ul style="list-style-type: none"> • Provide passively safe terminal ends for all barrier terminals. • Ensure the standard drawings are altered so “fish tail” terminals are removed and an approved passively safe terminal shown instead. 	



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Table 9: continued

Km	Safety Concern	Risk	Photo	Recommendations	Client Response
Km 190	<p>A side road joins the main line here at an acute angle and the exit and entry radii are very relaxed, increasing the entry speeds of vehicles entering from the side road. This also will encourage high-speed movements onto the side road. This problem is exacerbated by the size of the junction and the lack of any physical islands within the junction; only road markings are proposed. This will increase the risk of “give way” conflicts. It will also increase the risk of vehicles entering the side road at high speed and losing control.</p>	High	 <p>Source: TOP Geodezia, Almaty.</p>	<ul style="list-style-type: none"> • Provide tighter radii to cause drivers to reduce speed on their approach to the main line, and also while entering from the main line onto the side road. • Reduce the size of the junction to encourage lower vehicle speeds. • Provide a physical (not painted) island within the junction to deter vehicle from crossing into opposing lanes. 	
Km 248	<p>A side road joins the main line at an acute angle here. The exit and entry radii are very relaxed, which will increase the entry speeds from the side road. They will also encourage high-speed entry movements into the side road. This will increase the risk of “failure to give way” conflicts as well as vehicles potentially entering the side road at high speed and losing control.</p>	High	 <p>Source: TOP Geodezia, Almaty.</p>	<ul style="list-style-type: none"> • Provide tighter radii to cause drivers to reduce speed on the approach to the main line, and also when entering from the main line onto the side road. 	

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Table 9: continued

Km	Safety Concern	Risk	Photo	Recommendations	Client Response
Km 277	There is an existing narrow bridge across a wide river (500 m) here. It has large concrete parapets that are roadside hazards. It is the only such bridge along this highway and, as such, it may surprise some drivers. The drawings are silent about any safety improvements at or along this narrow bridge. W-beam safety barrier is needed to shield the side slopes, and there is a need to delineate the bridge to reduce the risk of side swipe collisions at night.	High		<ul style="list-style-type: none"> • Install a pair of “Narrow Bridge” warning signs approximately 100 m ahead of the bridge on each approach. • Install “width markers” on each parapet 2 m above the road surface to delineate the corners of the narrow bridge. • Install lengths of W-beam barrier to shield the side slopes on both sides of the highway. • Stiffen the barrier over the last 10 m by reducing the post spacings to half. • Affix the barrier firmly to the parapets. 	
Km 297.7	Pedestrians walk along a small side road on the right) from a village to the highway to catch minibuses. They cross the highway to do this. However, the drawings do not show anything to assist them with their crossing of the highway. Traffic speeds at the location are high and may increase after the rehabilitation. A pedestrian crossing is not appropriate due to the low volumes of pedestrians and the high speed of traffic. A refuge island offers the safest option for all.	Medium		<ul style="list-style-type: none"> • Ensure the safety of these pedestrians is discussed and resolved before the designs are completed. • Consider installing a length of divided road (up to 200 m long) with a median at least 3 m wide to provide a refuge for crossing pedestrians. • Install appropriate warning signs on both approaches—for the median and the pedestrians. • Consider a shelter for pedestrians. 	

Km = kilometer, m = meter.

The audit team carried out this detailed design stage road safety audit according to the CAREC Road Safety Audit Manual.

SIGNED:

{INSERT NAME HERE} Team leader on behalf of the Road Safety Audit team {DATE}

Source: Asian Development Bank.