



CAREC Road Safety Engineering Manuals

I. Road Safety Audit

Case Study 4

Central Asia Regional Economic Cooperation Program



Case Study 4

Case Study Four

A pre-opening stage audit of a 120km section of national highway in the western province

Title

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

Audit Team

The name and the role of each audit team member

Project Background

The national highway links the capital with the nation's second largest city and onwards into the border. One section of the highway (120km in length) has been recently rehabilitated as a category III road with two lanes (one in each direction) as a part of a national program of improving national highways. Most of the highway is quite straight and flat, with only a few undulating areas. The highway passes mainly through rural areas and there are several villages along the route. Near the midpoint of this section of highway is a rocky hill section that has led to lower design parameters for the rehabilitation. The highway passes through this hill section for approximately 8 kilometres. It has several steep grades (some up to 12%) and some sharp horizontal curves (four are 180° curves each with a radius of 50m or less). Traffic speeds in the hill sections were observed to be around 60km/h, and in the flat open areas around 90 - 110km/h during the site inspection.

No earlier audits have been undertaken for this road project. A pre-opening stage audit has been requested to ensure that road safety has been adequately considered. Some concerns have been expressed by some truck drivers for safety in the hill section, while the Client has sought the audit to assist with decision making during the 12 month "maintenance period" during which the Contractor is required to maintain the highway.

Audit Details

This pre-opening stage road safety audit included a day time and a night time site inspection on Monday 29th November. The weather during the inspection was windy, but generally fine and cold. The audit team comprised three accredited road safety auditors.

Photo credit:
Phillip Jordan



Audit Findings

KM.	SAFETY CONCERN	RISK	PHOTO	RECOMMENDATION	CLIENT RESPONSE
SAFETY CONCERNS ALONG THE NEWLY COMPLETED NATIONAL HIGHWAY IN THE WESTERN PROVINCE					
GENERAL	Curves have been delineated inconsistently. Several have too many CAM's installed, some have CAM's in one direction only (the other direction is not delineated), and there are several curves (especially in the hill section) that need CAM's but have none. Such inconsistent delineation can cause drivers to be caught by surprise at sharp curves; run-off-road crashes can result.	HIGH	 <p>Photo credit: Phillip Jordan</p>	<ul style="list-style-type: none"> - Undertake a review of the delineation (especially the use of chevron alignment markers CAM's) throughout the length of the highway. - Ensure that <u>all</u> curves with a radius less than 150m have at least three chevrons (with standard spacings) installed on the outside of the curve to face <u>both</u> directions of travel. - Remove redundant CAM's. 	
GENERAL	The line marking is clear and correct at the beginning of the newly completed road. However, the edge lines are not continuous in the second half of the highway. Loose gravel and sand from the shoulder is obscuring most of the edge lines that have been installed. This is leading to safety issues due to reduced day and night time delineation.	MED	 <p>Photo credit: Phillip Jordan</p>	<ul style="list-style-type: none"> - Sweep the road pavement and the shoulders to keep the road free of gravel and sand, and to make visible the edge lines that have been installed. - Then, complete the edge lines as shown in the Contract drawings. 	
GENERAL	W beam barrier has been installed at each of the six bridges along this highway to shield the side slope on each approach. However, none of these sections of barrier have been stiffened nor correctly affixed to the bridge parapets. There is a risk of "pocketing" into these bridge parapets.	MED	 <p>Photo credit: Phillip Jordan</p>	<ul style="list-style-type: none"> - Ensure that the barrier is securely attached to the bridge parapets as described in the CAREC Roadside Hazard Management Manual. - Reduce the post spacings in the final 10m before each bridge to half of the original spacing. Use double nested railing as necessary to prevent "pocketing". 	

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KM.	SAFETY CONCERN	RISK	PHOTO	RECOMMENDATION	CLIENT RESPONSE
KM 10 - 14	At the large cross intersection at Km 10.8 many items of agricultural machinery enter and leave the highway. They travel slowly along the highway for about 3km to either the local petrol station or the next side road junction near Km 13.6. However, the shoulders are unsealed and the drivers try to stay on the highway to minimise dust. Because they are slow moving and large machines they are difficult to overtake. Head on and rear end collisions may result.	LOW	 <p>Photo credit: Phillip Jordan</p>	<ul style="list-style-type: none"> - Pave the shoulders of the highway between Km 10+00 and Km 14+00 to a width at least 2m to provide an option for drivers of large machinery to use. - Install advance warning signs on the highway to advise drivers of the possibility of machinery using the road. - Install two street lights at the cross road at Km 11.8 and another two at the side road junction near Km 13+60 to highlight turning vehicles. 	
KM 45	There is a school on the right (north) side of the highway near Km 45. It is approximately 600m outside the nearby village and it appears that most of the young children attending the school walk along the edge of the highway from the village. With an unpaved shoulder and nearby long grass children sometimes walk on the road pavement. This exposes them to a risk of a collision with the fast-moving traffic.	MED	 <p>Photo credit: Phillip Jordan</p>	<ul style="list-style-type: none"> - Discuss options with the school. - Pave the shoulders between the village and the school (at least 2m wide) or, - Construct an "all weather" footpath (and possibly cycling path) within the road reservation (right side). This off road path should be at least 3m wide and should be signed for pedestrians and cyclists only. 	
KM 60 - 64	There are steep undrivable roadsides in the hill section between Km 60 – 64 (approx.). Some W-beam barrier has been installed but it is too short in four places, leaving unsafe side slopes unshielded. These side slopes are a serious risk to the occupants of errant vehicles. The slopes cannot be "softened" due to the topography. High quality delineation and more safety barrier is needed.	HIGH	 <p>Photo credit: Phillip Jordan</p>	<ul style="list-style-type: none"> - Improve delineation by installing CAM's (min. 3 per curve in both directions) on the four tightest curves. - Seal the shoulders on the outside of these curves; match the shoulder slope to the super elevation of the curve. - Increase the length of W-beam barrier at the four locations. Ensure all side slopes greater than 3m deep and within the 5m clear zone are shielded by barrier. 	

The Audit Team has carried out this pre-opening stage road safety audit according to the CAREC Road Safety Audit Manual.

SIGNED:

{INSERT NAME HERE} Team Leader on behalf of the RSA Team

{DATE}