

C. Case study 3: Roadworks Stage Audit of the Upgrading of Two Sections of an International Highway

(i) Title

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

(ii) Audit team

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

(iii) Project background

153. This project involves upgrading the two most westerly sections of this international highway. The first is an existing divided highway that is to be improved to a class I, four-lane divided highway. It extends between the border crossing (Km 256.7) and the outskirts of the border township at Km 252.1. The work in this section involves rehabilitating both carriageways, replacing four damaged culverts, constructing curb and channel at three key intersections, and replacing two old bridges. The second section is between Km 252.1 and the bridge over the river at Km 240.9. The work involves widening and upgrading this 11.2 km section of highway to a class II, two-lane highway according to the Trans Asian Highway design standard.

154. The project has a total length of 15.8 km. The highway is in undulating area for most of this length, but the first 3 km (from the bridge westward) are in hilly terrain with sharp horizontal curves, and steep grades. The highway is used by many trucks and buses, some cars, motorcycles, pedestrians, and some animal-drawn vehicles.




155. The construction work commenced in the first week of May. A roadworks stage audit was undertaken as a condition of the contract. It involved a desktop audit of the Traffic Management Plans (TMPs) submitted by the contractor as well as an audit of the initial TMP when set up. This report details the key findings from the roadworks audit.

(iv) Audit details

156. The road safety audit included a desktop audit of the TMPs between 10 and 11 April. A site inspection took place on Monday, 11 April (day and night) for the audit team to become familiar with the highway at this location. The weather during this inspection was overcast and warm. A further site inspection took place on Tuesday, 10 May, the first day on which the TMPs were in place and just as construction work commenced. This site inspection took place during the afternoon and into the late evening. The weather was fine and warm or hot.




157. The audit findings are provided in table 10.

Table 10: Case Study 3–Findings in a Roadworks Stage Audit of the Upgrading of Two Sections of an International Highway

Km	Safety Concern	Risk	Photo	Recommendations	Client Response
Safety Concerns Identified in the Desktop Audit of the Traffic Management Plans for the International Highway					
General	There are inadequate numbers of reflective warning signs shown in the TMP. The existing highway has speeds of up to 80 km/h in parts, and it is possible some drivers could miss seeing an advance warning sign on the left side of the highway. All warning signs should be duplicated (on both sides of the road) in the advance warning zone.	High	 <p>Source: CAREC Manual 2.</p>	<ul style="list-style-type: none"> Duplicate all road work signs used in this project by ensuring that a matching sign is placed on the right side of the carriageway to match the sign(s) installed on the left side. 	
General	There are no speed restriction or repeater speed restriction signs shown in the TMP. Consistent application of a 40 km/h speed limit through each work zone is recommended for the safety of road users and road workers.	High	 <p>Source: CAREC Manual 2.</p>	<ul style="list-style-type: none"> A uniform 40 km/h speed restriction is recommended through the work site. Ensure that reflective size “A” 40 km/h speed restriction signs are installed in the advance warning zone, and then continue to remind drivers of this limit by installing pairs of repeater 40 km/h speed limit signs every 1 km. 	
From Km 252.1 to Km 256.7	The TMP shows inadequate transition lengths at locations where two lanes were being reduced to one (typically in advance of sections where traffic is to be diverted onto the other carriageway). The TMP is unclear what devices are to be used to provide guidance in the transition zones. It must be ensured that highly visible, forgiving devices (such as traffic cones) are the only acceptable device to use for this.	High	 <p>Source: CAREC Manual 2.</p>	<ul style="list-style-type: none"> Use the <i>CAREC Safer Road Works Manual</i> to determine the necessary length of the transition zones for these locations. Traffic will be travelling at about 60 km/h and have to merge (2 lanes into 1 lane), thus, a zone length of some 100 m will be required. 	

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Table 10: continued

Km	Safety Concern	Risk	Photo	Recommendations	Client Response
From Km 252.1 to Km 256.7	No “Two Way Traffic” warning signs are shown in the TMP to warn and/or inform drivers in both directions when counterflow arrangements exist. One “Go Slow” sign is in place but it is general and gives no warning of the risk of head-on collisions. Allowing drivers to forget they are on a two-way road sets up a high risk of head-on collisions.	High		<ul style="list-style-type: none"> Redesign the TMP to show the installation of duplicated, reflective “Two Way Traffic” warning signs at spacings not exceeding 500 m through the counterflow section of the duplicated highway. Ensure the warning signs face both directions of traffic. 	
General	No workers were sighted wearing reflective or high visibility clothing on-site during the site inspections. This is a requirement in the contract and is essential for personal safety.	Medium		<ul style="list-style-type: none"> Ensure the contractor provides reflective high visibility clothing for all workers. Ensure all workers wear this clothing. Monitor the situation periodically and check that all workers wear the high visibility clothing at all times while working. 	
Km 256+200	Concrete-filled barrels are used as delineators and to hold some “Diversion” signs at this work site. These are roadside hazards and are highly dangerous if struck by a small vehicle or a motorcyclist.	Medium		<ul style="list-style-type: none"> Direct the contractor to remove these concrete-filled drums and replace them with conspicuous but forgiving traffic control devices (such as plastic traffic cones, bollards) and reflective metal signs. 	

Km = kilometer, km/h = kilometer per hour, m =meter, TMP = traffic management plan.

Note: The audit team carried out this roadwork 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.