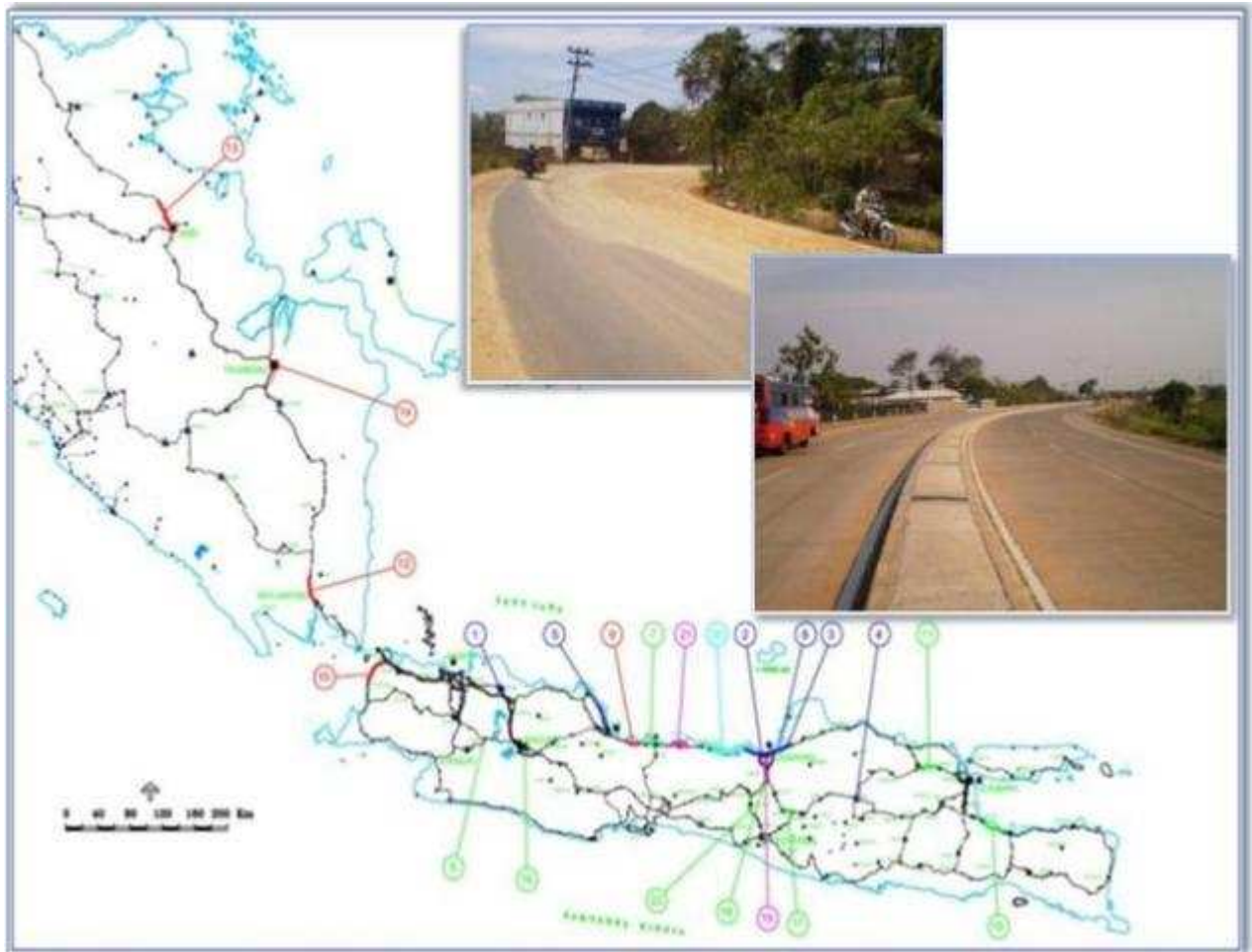




**REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF HIGHWAYS
DIRECTORATE OF PLANNING**



**KARAWANG BYPASS
ROAD SAFETY AUDIT REPORT
As Constructed**

January 2011

THE PROJECT MANAGEMENT UNIT
STRATEGIC ROADS INFRASTRUCTURE PROJECT
Under IBRD Loan 4834 / 7786 ID



Republic of Indonesia
Ministry of Public Work
Directorate General of Highways

Strategic Roads Infrastructure Project (SRIP)

Technical assistance for Core Team Consultant (CTC)
To Support the Management Unit
Under IBRD Loan No. 4834-IND



PACKAGE KARAWANG BYPASS ROAD SAFETY AUDIT REPORT As Constructed June 2010



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Summary of Problems and Recommendations

Junctions

The junction is still very unsafe for pedestrians and much of the signal equipment is not working or damaged

Recommendations

- **Add rumble bars to all approaches**
- **Ensure all broken signal equipment repaired promptly**
- **Upgrade main signal head on each approach to large high visibility specification**

Road Signs

Signs are missing or incomplete. Others are positioned in the wrong place or inappropriate or hidden

Recommendations

- **All traffic signs should be reviewed and damaged or non-standard ones replaced.**
- **Ensure signs are not blocked by trees or vegetation**
- **Install appropriate warning and chevron arrow signs at the sharp bend**

Median Gap

There is a gap in median at a Tee junction at Sta 0+250 that is likely to result in serious accident patterns. The U turns does not have a taper and only a narrow median and is poorly signed

Recommendations

- **Improve the signing at gap and junction at Sta 0+250**
- **Add additional rumble bars on the approaches**

Speed Limits

The road has a design speed 80 Km/H but no speed limit signs are installed

Recommendations

- **Review the whole length of the project and add appropriate speed limit signs**

Guard Rails

There are several areas where guard rail is needed but not installed.

Where it is installed there are defects related to overlap and bridge connections

Recommendations

- **Review the need for and installation of guard rail throughout the project**
- **Install guard rail where embankments 2 m or more**
- **Where possible bury exposed end of guard rails as per the standard**
- **Look at feasibility of constructing a strong connection between flexible guard rail and the rigid parapet.**
- **Ensure overlaps correct**

Pedestrian Crossing

There is an incomplete pedestrian crossing

Recommendation

- **Complete road markings for pedestrian crossings**

Broken Concrete Pavement

Many slabs of the new concrete pavement were completely cracked and some were being repaired already. This has serious safety implications particularly for motorcyclists. The subsequent road works pose hazards for all road users as well as the workers.

Recommendations

- **Review the reasons for the breakup of the concrete and whether related to design, construction or supervision**
- **Apply lessons learned to future projects with similar pavement**
- **Ensure repairs are permanent and will not have to be repeated throughout the life of the project**

1 INTRODUCTION

1.1 Audit Process

Road Safety Audit (RSA) can be defined as a formal examination of a highway or traffic project in which an independent qualified auditor or team of auditors reports on the road safety problems associated with the designs or construction of the project and makes recommendations on improvements.

It started in the UK some twenty years ago and is now common practice around the world. There are several Road Safety Audit Guidelines that are used as standard practice for Audits around the World, an adapted of the Australian Guidelines are actually used in Indonesia

Audits can be carried out at various stages and arguably the earlier the better:

- Feasibility
- Preliminary Design
- Final Design
- Construction
- Pre-Opening
- Existing Road

This Audit covers the As Constructed or Existing Road stage

1.2 SRIP

The Strategic Roads Infrastructure Project (SRIP) was developed to meet the increasing traffic demand and institutional requirements following easing of the 1997 financial crisis in 2001. SRIP, which is supported by the World Bank under IBRD Loan 4834-IND, is being implemented by the Directorate General of Highways within the Ministry of Public Works over the five-year Loan period following its effectiveness date of 01 November 2007. Project implementation is expected to continue through to end 2012, with a possible extension to 2014 to accommodate implementation of the Performance Based Contract component of the Project.

SRIP is composed of twenty two (22) Civil Works packages of road betterment capacity expansion and new roads / bridges, including a trial Performance Based Contract (PBC), encompassing urban and inter - urban National Roads in 7 provinces (4 provinces on Java and 3 provinces on Sumatra). Details for these packages are given in Appendix A. The Implementation Support Component includes two (2) road safety components: Integrated Road Safety Management System (IRSMS) for Directorate General of Land Transport (DGLT) and Directorate of Traffic Police.

SRIP project implementation will be supported by four key consulting assignments: (i) **Core Team Consultants (CTC)**; (ii) Construction Supervision Consultants for non-Metropolitan roads (CSC-1); (iii) Construction Supervision Consultants for Metropolitan roads (CSC-2); and (iv) Procurement Advisor.

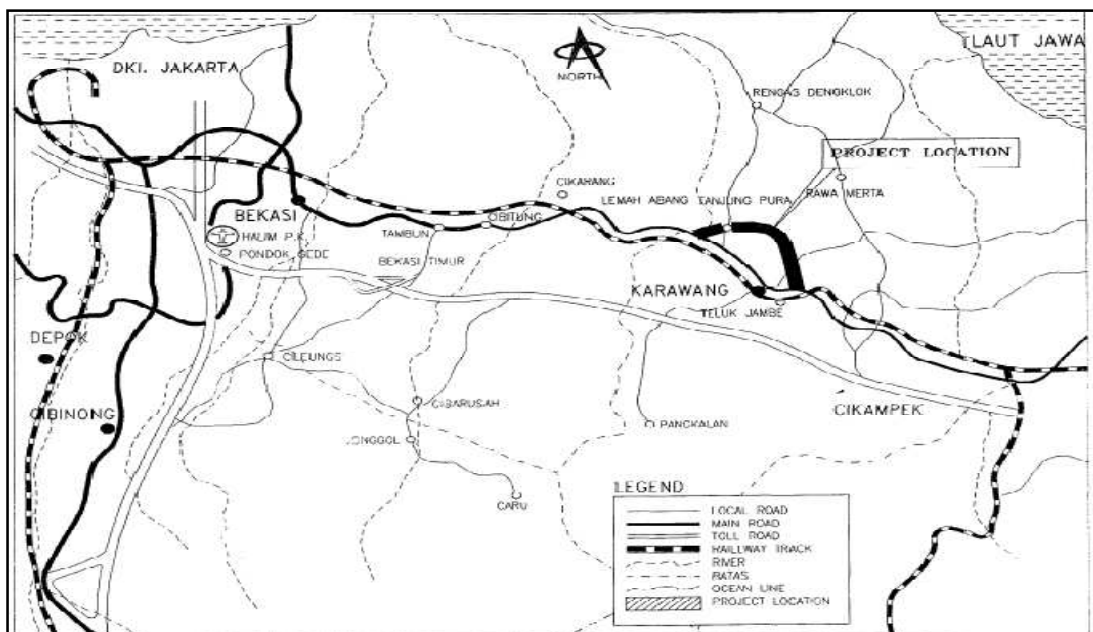
The Core Team Consultants responsibilities include the following: “Karawang Bypass” (WP-1) the CTC has to ensure this package have been reviewed by qualified Road Safety Audit.

The Contractor of the above activities is expected to undertake these works in accordance with the standard specifications of the Directorate General of Highways, Ministry of Public Works and special provisions prepared for this project with Time for Completion of 540 days.

1.3 Objectives of the Project

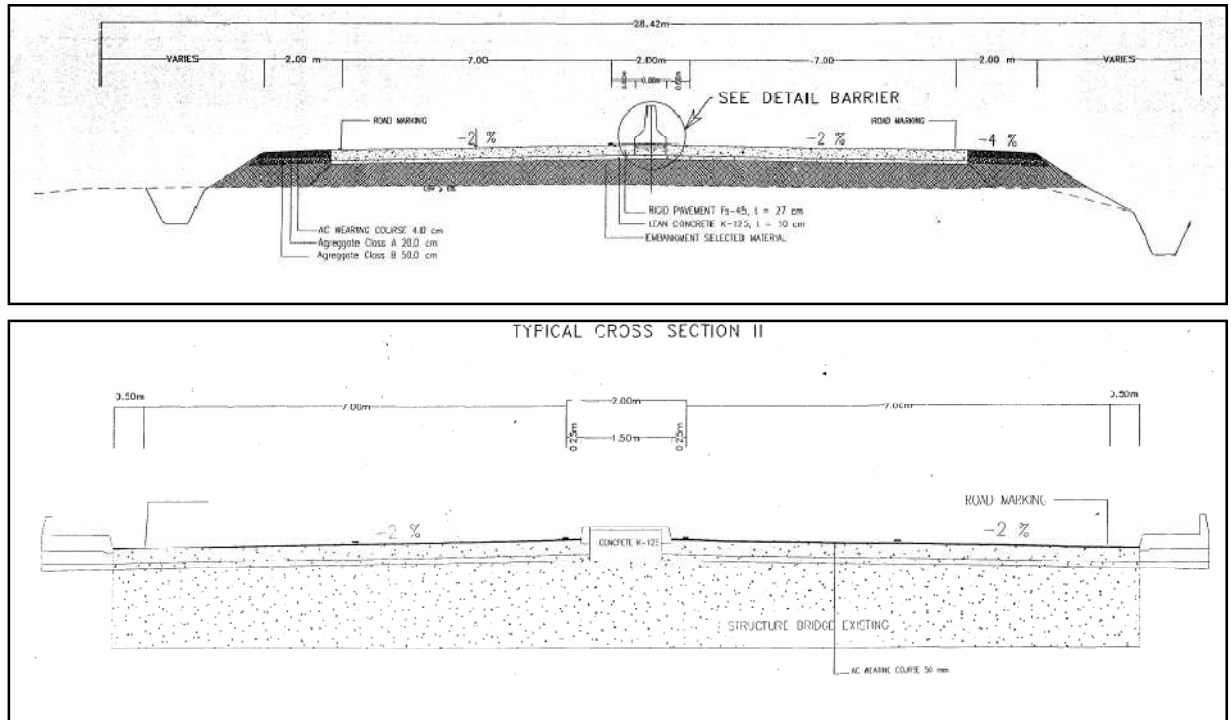
The objectives of the Road Safety Audit are to conduct among others the systematic review/checking of the safety aspects of the completed road plans (as constructed), traffic schemes, recommend the modifications of the plans when safety aspects warrants such changes, and the safety aspects during road construction.

1.4 Project Location



1.5 Project Information

The length of the Road is 11,47 km. Typical Cross section on Detailed Drawing



Karawang By Pass Road is situated in the province of West Java 67.5 km from Jakarta. The road passes mostly rice paddy fields from the starting point up to the end. The road traverses in almost flat terrain.

1.6 Plans and Documents

The plans used in this audit were the contract drawings. The drawings were checked and approved by concerned Bina Marga authorities.

1.7 Traffic Volumes

There are no information previous studies available to the audit team. A traffic study of the Karawang bypass Road normally needed as one of the basis for the level of improvement and justify its construction was not available at the time of the audit.

The existing road section has a high volume of traffic and about one third is considered as vulnerable road users; motorcycles and non-motorized vehicles.

The high volume of traffic along the area reinforces the need to provide a safe road.

1.8 Members of the Audit Team

The road safety audit team is all members of the Core Team Consultant of SRIP and composed of the following:

Mike Goodge	- Senior Road Safety Audit Engineer
Bayani J. Lusica	- Senior Highway Engineer
Agus Herudianto	- Road Safety Audit Engineer

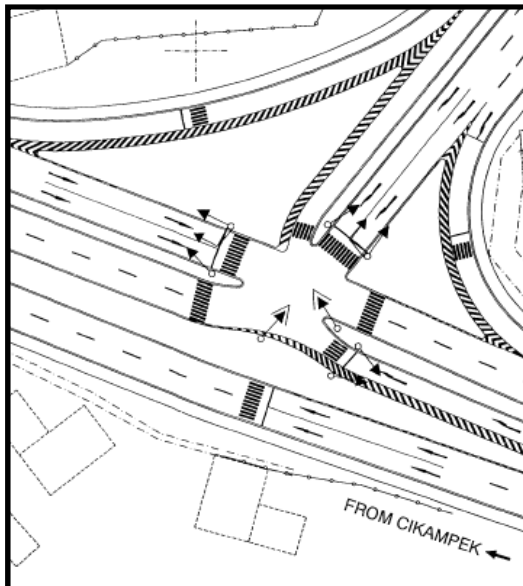
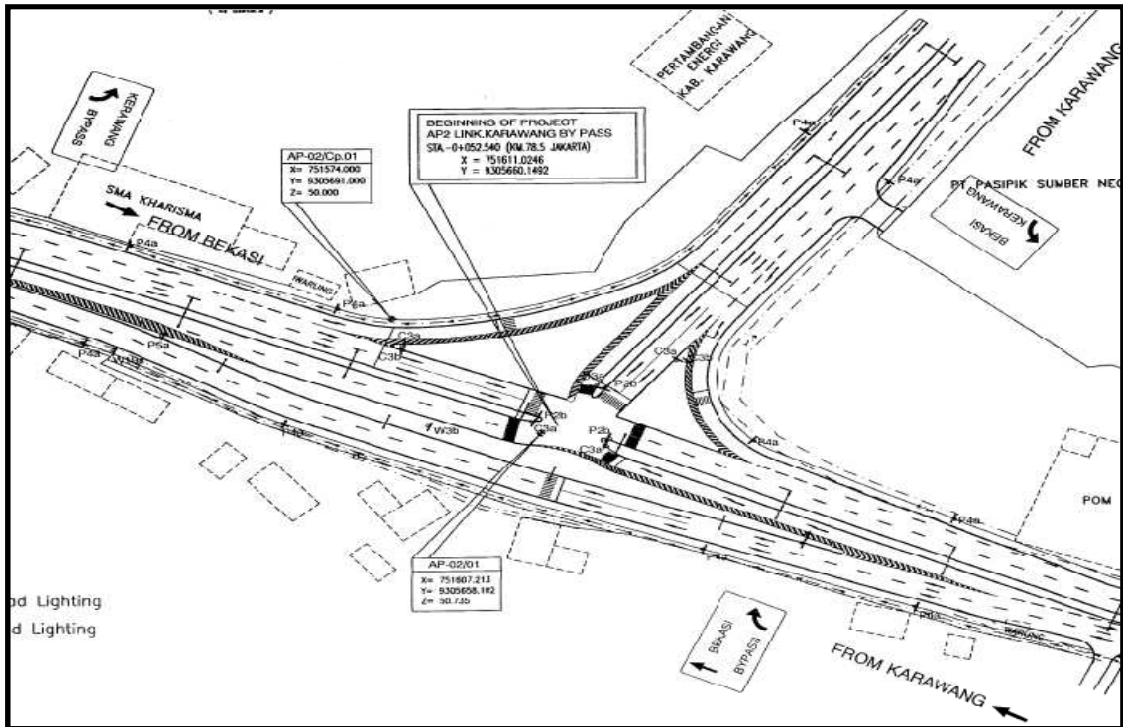
1.9 Date of Site Visit Audit

The site visit was conducted in 24 May 2010. Several pictures were taken at the 2 junctions and attached in this report. The pictures include notes on several safety problems/issues which may arise in the future once the road is opened to traffic.

2. Problems and Recommendations

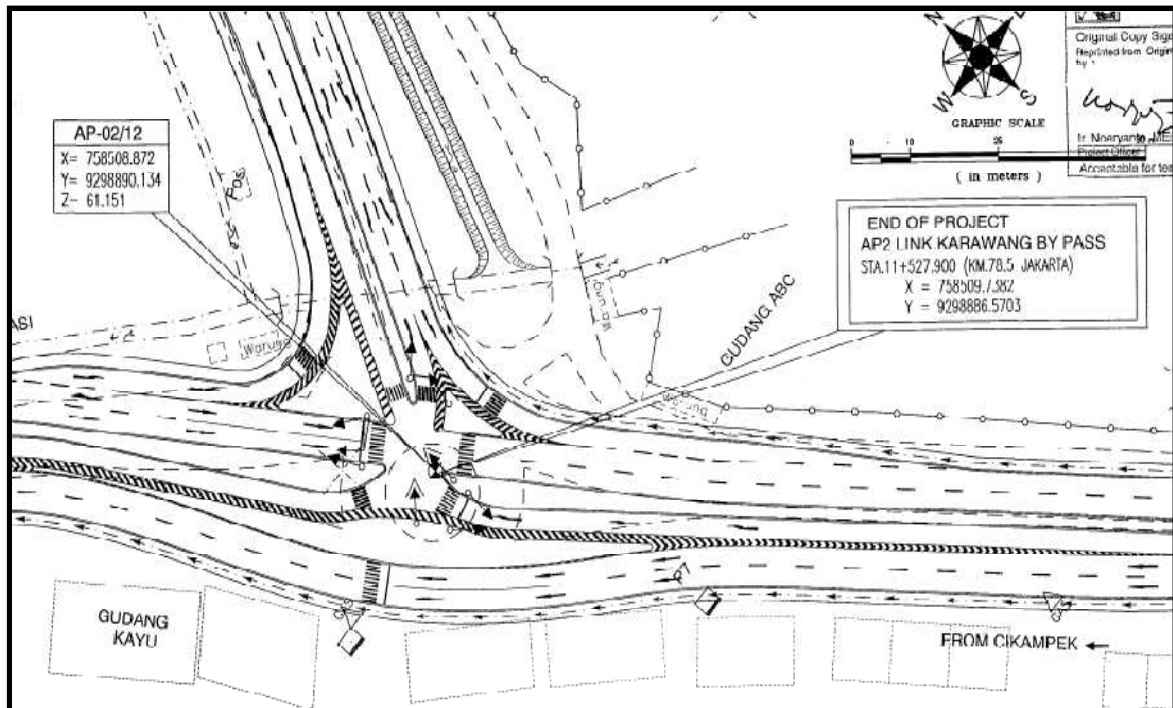
2.1 Junctions

Intersection 01 Sta.0+000



Phase A	Phase B	Phase C
G = 10 seconds G + I = 16 seconds (G + I)/C = 26.7 %	G = 10 seconds G + I = 16 seconds (G + I)/C = 26.7 %	G = 22 seconds G + I = 28 seconds (G + I)/C = 46.7 %

Intersection No. 02 Sta 11+475



Phase A	Phase B	Phase C
G = 6 seconds G + l = 12 seconds (G + l)/C = 16 %	G = 16 seconds G + l = 22 seconds (G + l)/C = 29.3 %	G = 35 seconds G + l = 41 seconds (G + l)/C = 54.7 %

The proposed design included new signal equipment, islands, footways, pedestrian barriers. The junction is still very unsafe for pedestrians and much of the signal equipment is not working or damaged, see photos below:

The traffic signal lamps were not working or not bright



Pedestrian Crossing was blocked by Traffic Signal poles



Drainage at the Islands is exposed and hazardous to pedestrians

Height and size of signal head for warning light is not standard and is not working



Traffic lights are not working and one pointing in wrong direction



Public transport is picking up the passengers but the pedestrian paths are not constructed for safety



Additional Problem: No rumble strips on approaches to the junction.

Recommendations

- Add rumble bars to all approaches
- Ensure all broken signal equipment repaired promptly
- Upgrade main signal head on each approach to large high visibility specification, (see photo below)



Good locations of signal lights with bright LEDs - Semarang Bawen

2.2 Road Signs

Problems

Signs are missing or incomplete. Others are positioned in the wrong place or inappropriate or hidden, see photos below

Road sign height and size are not following the standard drawing and some of the signs are damaged, as shown below;



The Road sign is not standard - should be two separate arrows



No advance warning approaching sharp bend and no arrow signs



Advance direction sign hidden by tree



Recommendations

- All traffic signs should be reviewed and damaged or non-standard ones replaced.
- Ensure signs are not blocked by trees or vegetation
- Install appropriate warning and chevron arrow signs at the sharp bend

2.3 Median Gap

Problems

There is a gap in median at a Tee junction at Sta o+250 that is likely to result in serious accident patterns. The U turns does not have a taper and only a narrow median and is poorly signed



There is evidence of crashes having happened and temporary signs were placed by local people to warn the road users.



The rumble strip is too close to U Turn less than 40 meter



Recommendations

- **Improve the signing at gap and junction at Sta 0+250**
- **Add additional rumble bars on the approaches**

2.4 Speed Limits

Problems

The road has a design speed 80 Km/H but no speed limit signs are installed

Recommendations

- **Review the whole length of the project and add appropriate speed limit signs**

2.5 Guard Rails

Problems

There are several areas where guard rail is needed but not installed.

Where it is installed there are defects related to overlap and bridge connections, see photos below.



**Overlap in
wrong direction**

The guard rail below has exposed end, not followed the standard drawing, also no maintenance for wild bushes



The height of the slope is greater than 2 meter. The guard rail should be installed on this condition. No protection for pipe culvert.



There is a gap between the guard rail and the bridge parapet



2.6 Pedestrian Crossing

Problems

There is an un-continuous pedestrian crossing, see photograph below;



Recommendation

- **Complete road markings for pedestrian crossings**

2.7 Broken Concrete Pavement

Many slabs of the new concrete pavement were completely cracked and some were being repaired already. This has serious safety implications particularly for motorcyclists. The subsequent road works pose hazards for all road users as well as the workers. See photos below





Recommendations

- **Review the reasons for the breakup of the concrete and whether related to design, construction or supervision**
- **Apply lessons learned to future projects with similar pavement**
- **Ensure repairs are permanent and will not have to be repeated throughout the life of the project**

Appendix A. References

1. Pedoman Audit Keselamatan Jalan (PD T-17-2005-B), PU Prasarana Transportasi (**Road Safety Guidelines (PDT -17 – 2005 – B). Public Works, Transportation**)
2. Pedoman Teknis Perekayasaan Tempat Pemberhentian kendaraan Penumpang Umum, Dirjen Perhubungan darat No. 271/HK.105/DRJD/96 (**Technical guidance for Public Bus Stops, Directorate General land & transportation No. 271/HK.105/DRJD/96**)
3. Pedoman Audit Keselamatan di jalan raya (Austroads Standard) edisi ke 2, 2002 (**Road safety Audit Guidelines (Austroads Standards) Second edition 2002**)
4. Pedoman Teknis Penanaman Pohon Pada Sistem Jaringan jalan 2010 (**Technical Guidelines for Planting trees at Road Network System 2010**)
5. Pedoman teknis Fasilitas Pejalan Kaki di Perkotaan SK.43/AJ 007/DRJD/1997 Direktorat Jenderal Perhubungan Darat) (**Technical Guidelines for Pedestrian facilities at Cities region, SK.43/AJ 007/DRJD/1997, Directorate General land & transportation**)
6. Mewujudkan Jalan Berkeselamatan di Indonesia, Australia – Indonesia bekerjasama dalam teknis keselamatan di Jalan. Direktorat Jenderal Bina Marga, INDIE 2010 (**Making Indonesia's Roads Safer, Australia- Indonesia Partnership in Road Safety Engineering, Directorate General of Bina Marga, INDI 2010**)
See extracts on construction zone safety below.
7. Petunjuk Praktis , Keselamatan Jalan Pada Zona Kerja di Jalan, mendukung Proyek EINRIP, Direktorat Jenderal Bina Marga (**Practical Guidelines, Road Safety of Construction Zone**) to Support "EINRIP Projects", Directorate General of Bina Marga