



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 SOEKARNO – HATTA ROAD SAFETY AUDIT REPORT Final Design and Construction Stages June 2010**



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This Report is “Final Design” Road safety audit and is a component of the Strategic Road Infrastructure Improvement Project (SRIP). The audit was carried out according to accepted International Road Safety Audit procedures as adapted in Indonesia

It is strongly urge that serious consideration is given, by all interested parties, to implementing all the recommendations or addressing all the safety issues raised in some other relevant manner.

It is very important that final detailed designs are prepared for all the junctions and should be independently audited.

Mike Goodge

**Senior Road Safety Audit Engineer,**  
CTC SRIP, Egis BCEOM  
June 2010

Agus Herudianto,

**Road Safety Audit Engineer,**  
CTC SRIP, Egis BCEOM  
June 2010

## Summary of Problem and Recommendation For Final Design and Construction Phase

### 1. Junction Designs

#### Problems

- Junction designs are missing details of many items on the contract drawings. There is:
  - No traffic calming;
  - No Bus stops/lay bays;
  - No secondary traffic signals;
  - No pedestrian phases at the signals
  - Lack of clarity on road markings and
- Crossing at the junction of a dual carriageway are hazardous without traffic control or a pedestrian bridge;
- Currently conditions include;
  - Many of traffic signals and street lights are not working due to lack of maintenance,
  - At night the light on the advertisements is too bright compared with traffic signals
  - Islands are not built for pedestrian safety.
  - Most of the bus and trucks are always parking and pick up/down passengers on the main roads, not at bus stops or laybys.

#### Recommendations

Redesign the intersections and present them in a larger scale with the following additional safety equipment:

- High standard, high luminosity traffic Signal head signs should be chosen and adjacent advertising removed or minimised;
- Rumble strips need to be installed on all approaches;
- Install secondary traffic signal lights;
- Traffic signal poles should be carefully located. Not to block pedestrians;
- Road lightning at Intersection should be provided and poles located with care
- Pedestrian phase should be provided in traffic signals;
- Stop lines should be moved closer to centre of the intersection;
- Directional signs should be installed on all approaches;
- Bus stops/lay bays;
- Fencing should provided to direct the pedestrians at crossings; and

- Deceleration/acceleration lanes with enough taper length should be provided along the new road and at the south lane of the old road.
- Dropped curbs at the islands
- Adequate maintenance procedures are also needed to be in place to keep equipment working

## **2. Road Signs**

### **Problems**

Signs are missing or incomplete. Others are positioned in the wrong place and inappropriate signs are recommended for installation.

### **Recommendations**

All traffic signs should be reviewed and detailed shop drawings produced to show all signs to be installed and their exact location on large scale plans.

## **3. U Turn and Gaps at Median**

### **Problems**

Many of U Turns are not designed with a taper and adequate signs or marking. None of the gaps have adequate signing or marking too

### **Recommendations**

- Close all the U Turns which don't have enough space on the main road.
- All the U turns and gaps should have initial sign/markings, traffic calming, or flashing lights.
- All median curbs should be marked with reflectors or painted at the gaps or U Turns.

## **4. Speed Limits**

### **Problems**

No speed limit signs are shown along alignment.

### **Recommendations**

Install appropriate speed limit signs approaching public areas, (offices, markets and especially at school zones) and at the beginning of each main junction ensuring clear visibility for drivers.

## 5. Traffic Calming

### Problems

No traffic calming is proposed

### Recommendations

Design a range of traffic calming measures for the project to reduce speeds at ;

- Junctions;
- Pedestrian Crossings;
- Median (U Turn, Gaps);
- School Zones
- Other locations where speed reduction is necessary.

(Rumble strips are probably most appropriate and usually use in Indonesia)

## 6. Tree Planting

### Problems

Trees are shown planted along the road, Trees can enhance road environment or be a safety hazard.

### Recommendations

- There should be a complete review of all trees (planting and/or landscaping).
- Planting the trees on approaches to the U Turns or at other locations where they will block signs or create visibility problems should be prohibited.
- A Standard Drawing detail should be submit
- Showing placement of trees adjacent to and not blocking sidewalks/shoulders nor near the road edge where they would become safety hazards.

## 7. Road marking

### Problems

There deficiencies in the pavement markings.

### Recommendations

Prepare a detailed pavement marking plan in a bigger scale and show all the required pavement markings especially the pedestrian crossings and school zones.

## 8. Guard Rail/Fence at Bridge, Water Hazard & Fence for Pedestrian Crossing Area

### Problems

- Guardrails proposed are insufficient including connections with new bridge railings.
- Fences proposed are insufficient too especially on the junction or prohibited crossing areas.

### Recommendations

All bridges should be protected, preferably by well designed guard rail or concrete barriers.

- No exposed ends of guard rails.
- Good connection between the guard rail and the rigid bridge walls.
- Fences should be designed where crossing is prohibited.

## 9. School Zones

### Problems

Details of layout, signs etc are missing. Other school zones maybe warranted At-grade school zone crossings may not be appropriate on a dual carriageway

### Recommendations

- Safety should be addressed throughout the construction period and in the final design.
- Needs of pedestrians, cyclists and bus users all must be designed for a standard
- School Zone (ZoSS) is probably not suitable for a dual carriageway a pedestrian bridge is probably necessary.

- Road marking should be designed properly or use a standard school zone marking.
- Traffic calming with signing, marking and rumble strips is needed approaching schools.
- The shoulder of the road, bus bays, bus stops and appropriate pavement on the shoulder should properly designed and paved

## **10. Pedestrian Crossings**

### **Problems**

None of the crossings are adequately detailed in the drawings.

### **Recommendations**

Detailed large scale drawings should be produced for all pedestrian crossings showing signs, markings, sidewalks and all street furniture such as poles and trees.

## **11. Pedestrian Bridges**

### **Problems**

No pedestrian bridge are proposed in contract drawing even though the highway is a dual carriageway

### **Recommendations**

- Pedestrian Bridges should be proposed near the school zones, public areas, and approaching the intersections on the dual carriageway
- All bridges should be protected, preferably by well designed guard rail or concrete barriers.
- Fencing should be installed on median under and adjacent to the bridges to encourage pedestrians to use the bridge

## **12. Bus Stops and Parking Areas**

### **Problems**

No Bus stops or bays are proposed on the drawings, although at each junction there are many queuing buses particularly near the junctions with the buses blocking the main road. There is an overall lack of designs bus/truck stopping, parking and resting areas and thus the potential for creating traffic hazards along the road.

### **Recommendations**

- Review need for bus bays, particularly at all junctions, and design bays that are in a safe location and long enough to handle required number of waiting buses.
- Design appropriate truck parking facility as many trucks were found to be parking at the side of the road near the project.

## **13. Slow Lane/Motorcycle and Un motorised lane**

### **Problems**

The designs do not show any slow lanes, even though 73% of the road users are motorcycles

### **Recommendation**

Designs should be reviewed and where possible slow lane installed with appropriate signs and markings for use primarily by motorcycles

## **3. Construction Safety Issues**

### **Problems**

- Many temporary sign is missing
- No advance warning
- Potholes or road deteriorations are not marked.

### **Recommendations**

- Advance temporary warning should be installed
- All the Workers should use a reflector Jacket during on work
- Additional cable/rope reflector lines would be better installed between cones
- Potholes and road deterioration should be marked with cones or paint.
- The Traffic flows should be maintenance to avoid the long queuing.

# 1 INTRODUCTION

## 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 both Final Design and Construction stages

## 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: "Soekarno - Hatta (WP-2), the CTC has to ensure this package have been reviewed by qualified Road Safety Audit since this package will be as a pilot of 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 (DED plans), traffic schemes, recommend the modifications of the plans when safety aspects warrants such changes, and the safety aspects during road construction.





## **1.6 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:

- a) Mike Goodge - Senior Road Safety Audit Engineer
- b) Bayani J. Lusica - Senior Highway Engineer
- c) Agus Herudianto - Road Safety Audit Engineer

## **1.7 Date of Site Visit Audit**

The site visit was conducted in 26 May 2010, 5 intersection was visit. Several pictures were taken at the 5 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. Problem and Recommendation For Final Design and Construction Phase

### 2.1 Junction/Intersection

#### Photograph Condition of the road



The signals is not work



The signals is not work



The signals not bright



To Many Advertisement

To



*Small Bus parking and waiting the passengers on the main road*



*Gaps on the narrow median (difficulties to make U turn)*

### **Present Condition of the Junction**

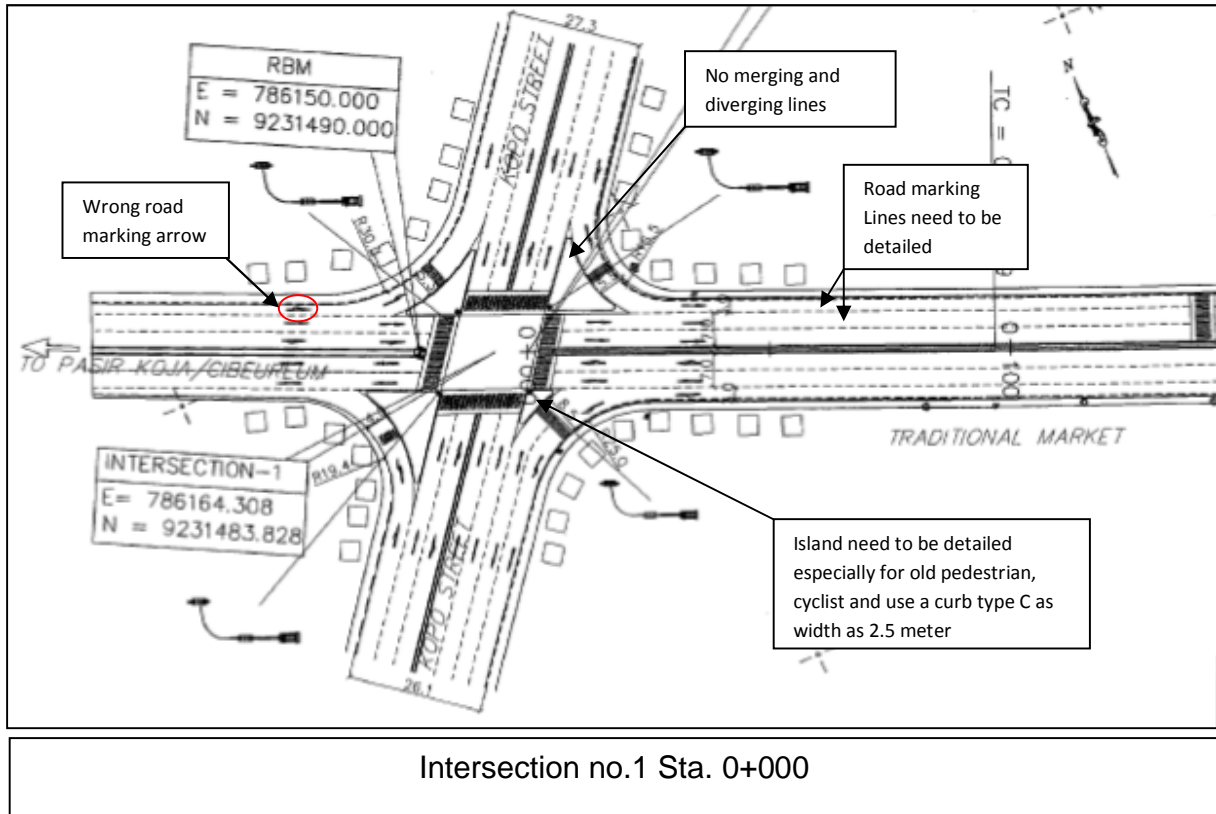
- Many of small bus or Heavy Bus are parked and stops near the Junction for rest or parking
- Bus were Pick up/down the passengers at main road

- There are old Traffic signal, It were properly located but many of traffic lights are not worked, remedial investigation and reinstatement work for those need to be carried out
- Re timing for green time is necessary needed. And additional traffic signals for pedestrian crossing should be proposed on technical justification
- Road Lightning at the junction are not worked (Installation problems or broken light are not investigate) need to be reinstatement or the head of traffic signal is not bright enough to notice the road users
- Intersection and Connection to local road are need to be light for comfortable the road users include the Pedestrian during night time
- No road marking lanes at the taper crossing to main road
- No signals light ahead to be posted in all approaches of the main roads
- No Rumble strips in all approaches the intersection and in both approaches of the minor roads.
- Most of the Islands or median are not for pedestrian service
- The Advertisement especially at Junction are brighter than Road Lightning and consequences make the road users are missing the sign.

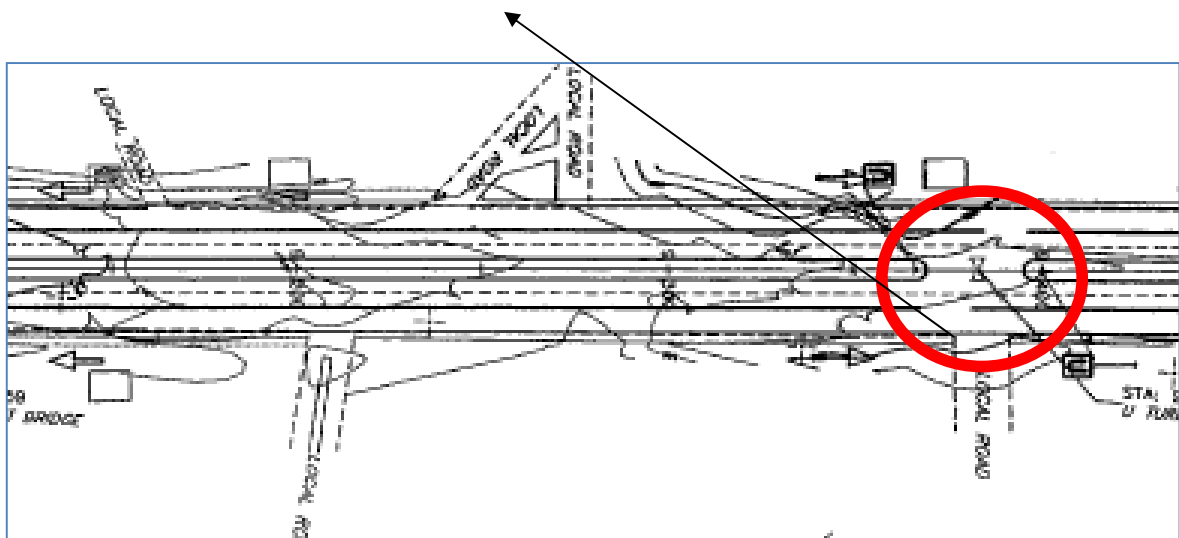
**Junction Design has many Deficiencies, for example;**

- No detailed design for Islands and most of island and median are not design for Old, Young, Cyclist and Children (Type C for curb are properly design)
- No Secondary Traffic Signals at the junction even though some intersection already have the secondary
- No Traffic Sign for Pedestrian movement (Pedestrian movement not arranged)
- Wrong detailed arrow symbol marking at taper lanes in each legs approaches the intersection.
- No detail drawing for road marking shows at Final drawing (type of lanes, merging and diverging lines, slow lane marking and etc)
- Bus stops/lay bays are not arranged near the junction
- No detailed drawing for Island, It is still use high curb (not purpose for the pedestrian crossing) the standard drawing for curb type c more appropriate for pedestrian
- No pedestrian bridge at approaching intersection for road which have more than dual carriageway (6 Lanes) are proposed

- No Rumble strips in all approaches the intersection and in both approaches of the minor roads.
- The curbs need to be paint at the Intersection



- No traffic calming and road lightning (Road Sign, Road Marking, rumble strips, etc) from local road proposed in final design





Blocked pedestrian crossing with signal light and crash protection poles

### **Recommendation**

- Signal light ahead signs to be posted in both approaches of the main road about 50 meters before the intersection and in both approaches of the minor road about 30 meters before the intersection;
- Rumble strips to be installed in both approaches of the main road about 60 meters before the intersection and in both approaches of the minor road about 40 meters before the intersection;
- Signal lights should be provided in all approaches near the stop line and with secondary signs across the street facing the stopped vehicles;
- Pedestrian lanes should be provided with enough green times for crossing, refuge area in the medians, and free from trees, plants, electric and signal poles;
- Intersection approaches should not be positioned far from the centre making the crossing longer;
- Directional signs should be installed in both approaches one about 80 meters and another about 10 meters from the junction;
- Bus stops/lay bays should be provided in the technical justification and located about 70 meters after the intersection;

- Pedestrian Bridge should be provided in technical justification and located not less than 20m after and before intersection on the main road;
- Investigation for road lightning and Traffic signal condition are necessary, many of light was off during night time and most of traffic signal were not working well, the remedial/reinstatement work should be carried out and should be proposed on technical justification.
- Fence for directing the pedestrian to cross the road and waiting bus are need to be proposed for technical justification
- Road lightning, rumble strips, road signs and necessary road marking should be proposed at approaching the T junction in the technical justification
- Draw large scale detailed drawing as matter urgency.
- For the right turn traffic signal should use an arrow and proper direction
- Better used the LED lamp for Traffic signal besides the low electric consumption and longer life comparing bulb.



Proper locations of signal lights with LED on the Head lights

- Additional Secondary traffic signal for right turn is needed



A proper arrow traffic signs at the intersection when there are right turn phase

## 2.2 Road Signs

### Problems

Signs are missing or incomplete. Others are positioned in the wrong place and inappropriate signs are recommended for installation.

### Recommendation

- All traffic sign should be reviewed and detailed shop drawing produced to show all signs need to be installed and their exact location on large scale plans.
- Avoid placing Traffic sign on narrow median, Blocking footpaths, hiding signals or hidden by Trees



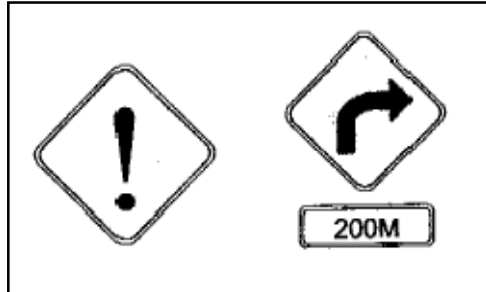
- W23 (warning sign) should be avoided and use the communicate sign is better



**W23 Sign**  
In common use in Indonesia to warn of need to take care, additional information need to be inform

- An “Exclamation” sign does not provide sufficient information to road user for them to understand why they need to take care and probably slow down

- Consider the use of yellow backing boards on important sign to help with speed reduction (speed limit)



Better to warn  
of bend ahead  
than just  
show  
exclamation



Yellow backing boards  
& speed limit greatly  
increase effectiveness  
of any warning sign

- All road marking should be referred to "Tata Cara Pemasangan Rambu dan Marka Jalan Perkotaan" Bina Marga no.01/P/BNKT/1991)

## 2.3 U Turn / Gaps at Median



Two different sign for U Turn makes the road users confused, and U Turn service already have taper



Median is too narrow, bus parked on the main road, the road sign will be cover by plant in a short time, the visibility of vehicles which Turning was blocked by trees



No taper for making the U turn, the vehicles could be crashed from behind

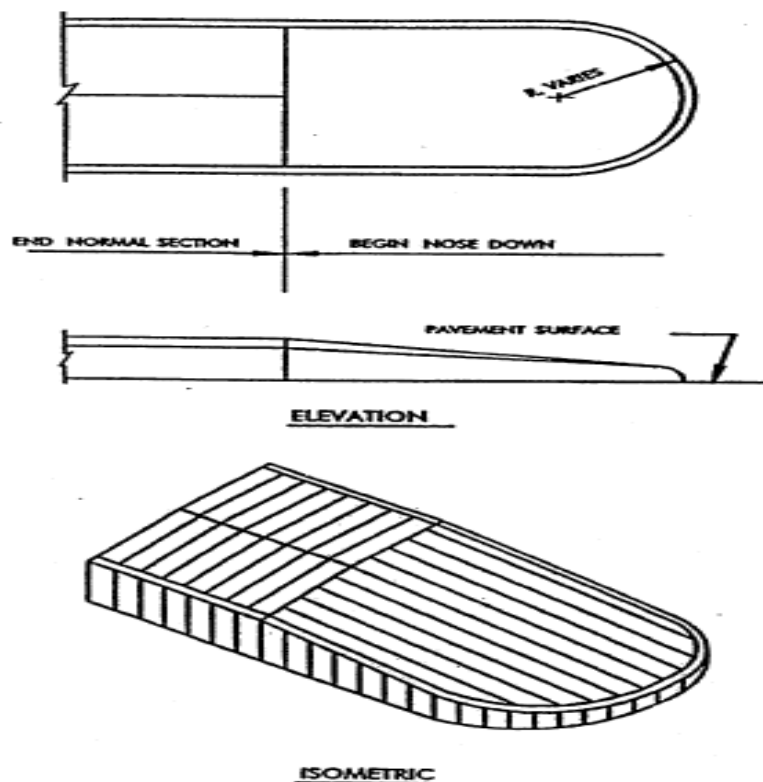
## Problems

There are many gaps in median are likely to result in serious accident pattern, most of the U turns does not used Taper and most of them are narrow median. And all gaps in median will require highly visible advance warning signing and speed reduction measure.

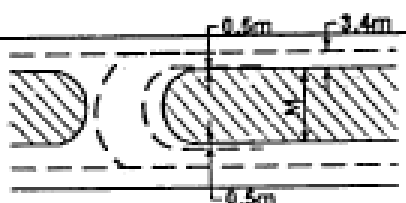
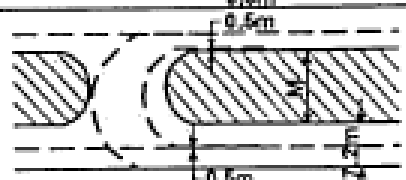
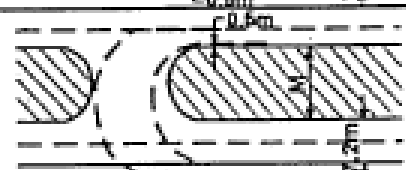
## Recommendation

Improving signing at wide U turns

- Prepared the standard drawing of gap in median including high visibility signing and traffic calming and used a taper for U turn design (The sample of standard U Turn and Narrow median are below)
- Continuous line marking, painting on the curb and symbol marking at U turn is necessary



bit 9-39. Nose Ramping at Approach End of Median or Corner Island

TYPE OF MANEUVER		M - MIN. WIDTH OF MEDIAN (m) FOR DESIGN VEHICLE						
		P	WB-12	SU	BUS	WB-16	WB-18	TDT
		LENGTH OF DESIGN VEHICLE (m)						
		5.7	16.0	9.0	12.0	16.5	19.5	35.4
INNER LANE TO INNER LANE		9	18	19	19	21	21	30
INNER LANE TO OUTER LANE		6	16	15	15	18	18	27
INNER LANE TO SHOULDER		2	12	12	12	15	16	24

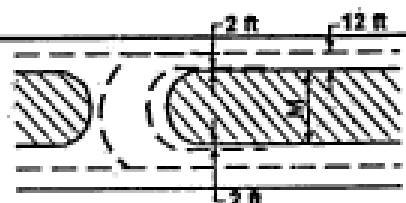
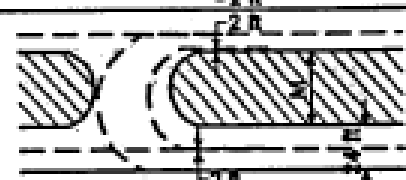
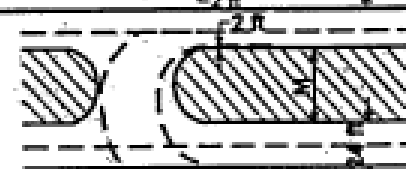
TYPE OF MANEUVER		M - MIN. WIDTH OF MEDIAN (ft) FOR DESIGN VEHICLE						
		P	WB-40	SU	BUS	WB-60	WB-65	TDT
		LENGTH OF DESIGN VEHICLE (ft)						
		19	60	30	40	65	65	118
INNER LANE TO INNER LANE		30	61	63	63	71	71	101
INNER LANE TO OUTER LANE		10	49	61	61	69	69	89
INNER LANE TO SHOULDER		8	39	41	41	49	49	79

Exhibit 9-92. Minimum Designs for U-turns

- See requirement (Tata Cara Perencanaan Pemisah, Dirjen Bina Marga. No.014/BNKT/1990)

## **2.4 Speed Limits**

### **Problems**

The design road is indicate use a design speed 60 Km/H

- No Speed limit sign apparent on detail drawing at public zone (Office, scholl zones, Market, Hospital etc.

### **Recommendation**

- Review the whole length of the project and use an appropriate speed limit where through the commercial area and etc.
- Locate speed limit approaching the public area (market, Office, and commercial area)
- Ensure reduce speed limit are installed on school zone and in heavily urbanised areas

## **2.5 Traffic Calming**

### **Problems**

Traffic Calming could be defined as physical measure that slow vehicles down at the approach to hazards. The most common are rumble bars/humps which is commonly used in Indonesia.

### **Recommendation**

Design a range of traffic calming measures for the project to reduce speeds at

- Junctions/Intersection;
- Pedestrian Crossings;
- Median (U Turn, Gaps);
- School Zones
- Other locations where speed reduction is necessary.



Rumble Strips at approaching Intersection

## 2.6 Tree Planting

### Problems

- Trees are shown planted adjacent to side road from Sta. 0+000 – 10+000 and Sta. 10+700 – 11+125, It would be hiding a Road Sign and Road lightning
- Trees would blocking the pedestrian Path (side walk)
- Trees would impede visibilities from side roads (hazardous if combine with un-segregated pedestrian crossing)
- Trees would impede visibility from side roads and hiding Signs



### **Recommendation**

- The minimum space for road sign to the edge of Pavement is 0.7 m, The minimum of Road lightning is 1.0 m and the plantation like Tanjung trees should be more.
- All the trees should be plant 2.5 m from road
- At median or islands should use the plant that needs minimum maintenance.
- The standard drawing detail should be submitted showing placement of trees
- Ensure trees are not planting at crossing or junction causing safety problems
- The trees should not obscure signs, signals, lightning or pedestrian
- No trees should be planted approaching the U Turns, the distance should not less than 20 meter approached the U Turn
- No Trees will be planted approaching the T Junction, at Least 20 meter from junction (visibility sight distance approaching the T Junction)

Please Submit the Revised Drawing for Audit By CTC Team, all the road safety principles on road design should be followed.

All trees planting should be referred to

1. *Tata Cara Penanaman Tanaman Landscape Perkotaan No. 03/T/BNKT/1992*
2. *Tata Cara Pemeliharaan Tanaman Landscape Jalan No. 009/T/BT/1995*

## **2.7 Road Marking**

### **Problems**

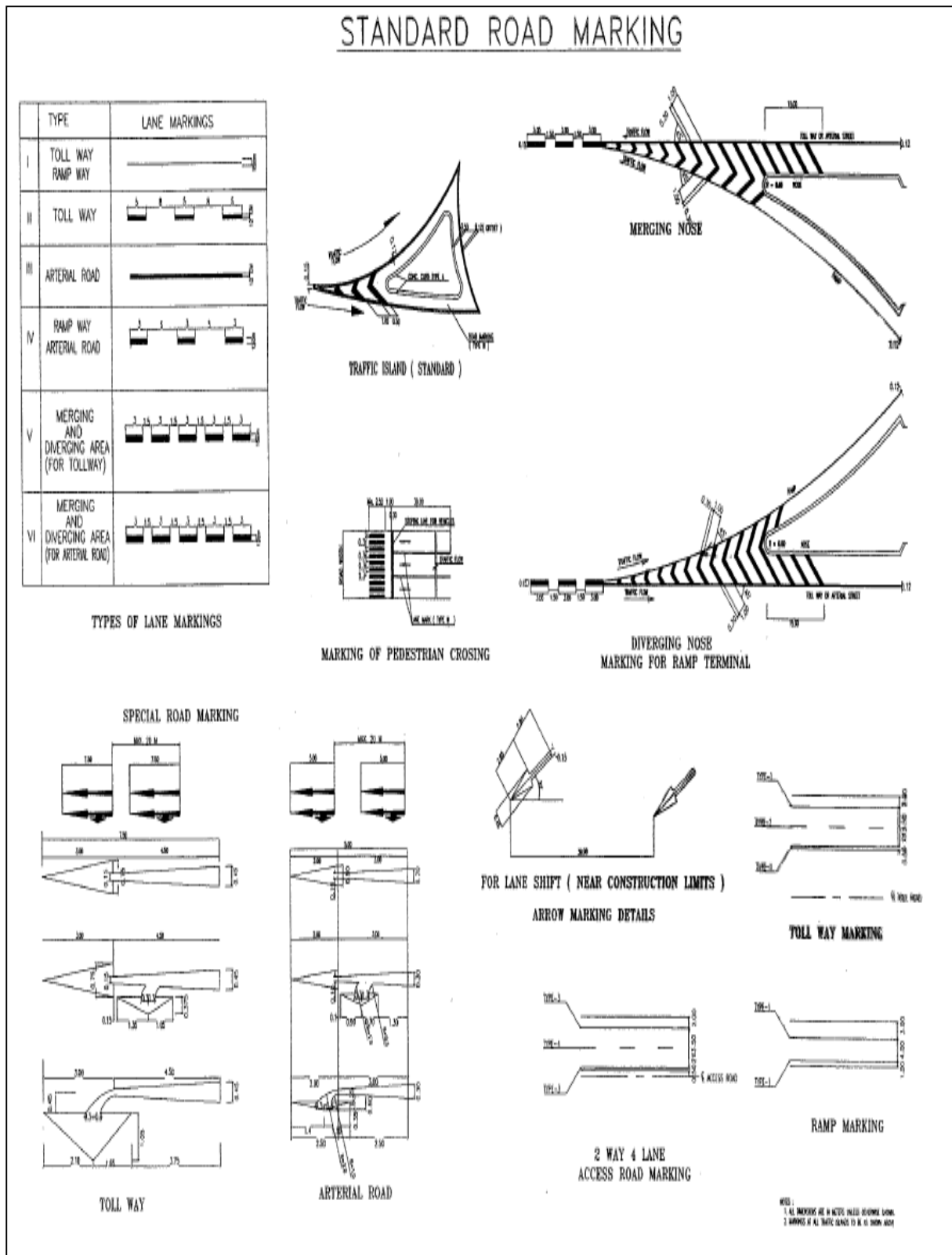
No detail drawing for road marking at Junction area plan, school zone and etc.

### **Recommendation**

The detail drawing should consider as follows;

- Where longitudinal marking is formed by a solid line, it is designated as a ban for vehicle to pass that line. On a certain part of road segment for traffic safety reasons a double solid or broken line can be used. A single solid line can also be used to designate the edge of road lane.
- Used the Transverse marking is formed by a solid line to show where vehicles should stop at traffic signals or at a ban sign.
- Hatched markings that are edged by a broken line are used to inform drivers that they cannot enter the area unless it is safe to do so.
- Symbol markings are formed by arrows, triangles or word designations and can be used to supplement the traffic signs. Their purpose is to inform road users where they have not been fully informed by the traffic signs.
- Zebra crossings formed by solid marking lines traversing the traffic lanes and two solid lines crossing the traffic lane
- Road marking for School Zone and slow lane should be added
- Painting for curb and median is very necessary, the road users are limited visibility especially during night time, many of road lightning is off
- All road marking should be referred to "Tata Cara Pemasangan Rambu dan Marka Jalan Perkotaan" Bina Marga (no.01/P/BNKT/1991)
- The slow lane or motorcycle lane is needed considered, this road section are used by motorcycle (>70%), improving with provide the motorcycle lane or slow lane with road marking would be better solution

Please Submit the Revised Drawing for Audit By CTC Team, all the road safety principles on road design should be followed.



## 2.8 Guard Rail / fence at Bridge, Water Hazard and Fence for Pedestrian Crossing Area



Potential hazard for road user, no guard rail approaching the bridge



Better condition of guard rail but needs to have a solid/strong connected to parapet



The pedestrian bridge was not protected by guard rail



The pedestrian crossing at wrong place, no fence to hold pedestrian cross the highway

### Problems

Many areas are needed a fence or guard rail but no detailed design on the drawing

### Recommendation

All Bridge Should be protected, preferably by well design guard rail or concrete barriers (bridge is Hazard) (sample other project)

- There should be no exposed end of guard rails
- The Strong connection between flexible guard rail and the rigid parapet should be properly design.



A proper connection between guard rail and parapet

- All water hazardous or the location where have existing ground more than 2 meter height from pavement surface should be fencing by guard rail
- The foundation of the bridge should be protected by guard rail
- Additional road reflector at the edge of guardrail is important to notice the road user at night time.
- Guard rail should be installed at sharp bend combine with reflector or arrow sign for directing



## **2.9 School Zones**

Sta. 1+700, Sta. 6+450, Sta. 7+200 and Sta. 7+800 are planned for school zone area.

### **Problems**

- Detail of Layout sign etc are missing.
- At Grade school zone crossings may not be appropriate on a dual carriageway
- School zone need to be designed for hundreds of cyclists and pedestrian on the sidewalks and hundred boarding buses as well as those crossing the road
- Existing signing of school is very poor, fence were not proposed to be install and traffic calming is not design for approaches.
- Busses is adding to the danger of the school zones most of the median are proposed for 0.6 m
- Bus stops/lays are not design
- The shoulders should be paved

### **Recommendation**

- Urgent consideration needs to be given to designated school zone
- Safety should be addressed through the construction period and review final design should be submitted to CTC
- Needs of pedestrian, cyclist and bus users all must designed for Standard School Zones (ZoSS is not suitable for dual carriageway)
- Pedestrian Bridge is probably necessary
- Warning sign, traffic calming and speed limits should be highly visible
- Road humps should be planting to reduce the vehicles speed
- Accident records should be investigated with the help of the traffic police near all school.
- Road safety educational material needs to be incorporated into school curriculum
- Police enforcement of main road traffic and scholar is needed
- Fence should be used to protect the scholar at pedestrian crossing

## **2.10 Pedestrian Crossing**

### **Problems**

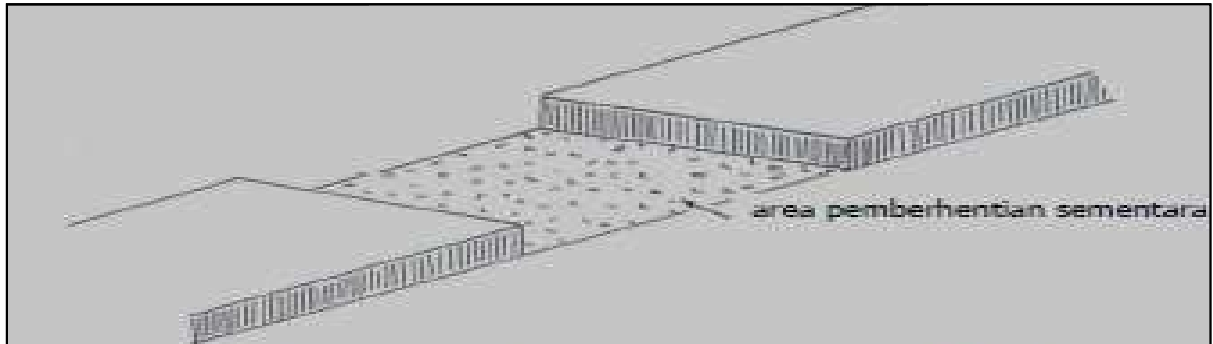
- None of pedestrian crossing is adequately detailed in the drawings.
- Trees will reduce safety (could hiding the pedestrian at pedestrian crossing area)
- Stopping Bus/Parking Car near the pedestrian crossing should not be allowed.

### **Recommendation**

Key points in relation in designing for pedestrians are as follows:

- The proper location and design of pedestrian footpaths and crossing facilities can make a valuable contribution to the environment.
- Activities on, or near, the kerbside such as car parking, local accesses, commercial activities etc. can have adverse affects on the freedom of movement to pedestrians and can jeopardize their safety.
- Increased crossing delay due to widening of an existing road is likely to have some adverse impact on the resident or employed community on either side of it.
- If the road is more than dual carriageway, designing with the pedestrian bridge is better for safety pedestrian crossing especially at public facility if the road is more than dual carriageway
- High visibility area for pedestrian crossing, Traffic calming or speed limit, flasher may be needed or pedestrian signal with push button should be installed,
- Rumble strips should be planting to reduce the vehicles speed
- Island and median at the pedestrian crossing should be passing through without obstacle (height of the curb at Island and median should be lower down) All the pedestrian crossing should have protection at the middle of road (median)

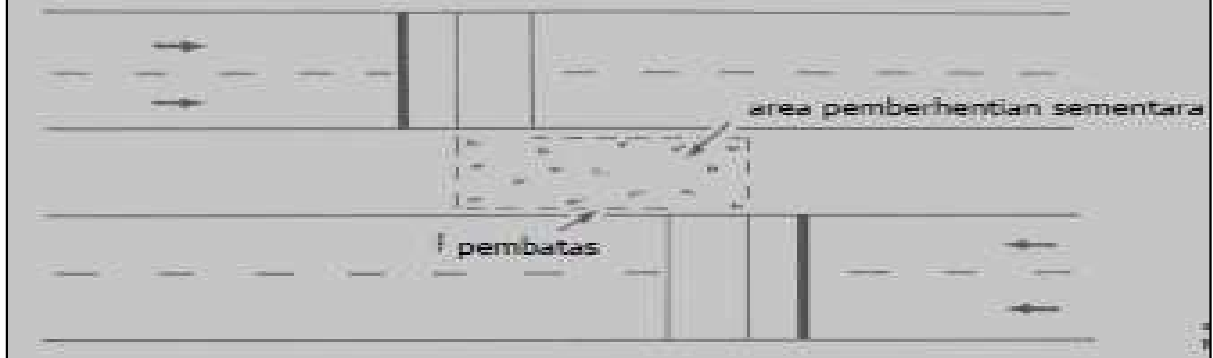
Pedoman Teknis Perekayasaan Fasilitas Pejalan Kaki di Wilayah Kota, SK.43/AJ 007/DRJD/97

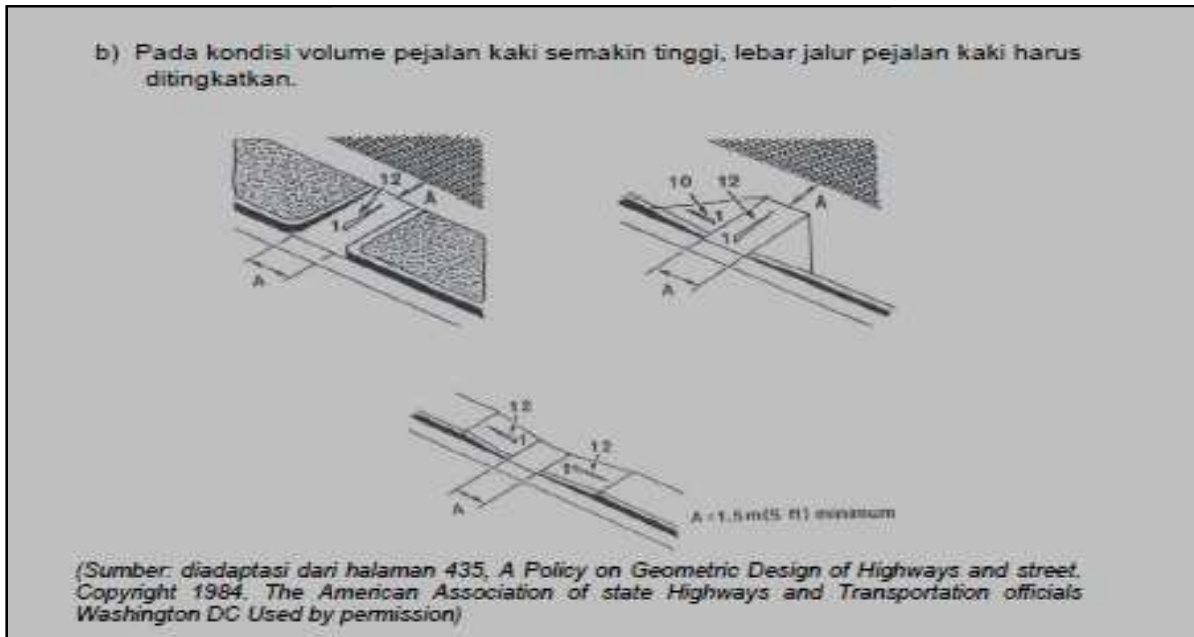


Gambar 2.14 Ruang Pemberhentian Pedestrian yang Diturunkan



Gambar 2.15 Median Pemberhentian Pedestrian Sementara





## 2.11 Pedestrian bridge



onal fence is necessary

### Problems

None of pedestrian bridge is proposed on this drawing; even the Soekarno Hatta road is designed with more than 60 Kph with more than dual carriageway and some of median were 1.00 m and this road is through the

office area, school zone, public facility. It is very dangerous for pedestrian to cross the road without bridges.

### **Recommendation**

Proposed the Pedestrian Bridge is necessary and should be followed with detailed drawing and following the road safety aspect and equipment, such as guard rail, signage, lightning, fencing, and etc.

## **2.12 Bus Stops and Area Parking**



Bus stop/lay was not design in the final drawing, most of the bus always park on the main road approaching the junction

### **Problems**

No Bus stop and area parking are design on Soekarno - Hatta road especially at market, public area and school zones. Even though there are much Heavy vehicle (Truck, buses etc)

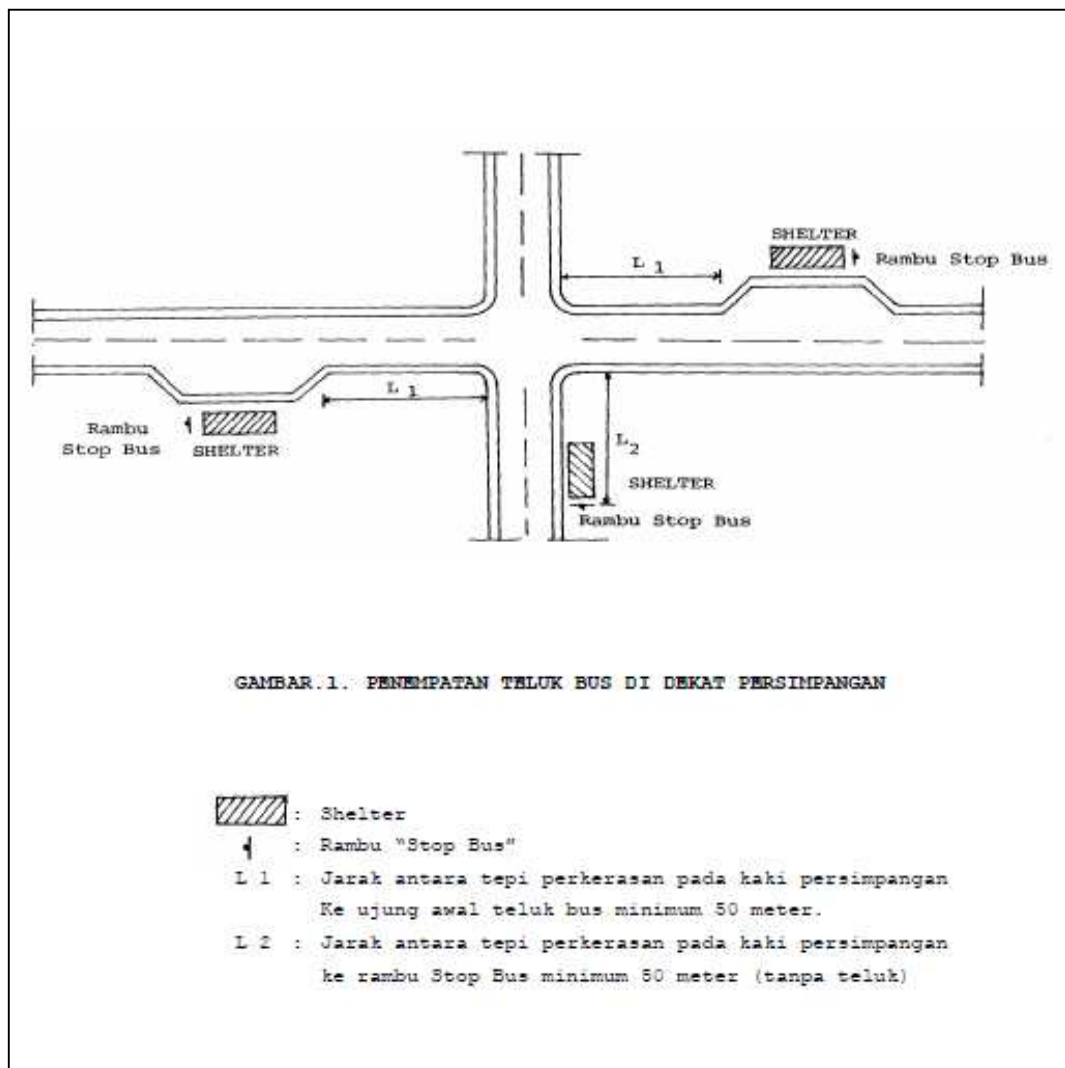
Most of Activities on, or near, the Kerbside such as car parking, local accesses, commercial activities etc. can have adverse affects on the freedom of movement to pedestrians and can jeopardize their safety.

- Parked
- vehicles causing physical obstructions which are sideswiped or run into;
- Parked vehicles causing sudden braking or nose-to-tail shunts;

- Parked vehicles which deflect oncoming vehicles into adjacent vehicle paths;
- Parked vehicles blocking visibility for any road user;
- Parked vehicles between which pedestrians emerge<sup>3</sup>

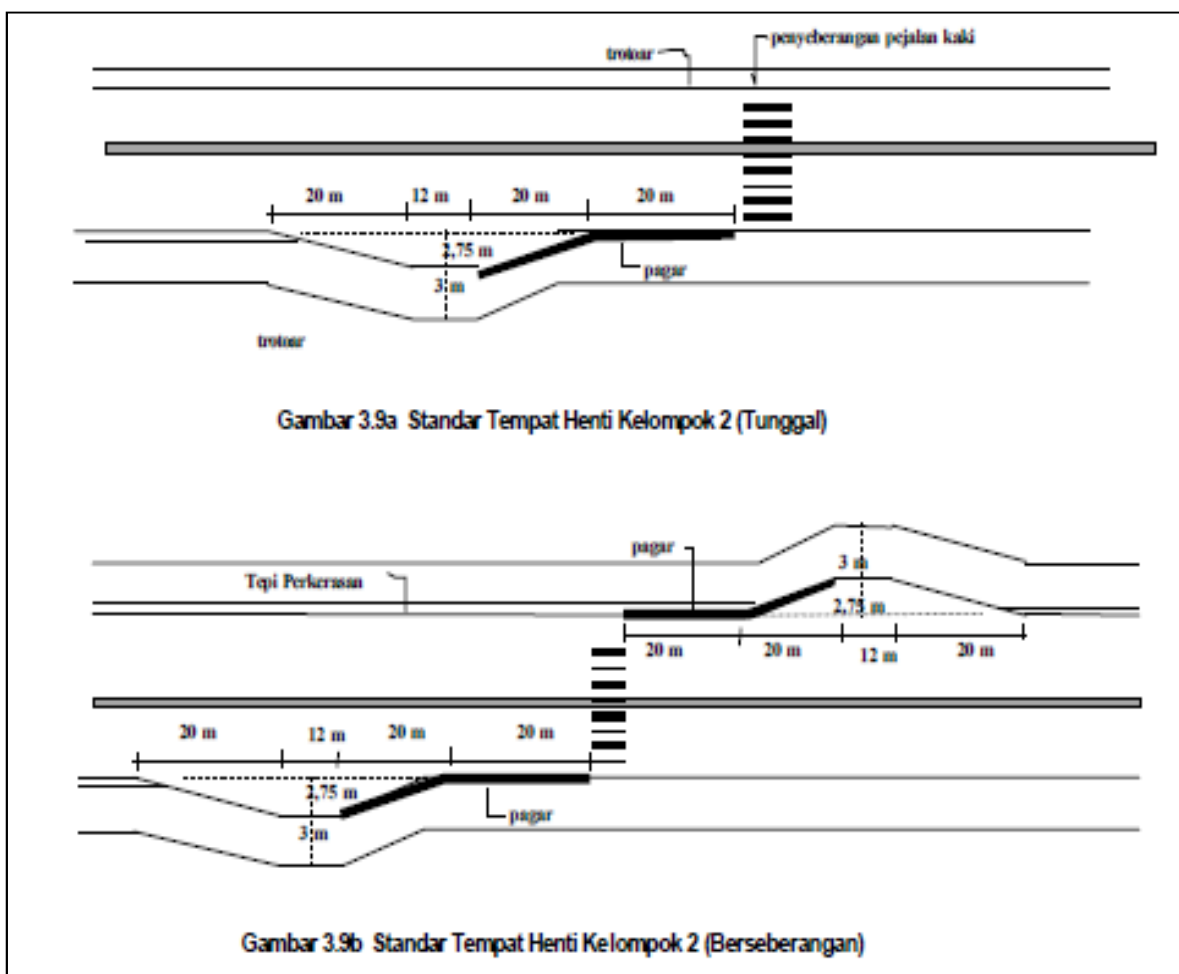
**Recommendation**

Obtain details of existing and proposed road accesses in the vicinity of the potential crossing point (within 100 metres), existing and future kerbside parking and loading areas, and informal kerbside activities, all of which may affect sightlines and safety.



- To reduce the risk of parked vehicles contributing to an accident it is important that designs should minimize parking in main traffic lanes.

- All the Bus stop and parking area should be design not in the main traffic line.
- Additional taper for Bus stop and parking side the main traffic are better proposed. See requirement (Pedoman Teknis perencanaan tempat pemberhentian kendaraan penumpang umum, Dirjen Perhubungan darat)
- Design Bus stop/lay bays that are safe location and adequate length for taper to handled required number of waiting bus especially at School, factory and junction.



### 3 Road safety Audit at Construction Phase

#### Problems



Many advance sign was lost, only cones and warning boards

#### Recommendation

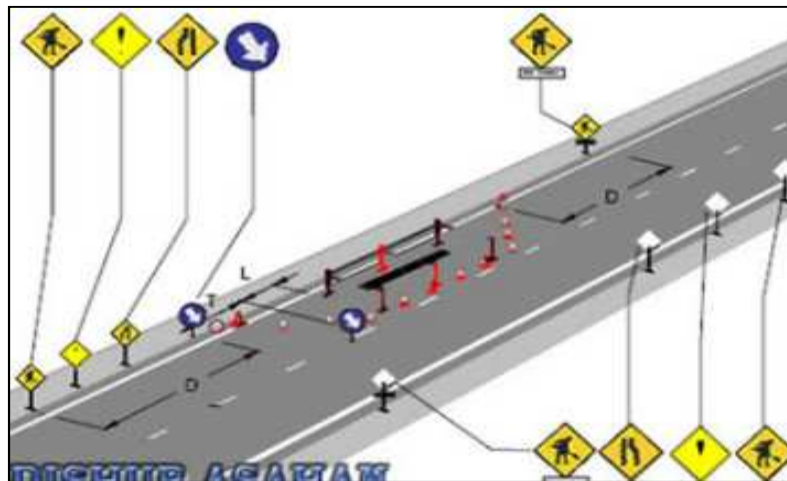
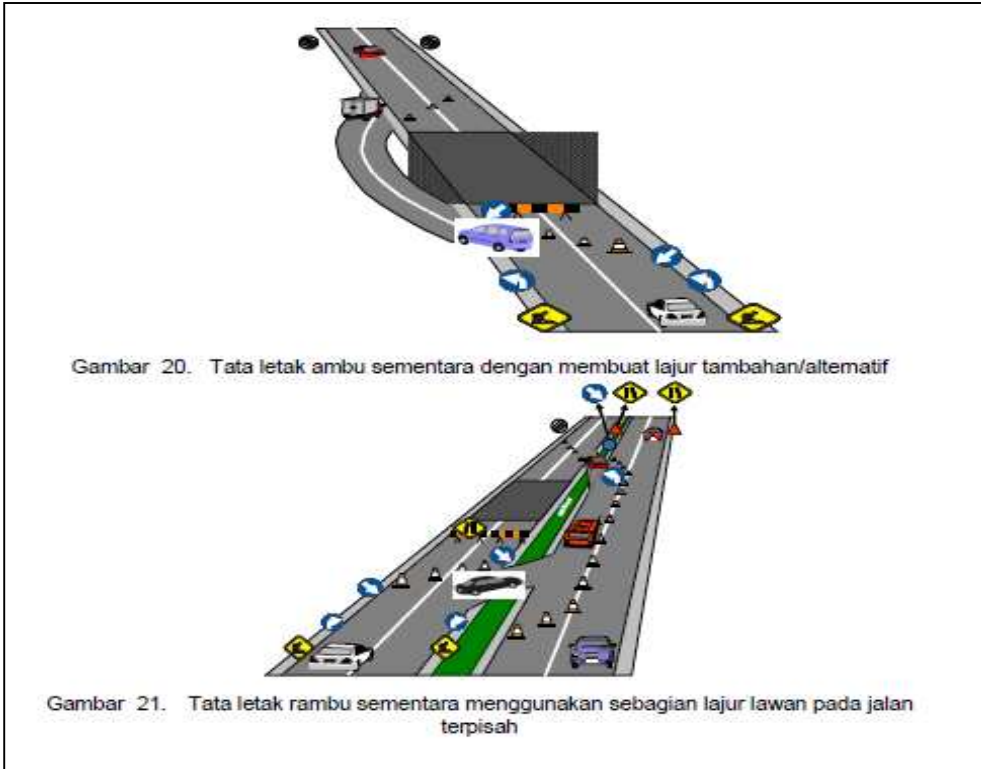


Better Uniform, All Workers already have Reflector Jacket

- Advance temporary warning should be installed
- All the Workers should use a reflector Jacket during on work
- Additional cable/rope reflector lines would be better installed between cones
- Potholes and road deterioration should be marked with cones or paint.

- The Traffic flows should be maintenance.

**Sample advance temporary sign for working at the roads**



The safety of the workers and the road users should have, especially during work on Intersection, widening and surfacing.

**Appendix A. References**

1. Pedoman Audit Keselamatan Jalan (PD T-17-2005-B) Puslitbang PU Prasarana Transportasi
2. Road safety Audit Guidelines (Austroads Standards) Second edition 2002
3. Indonesian Road Design Manual 2002
4. Technical Guidelines for Bus stop and Bus Lane, Directorate Transportation and Highways
5. Technical Guidelines for Safety Structure for Road Side No: 013 / S / BNKT / 1990 Bina Marga
6. Technical Guidelines for Median. Directorate General of Bina Marga 014/BNKT/1990
7. Technical Guidelines for Pedestrian at Cities region SK.43/AJ 007/DRJD/1997
8. Technical Guidelines for Landscaping in Urbanized area No.03/T/BNKT/1992
9. Technical Guidelines for maintenance the plant on the roads 009/T/BT/1995