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"Safe Design for Roads in Urban Areas" Working Report TC C.1.2

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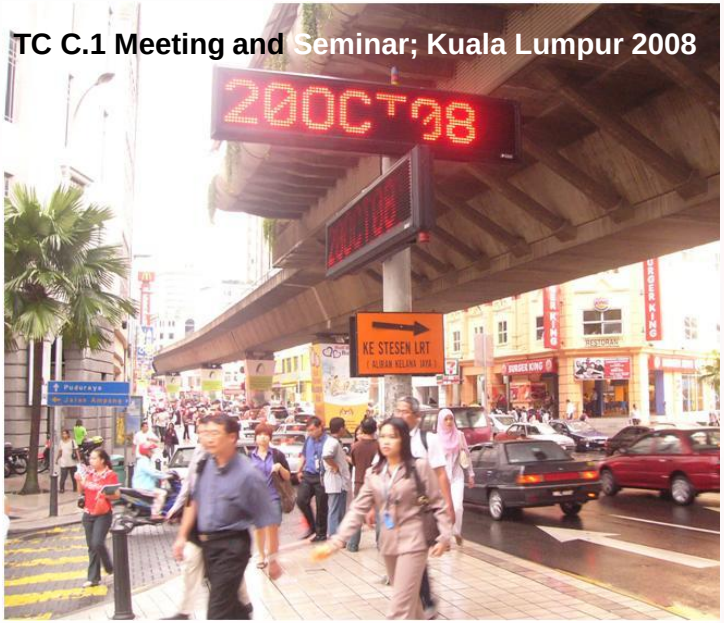
SAFE DESIGN FOR ROADS IN URBAN AREAS
WORKING REPORT C1.2

Format of talk

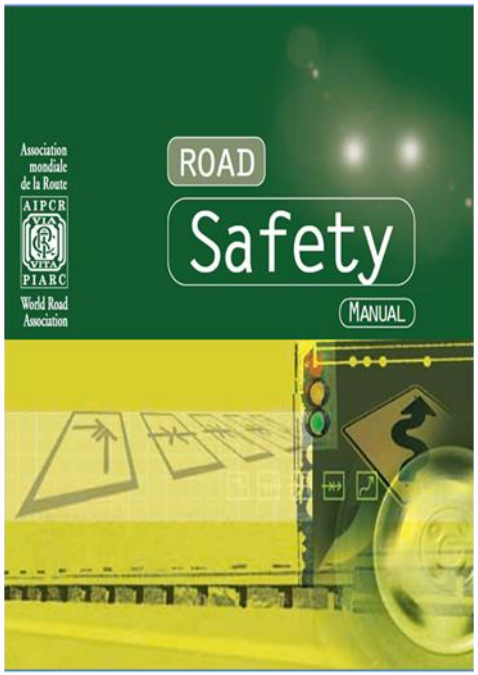
- Topics TC C 1.2
- Road Safety Manual
- RSA / RSI Checklists
- Catalogue of Design Safety Problems and Potential Countermeasures



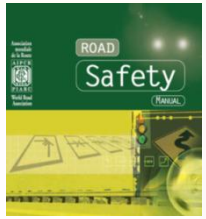
TC C.1 Meeting and Seminar; Kuala Lumpur 2008

SAFE DESIGN FOR ROADS IN URBAN AREAS
WORKING REPORT C1.2

Topics of group work



Road Safety Manual - Content



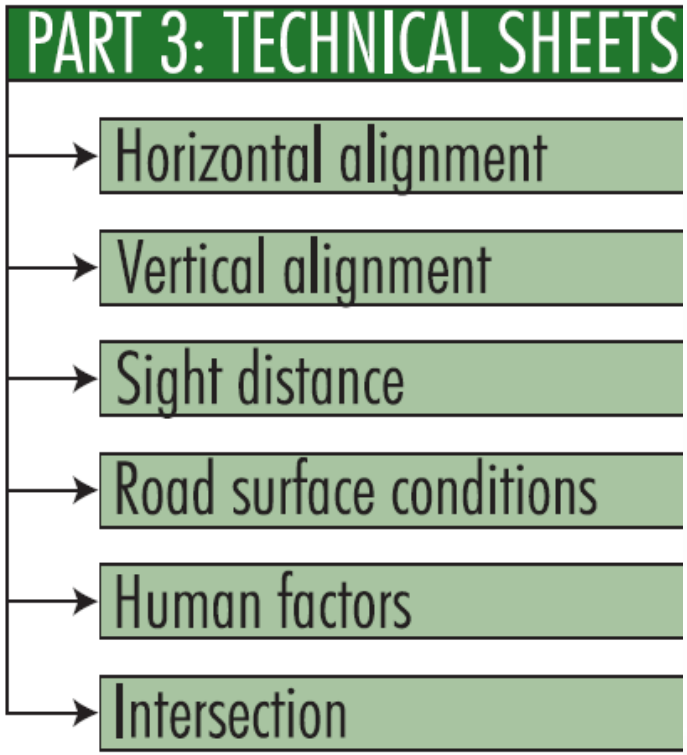
- Part 1: Introduction to Road Safety
- Part 2: Analysis Process
- Part 3: Technical Sheets
- Part 4: Technical Studies

Review of RSM

Recommendations for general improvement of RSM

Upgrading of Technical Sheets regarding urban roads

Technical Sheets



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Network planning / Land use / Road class / Road function
Speed management
Cross section
Public and private services
Vulnerable road users
Traffic signing and markings
Roadside features

ROAD SAFETY AUDIT GUIDELINE / ROAD SAFETY INSPECTION GUIDELINE

RSA and RSI Checklists

Annex 1: Structure of the Checklists				
For Road Safety Audits of road design		Motorways	Interurban Roads	Urban Main Roads
RSA ases		Annex 1.1 Motorways	Annex 1.2 Interurban Roads	Annex 1.3 Urban Main Roads
1	Feasibility Study	Annex 1.1.1	Annex 1.2.1	Annex 1.3.1
2	Preliminary Design	Annex 1.1.2	Annex 1.2.2	Annex 1.3.2
3	Detailed Design	Annex 1.1.3	Annex 1.2.3	Annex 1.3.3
RSI For Road Safety of existing		Motorways	Interurban Roads	Urban Main Roads
4	Pre Traffic Opening	One Checklist Annex 1.1.4 = Annex 1.1 RSI -Guideline	One Checklist Annex 1.2.4 = Annex 1.1 RSI -Guideline	One Checklist Annex 1.3.4 = Annex 1.1 RSI -Guideline
5	Post Traffic Opening			
	Pre design and regular Inspections			

ROAD SAFETY AUDIT GUIDELINE / ROAD SAFETY INSPECTION GUIDELINE

RSA and RSI Checklists

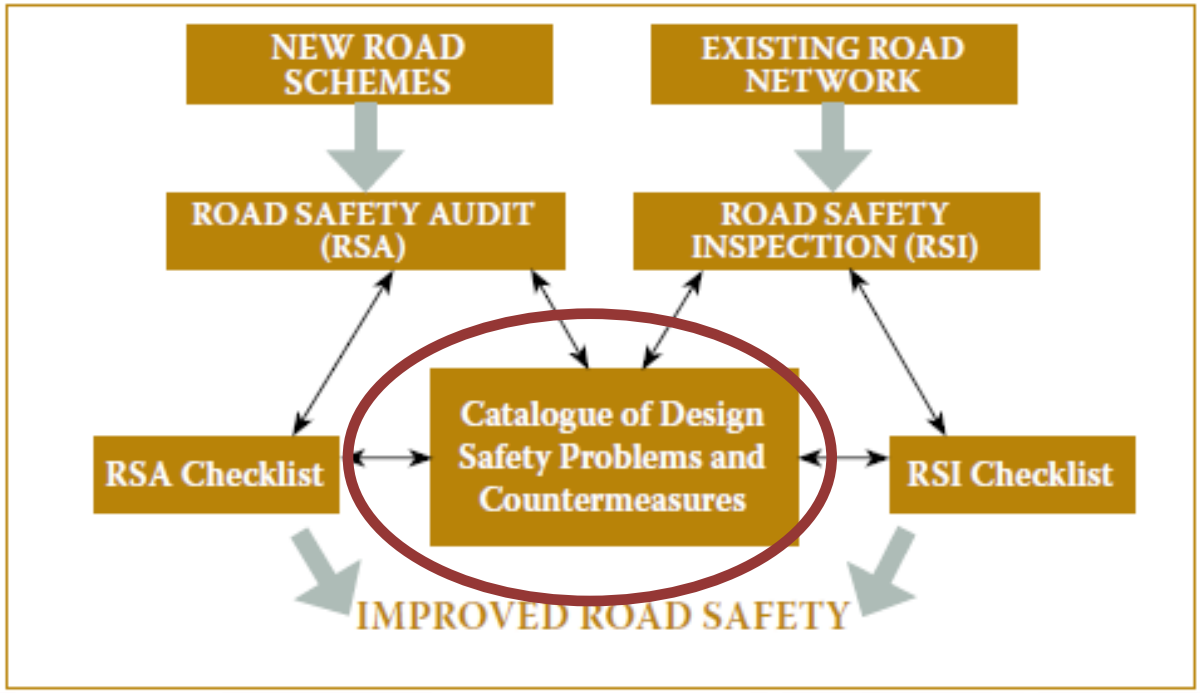
- Creation of an excel-file
- Switching from questions to deficiencies
- Updating of checklists from an urban viewpoint
- Need for a new Residential Road Checklist

Characteristic	No.	Question	Yes (√) No (X)	Comments
1. Function of the road (design and operating elements)	12	In case fixed obstacles are not placed outside the safety zone, are safeguarded?		
	13	Is the end of the co critical points, e.g. s curves, areas with r		

Charcteristic		No.	Deficiencies	Yes/No	MF, Stage 1	MF, Stage 2	MF, Stage 3	MF, Stage 4	MF, Stage 5	IUR, Stage 1	IUR, Stage 2	IUR, Stage 3
1	A	7	Important fin not been tak			y	y	y	y		y	y

CATALOGUE OF DESIGN SAFETY PROBLEMS AND POTENTIAL COUNTERMEASURES

Linkage between RSA, RSI and Catalogue



Source: PIARC

CATALOGUE OF DESIGN SAFETY PROBLEMS AND POTENTIAL COUNTERMEASURES

Description of problem

Potential solutions

BARRIER SPEARING

Exposed W-beam spade end

Vehicle speared by unprotected W-beam spade end

Problem: Although traffic barriers are intended to protect vehicle drivers and occupants by preventing them from running off the road, they can also be severely hazardous if the vehicle impacts the end of the traffic barrier and the traffic barrier end is not fitted with an acceptable end treatment.

Treatment Types & Costs

T1: Buried end terminal
A low cost end treatment since no additional hardware is required. $

T2: Breakaway terminal
This is a relatively inexpensive treatment. $

T3: Energy absorbing end treatment
A more expensive end treatment since it requires more elaborate hardware and site [illegible]evelling and hard $$

Crash Types

- Single vehicle run-off collisions
- Collision with object

Affected Users

- Drivers and occupants

Accident type

Comparative cost

Road users affected

Treatments and Their Benefits

T1: Buried End Terminal
The buried terminal is preferred because it eliminates any exposed end of the guardrail. The barrier is anchored into the back slope.

Note that a turned down and buried treatment is not an acceptable treatment as it causes ramping and launching of the vehicle.

T2: Breakaway terminal
As can be seen from the photo, the posts are weakened to allow shearing of the posts, allowing the end to rotate out of the way. The terminal treatment is also large enough that it does not spear the vehicle.

While allowing the vehicle to possibly travel behind the traffic barrier, this treatment reduces the severity of the collisions with the end of the traffic barrier.

[illegible]ercial models are available.

T3: Energy absorbing end treatment
Energy absorbing end treatments are usually the best treatment for rigid barriers.

The example shown is the Narrow Connecticut Impact Attenuation System (NCIAS). Other commercial models are available.

The NCIAS consists of 8 steel cylinders in a single row with two anchored wire ropes along each side. All cylinders are 900 mm in diameter and 1200 mm tall. Wall thicknesses vary from 3.2 mm to 15.9 mm.

CATALOGUE OF DESIGN SAFETY PROBLEMS AND POTENTIAL COUNTERMEASURES

Cross section

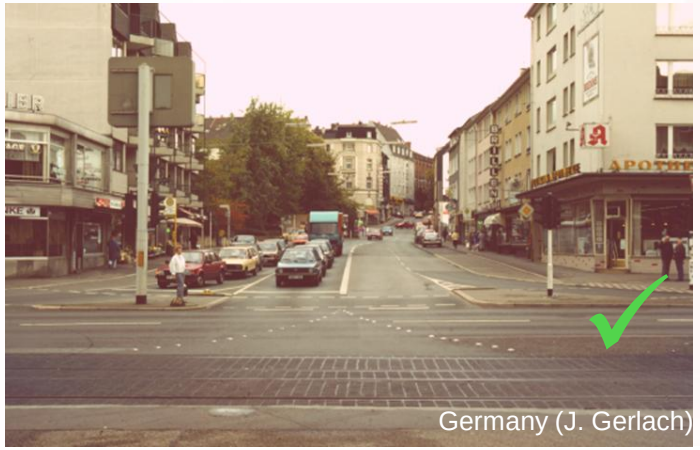

Romania (H.J. Vollpracht)

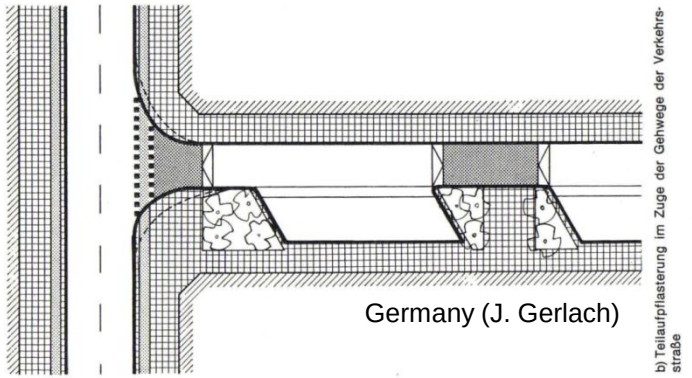

Switzerland (TBA Bern)

- Change the cross section at the entrance of settled areas
- Change shoulder into a sidewalk
- Add traffic islands, reduce lane width

CATALOGUE OF DESIGN SAFETY PROBLEMS AND POTENTIAL COUNTERMEASURES

Intersections





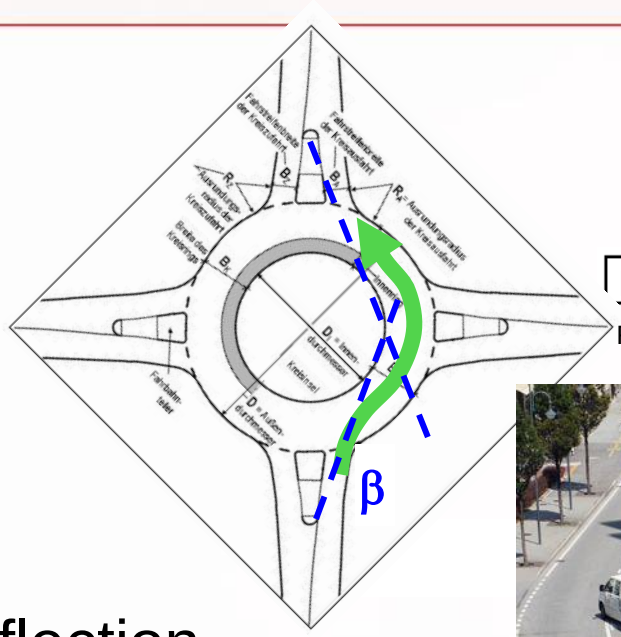
Channelisation using

- Traffic islands
- Markings

CATALOGUE OF DESIGN SAFETY PROBLEMS AND POTENTIAL COUNTERMEASURES

Intersections


PIARC Catalogue



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RASt 06 (D) + ETHZ (CH)

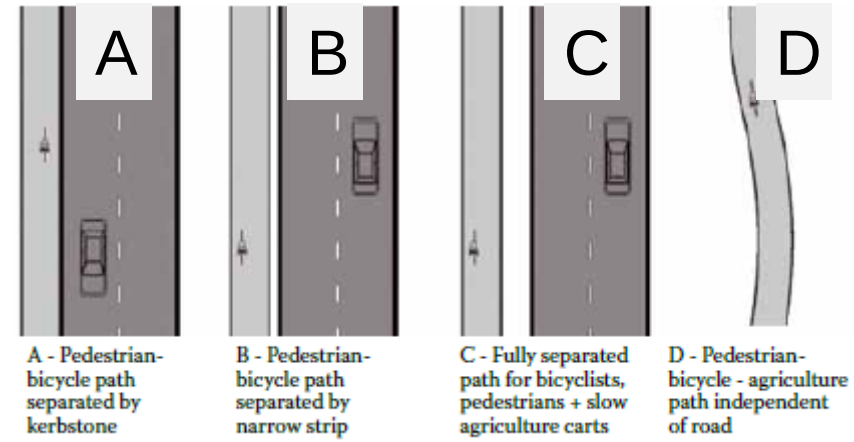

Switzerland (M. Doerfel)

Achieve sufficient deflection

- Increase the size of centre islands
- Narrow lane width
- Add or redesign approach islands

CATALOGUE OF DESIGN SAFETY PROBLEMS AND POTENTIAL COUNTERMEASURES

Vulnerable Road Users



PIARC Catalogue

- Visual segregation by line markings (A, B)
- Physical or total segregation (C, D)

CATALOGUE OF DESIGN SAFETY PROBLEMS AND POTENTIAL COUNTERMEASURES

Vulnerable Road Users


Kuala Lumpur (M. Doerfel)


UNRSC Safe Roads for Development


UNRSC Safe Roads for Development

Exhibition PIARC Seminar Cape Town 2009

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Thank you for your attention.