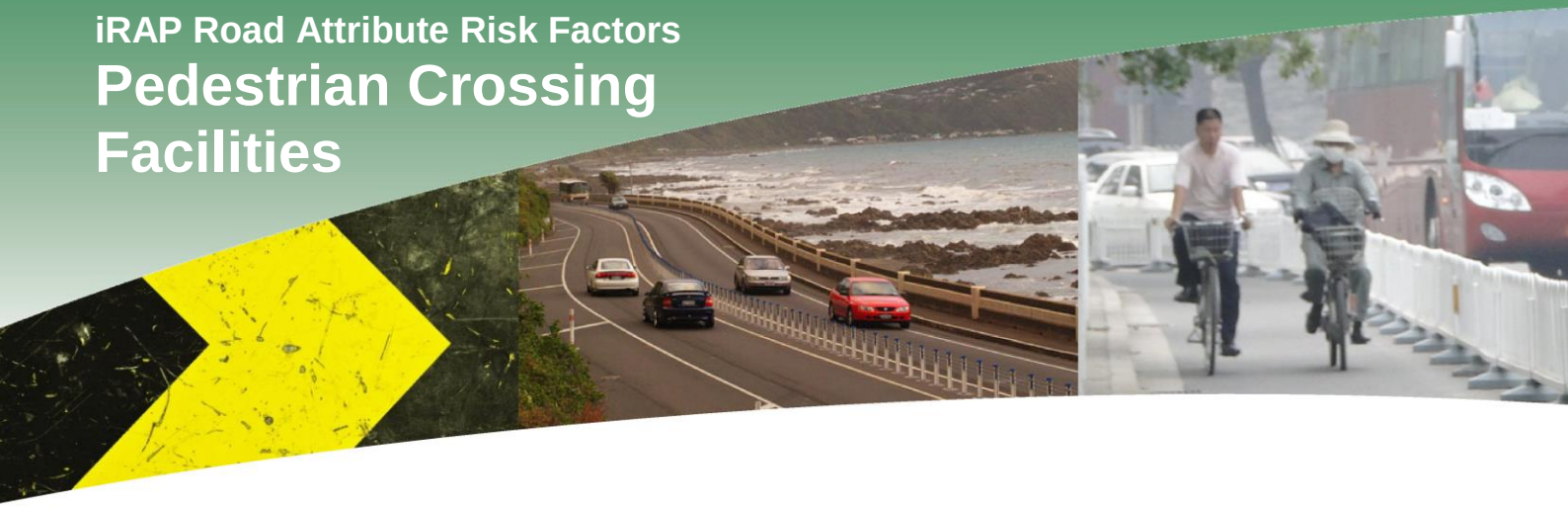
iRAP Road Attribute Risk Factors

Pedestrian Crossing Facilities



This factsheet describes the road attribute risk factors used in the iRAP methodology for Pedestrian Crossing Facilities. Pedestrian Crossing Facilities records the presence of purpose built facilities to assist pedestrians to cross the road.

About risk factors

Risk factors, sometimes called crash modification factors (CMF), are used in the iRAP Star Rating methodology to relate road attributes and crash rates. Risk factors (or CMF) are described by the Crash Modification Factor Clearing House as follows:

> *A crash modification factor (CMF) is a multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site.*
>
> *For example, an intersection is experiencing 100 angle crashes and 500 rear-end crashes per year. If you apply a countermeasure that has a CMF of 0.80 for angle crashes, then you can expect to see 80 angle crashes per year following the implementation of the countermeasure (100 x 0.80 = 80). If the same countermeasure also has a CMF of 1.10 for rear-end crashes, then you would also expect to also see 550 rear-end crashes per year following the countermeasure (500 x 1.10 = 550).*

Related documents

This factsheet should be read in conjunction with:

- *Star Rating Roads for Safety: The iRAP Methodology.*
- *Safer Roads Investment Plans: The iRAP Methodology.*
- *Star Rating and Investment Plan Coding Manual.*
- *Road Safety Toolkit (http://toolkit.irap.org).*

Risk factors

Risk factors by road attribute category, road user type and crash type

Pedestrian Crossing Facilities	Pedestrian likelihood - not at a school	Pedestrian likelihood – at a school with a school zone crossing supervisor during school start and finish times	Pedestrian likelihood – at a school without aschool zone crossing supervisor	Pedestrian severity
Grade separated facility	0.40	0.30	0.40	90
Signalised with refuge	1.00	0.95	1.00	90
Signalised without refuge	1.25	1.20	1.25	90
Unsignalised marked crossing with refuge	3.80	1.00	3.80	90
Unsignalised marked crossing without a refuge	4.80	1.25	4.80	90
Refuge only	5.10	3.80	5.10	90
No facility	6.70	4.80	6.70	90
Grade separated facility – pedestrian fencing present *	0	0.00	0	90
Unsignalised raised marked crossing with refuge	2.50	1.00	2.50	90
Unsignalised raised marked crossing without refuge	3.20	1.00	3.20	90
Raised marked crossing with refuge	3.40	2.50	3.40	90
Raised marked crossing without refuge	4.50	3.20	4.50	90

***** No value recorded

Selection of risk factors

Where there is a grade separated facility, it is assumed that an impact does not occur if there is pedestrian fencing present. Where pedestrian fencing is not present it is assumed that there is still some crossing at-grade but that the overall risk is relatively low and equivalent to a pedestrian crossing with a refuge.

Turner et al. (2009) report that providing a refuge provides a crash modification factor of 0.55 – hence the reduction to in risk (rounded) from 8 to 4.5 when there are no signals and from 2 to 1 where signals are present.

There is little good evidence to show the benefit of marked crossings and the 2012 review by Turner et al has a range of results, including some increases in crashes after installation (but there are very few studies with exposure data to assess whether or not this is due to increases in pedestrians). The halving of risk implied by 8 to 4 upon installation of a marked crossing without a refuge implies good compliance and Turner et al in the 2009 review suggested a reduction of around a quarter.

As noted in the factsheet on Pedestrian Crossing Quality, Turner et al. (2009) suggested that where a pedestrian crossing is difficult to see, the situation is as bad as not having a facility, or that it is even worse for individuals in some instances because it encourages a false sense of security (i.e. pedestrians expecting vehicles to stop on a faded zebra crossing might present a higher risk than having no facility at all).

Because poor quality pedestrian crossings may actually focus risk at crossing points, in some countries in which iRAP has been active it has been agreed that their presence should not be rated as a benefit and that the section should be rated as though the crossing were not present. The availability of improved exposure data may enable such risk to be quantified more accurately in the future.

Turner et al. (2009) also suggested a factor of about 7:1 between a signalised crossing with a refuge and no facility.

The risk factor modifications arising from the presence of a school zone supervisor are estimates resulting from Mead, Zegeer and Bushell (2013) and iRAP's discussion with experts in pedestrian risk. These may be reviewed as relevant research becomes available.

The severity factor of 90 for pedestrians is related to the severity factor for other road-users within the model, and reflects the fact that pedestrians have less protection than vehicle occupants.

Background research and model development

Risk factors in earlier versions of the iRAP model

Pedestrian Crossing Facilities	Pedestrian and bicyclist likelihood	Pedestrian and bicyclist severity
Grade separated facility	1.0	90
Signalised with refuge	1.0	90
Signalised without refuge	2.0	90
Unsignalised marked crossing with refuge	2.0	90
Unsignalised marked crossing without a refuge	4.0	90
Refuge only	4.5	90
No facility	8.0	90
Grade separated facility – pedestrian fencing present *	0.0	0*

Primary references

The following publications are the primary references used in the selection of the iRAP road attribute risk factors. A complete list of citations is available in: *iRAP Road Attribute Risk Factors: Full Reference List*.

Elvik, R, Hoye A, Vaa, T, and Sorensen, M. (2009). The Handbook of Road Safety Measures, Second Edition (2009) Emerald Group Publishing Limited. ISBN 978-1-84855-250-0.

Lynam, D (2012). Development of Risk Models for the Road Assessment Programme. RAP504.12 and TRL Report CPR1293, Published by iRAP and TRL and available at: http://www.trl.co.uk and at http://www.irap.org.

Mak, K. and Sicking, D. (2003). Roadside Safety Analysis Program – Engineer's Manual. Transportation Research Board (TRB) National Cooperative Highway Research Program (NCHRP) Report 492. ISBN 0-309-06812-6.

Turner, B. Steinmetz, L., Lim, A. and Walsh, K. (2012). Effectiveness of Road Safety Engineering Treatments. AP-R422-12. Austroads Project No: ST1571.

Turner, B., Affum, J., Tziotis, M. and Jurewicz, C. (2009). Review of iRAP Risk Parameters. ARRB Group Contract Report for iRAP.

Turner, B., Imberger, K., Roper, P., Pyta, V. and McLean, J. (2010). Road Safety Engineering Risk Assessment Part 6: Crash Reduction Factors. Austroads AP-T151/10. ISBN 978-1-921709-11-1.

University of North Carolina Highway Safety Research Center and U.S. Department of Transportation Federal Highway Administration (2013). Crash Modification Factors Clearing House: http://www.cmfclearinghouse.org/.

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