

Treatment/Crash Reduction Matrix*

APPLICATION OF THE TREATMENT/CRASH REDUCTION MATRIX

Traffic crashes arise through a combination of factors and remedies can be sought through a variety of approaches. This matrix focuses on traffic engineering remedies. The matrix provides broad guidance only and is not intended to replace local experience or judgement.

Assuming that sites have been identified for treatment on the basis of a history of crashes or other systematic technique, crashes at the site should then be analysed in terms of the pattern of accident-types [DCA code] and any consistency of other factors. If road-related factors are relevant to the amelioration of crashes at a site, this matrix can be used for guidance as to the influence of particular treatments.

The matrix provides 'ball-park' guidance on the estimated extent of change in crashes of particular types that might generally be expected from a range of typical treatments. The reductions for the various treatments are averaged values and therefore the results [percent reduction] that will be observed when any particular treatment is installed may be greater or less than the value in the tables.

The selection of a particular treatment will of course depend on a range of factors, including the characteristics of crashes, the expected potential of reducing those crashes, the cost of alternative treatments, possible wider road network considerations, and so on. The Australian Manual of Uniform Traffic Control Devices sets out minimum warrants for a number of treatments.

The matrix is divided into two tables:

Table 1: *relates to intersections (and intersection-related crashes);*

Table 2: *relates to road sections (and non-intersection-related crashes). This table is spread over two pages 2(a) and 2(b) for the ease of reading the information.*

At some locations more than one road feature may be present, eg consider a tee intersection on a curved section of road - crashes of accident-type DCA codes 801-804 [run off road types] occurring at such a location would generally not relate to the intersection. On the other hand, crashes of codes 101-109 would relate to traffic movements at the intersection.

The matrix tables emphasise the importance of the road user movements that lead up to the crash in the determination of appropriate treatments. The average costs per casualty crash have been derived for Australia-wide use and are split by 'Rural' and 'Metro' environments and are based on there being good coding compatibility between the crash data being used and the "Definitions for Coding Accidents [DCA]" codes.

The crashes described by the DCA codes and the costs per crash for DCA codes relate to one-vehicle and two-vehicle crashes. The vehicles encompassed are all road vehicles eg cars, trucks, motor bikes, and bicycles. A treatment may be installed to provide for a particular vehicle type eg traffic signals for bicycles where a bicycle track crosses an arterial road, or the improvement of lighting at an intersection where there are many bicycles at night and, say, a history of crashes of DCA codes 301-304.

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Table 1 - Intersection Matrix - Intersection related crashes.

Accident-type [DCA Code]		101-109	201	202-206	301-304	305-307	308, 309	001-003	706-707	601, 401-2
Description		Adjacent approach	Head on	Opposing turns	Rear end	Lane change	Parallel lanes, turning	Vehicle hits pedestrian	Loss of control, L or R turns	Hit parked, parking vehicle
Treatment		Estimated Crash Reduction – Percent Change								
Code	Type									
K 1	Roundabout	75			+20		+20	+30	+140	
K 2	New traffic signal [no turn arrow]	80		+90				30		
K 3	New signal with turn arrows	70		50				30		
K 4	Remodel signal	50		60				30		
K 22	Add right turn arrow			65						
K 5	Grade separation	100		50			20	70	50	
K 6	Improve sight lines	30		30				30	20	
K 7	Street closure [one leg of cross]	50		50				50	10	
K 8	Street closure [close stem of Tee]	100		100				50	100	
K 9	Non-skid treatment				40				30	
K 10	Stagger cross intersection [right-left]	70		50	+30	+10				
K 11	Improve/reinforce priority signs [eg Stop]	50								
K 12	Ban right turns			50			50		50	
K 13	Ban left or U turns			Note 1	50		50		50	
K 14	Improve lighting							30		
K 15	Traffic islands on approaches	50	20	50	20				10	10
K 16	Indented right island			30	40				20	20
K 17	Painted turn lane			20	40					20
K 18	Ban parking adjacent to intersection	10			20	20		30		50
K 19	Extend median through intersection	75	100	100				50		
K 20	Reduce radius on Left turn slip lane				50					
K 21	Protected L turn lane in crossing street				30					
Cost per casualty crash (\$1000)	Metro	122.0	262.9	126.9	62.7	95.0	83.8	165.0	99.1	122.9
	Rural	258.8	465.5	213.6	146.9	238.8	188.3	289.4	206.8	209.5

Note 1 For treatment code K 13, banning U-turns is a relevant treatment for DCA 207 with an estimated crash reduction of 50 %. [Costs for 207 - \$119.5K (Metro) and \$216.7K (Rural)] Banning left turns is a relevant treatment for DCA 203, 205, and 206 with a 50 % reduction.

Table 2 (a) Road Sections Matrix - Non-intersection related crashes

Accident-type [DCA Code]		201	202-206	301-304	305-307	001-003	601,401, 402
Description		Head-on	Opposing turns	Rear end	Lane change	Vehicle hits pedestrian	Hit parked, parking vehicle
Treatment		Estimated Crash Reduction – Percent Change					
Code	Type						
S 1	Median on existing road	90				50	
S 2	Pedestrian refuge					50	
S 3	Pedestrian crossing					40	
S 4	Pedestrian overpass					90	
S 5	Pedestrian signals					70	
S 6	Ped crossing lighting					60	
S 7	Improved route lighting					30	
S 8	Clearway, parking bans			20		30	50
S 9	Indented RT island		30	40			
S 10	Painted turn lanes		20	30			
S 11	Roadside hazards – Remove	Note 2					
S 12	Roadside hazards – Guard rail						
S 13	Non-skid surface			20			
S 14	Seal shoulder	40					
S 15	Advisory speed sign on curves	30					
S 16	Delineation						
S 17	Edgelines						
S 18	Reconstruct superelevation on curve	50					
S 19	Climbing lane [overtaking lane]	30 Note 3				+10	
S 20	Signs [rail crossing]						
S 21	Flashing lights [rail crossing]						
S 22	Barriers/gates[rail crossing]						
S 23	Bridge/overpass[rail crossing]						
S 24	Frangible posts, poles						
Cost per casualty crash (\$1000)		Metro		Rural			
		262.9	126.9	62.7	95.0	165.0	122.9
		465.5	213.6	146.9	238.8	289.4	209.5

Note 2 For treatment code S 11, the effect of removing objects that were hit after a vehicle left the road is to reduce crashes that relate to hitting the objects [DCA 703, 704, 803 & 804]. However, the reduction in these crashes will be matched by an increase in DCA 701, 702, 801 & 802 as vehicles will continue to leave the road, but now without hitting objects [all else being equal]. The net benefit relates to the difference in the cost of the accident-types.

Note 3 For treatment code S 19, DCA 501 is also relevant [use DCA 201 cost].

Table 2 (b) Road Sections Matrix - Non-intersection related crashes

Accident-type [DCA Code]		On Straight			On Curve			903
		701-702	703-704	705	801-802	803-804	805	
Description		Off road	Off road, hit object	Loss of control, on road	Off road	Off road, hit object	Loss of control, on road	Vehicle hits train
Treatment		Estimated Crash Reduction – Percent Change						
Code	Type							
S 1	Median on existing road							
S 2	Pedestrian refuge							
S 3	Pedestrian crossing							
S 4	Pedestrian overpass							
S 5	Pedestrian signals							
S 6	Ped crossing lighting							
S 7	Improved route lighting							
S 8	Clearway, parking bans							
S 9	Indented RT island							
S 10	Painted turn lanes							
S 11	Roadside hazards –Remove	+80	80		+80	80		
S 12	Roadside hazards –Guard rail	30	30	+30	30	30	+30	
S 13	Non-skid surface	30	30	30	30	30	30	
S 14	Seal shoulder	40	40	40	40	40	40	
S 15	Advisory speed sign on curves				30	30	30	
S 16	Delineation	30	30	0	30	30	0	
S 17	Edgelines	30	30		30	30		
S 18	Reconstruct superelevation on curve				80	80	80	
S 19	Climbing lane [overtaking lane]							
S 20	Signs [rail crossing]							15
S 21	Flashing lights [rail crossing]							50
S 22	Barriers/gates[rail crossing]							80
S 23	Bridge/overpass[rail crossing]							100
S 24	Frangible posts, poles		Note 4			Note 4		
Cost per casualty crash (\$1000)	Metro	94.1	192.1	99.1	148.0	227.7	104.9	443.1
	Rural	183.8	318.4	206.8	285.0	354.4	188.8	654.1

Note 4 For treatment code S 24, the effect will be that the injury outcome distribution will change within DCA codes 703, 704, 803, 804 rather than a reduction in the number of crashes per se. This gives reduced average number per crash of deaths and serious injuries and more minor injuries.

Note 5 Accident-type [DCA - “Definitions for Coding Accidents”] refers to the system of classifying crashes by the movements of road users leading up to the impact. Descriptions of the system are to be found in “Standard Accident Definitions: Primary Accident Classes and Accident Types, Andreassen, D., in Australian Road Research, 13[1], pp 10-24, March, 1983” and various later versions.