

3 Problem definition and recommendation form (PR form)

Use the problem definition and recommendation (PR) form for coding:

- € crash problems that have been identified during the investigation
- € recommendations made as a result of the investigation or changes likely to affect the crash pattern that have recently been implemented.
- € information on crashes addressed by recommendations
- € estimated cost of works.

For the purpose of the monitoring system, identify crash problems by the main crash types or crash situations at the location. Select crash type and optional details codes from the problem coding sheet on page 25.

Define recommendations by a combination of action/object keywords and codes selected from the recommendation coding sheet, found at the end of this section (pages 26 to 29).

After filling in the PR form, attach it to the corresponding CL form and include it as an appendix in the crash reduction study report. Send the report and all the forms to the engineering section of the local Land Transport NZ office. The data will be entered in the monitoring database and an implementation report (IR) (see section 4) will be generated and sent to you. Update the IR to show implementation details for recommendations or to record changes if you reject or modify any recommendations.

Detailed instructions follow on how to fill out the PR form. See Appendix B (B2 and B4) for samples of a blank PR form and a completed PR form. The paragraph numbers below correspond to the numbers on the PR form.

3.1 ID no (identification number)

For Land Transport NZ use only. (Matched to the ID number used on the corresponding CL form.)

3.2 Study name

Use the same study name that was given on the CL form. A maximum of 30 characters are allowed for the study name.

3.3 Location name

Use the same location name as on the CL form. A maximum of 35 characters may be used for the name.

3.4 Location number

Use the same location number as on the CL form. Two digits only are allowed.

3.5 Problem coding

A problem coding sheet to assist with this part of the form is included on page 25 at the end of this section. This information is also repeated in the crash reduction monitoring system quick reference chart (Appendix E).

Crash locations often have more than one problem. At least one but no more than five problems must be coded for each crash location. Code only those that are clearly common factors, or that will be addressed by the recommendations.

If needed, optional details can be added to the crash type to clarify the problem definition.

Problem number

The problem number identifies the problem coded so that it may be linked to any recommendation made (see section 3.8). *Note:* Code at least one and up to a maximum of five problems at a location.

Crash type

Each problem must be assigned a code from the crash type section on the problem coding sheet. There are 12 crash types from which to choose. The crash movement codes which correspond to these crash types are listed in the table on the next page:

	Crash type	Associated crash movement codes
1	All/general	All or general mixture of codes
2	Overtaking	AA, AB, AC, AD, AE, AF, AG, GE, GB
3	Head-on (bend)	BB, BC, BD
4	Head-on (straight)	BA
5	Lost control (bend)	DA, DB, DC, BF
6	Lost control (straight)	CA, CB, CC, BE
7	Rear-end obstruction	EA, EB, EC, ED, EE, FA, FB, FC, FD, FE, FF, GA, GC, GD, GF, MA, MB, MC, MD, ME, MF, MG
8	Crossing	HA
9	Turning	JA, JC, LA, LB
10	Merging	KA, KB, KC
11	Pedestrian	NA, NB, NC, ND, NE, NF, NG, PA, PB, PC, PD, PE, PF
12	Other	QA, QB, QC, QD, QE, QF, QG

See Appendix A (A.1.1 Problem categories) pages 33 to 36, for diagrams linking movement codes to each of the crash types listed above.

Note: Crash type 1: 'All/general' should only be used if all movement types are considered a problem and are likely to be addressed by the proposed recommendations.

Optional details

Each problem may also be assigned a code from the optional details section on the problem coding sheet. This will be used if details are needed to fully describe the crash situation. There are five optional details:

Darkness	1
Wet road/ice	2
Struck roadside object	3
Speed	4
Cyclist	5

For example, if the identified problem at the location is crossing-type crashes, eg HA, the coding format is:

3.5. Problem coding		
Prob no	Crash type	Optional details
1	<input type="text" value="8"/>	<input type="text"/>

However, if the problem identified at the location is crossing-type crashes at night, the coding format is:

3.5 Problem coding		
Prob no	Crash type	Optional details
1	<input type="text"/> <input type="text" value="8"/>	<input type="text" value="1"/>

3.6 Recommendations

Recommendations are defined by a combination of action/object keywords and codes. A recommendation coding sheet to assist with this part of the form is included in this section on pages 26 to 29. This information is also repeated in the crash reduction monitoring system quick reference chart (Appendix E).

Interpretations of keywords for coding actions and objects for the recommendations are shown in Appendix A2.

If no *physical* remedial works are recommended, do not fill out monitoring forms.

Traffic education/enforcement recommendations are not coded as these recommendations cannot be monitored with the present monitoring system because:

- € no costs are allocated
- € there is no direct control over enforcement agenda
- € there is difficulty in establishing an implementation date.

Enter each physical recommendation at a crash location on the PR form using the action and object code numbers from the recommendation coding sheet. Each recommendation is made up of both an action code and an object code. A maximum of 15 recommendations can be coded.

To make it easier to find the appropriate action and object codes, these have been grouped into common treatment categories. There are nine categories:

Treatment categories

- 100 Surface and layout
- 200 Markings and delineation
- 300 Lighting
- 400 Traffic signs
- 500 Kerbs, islands and medians

- 600 Roadside features
- 700 Traffic flow
- 800 Control types
- 900 Geometric alignment

If a recommendation can't be coded, describe it in words and Land Transport NZ will code it, if considered appropriate. Interpretations of action and object keywords are shown in Appendix A, pages 37 to 48.

If more than one option has been recommended and each option has a number of recommendations, code all recommendations for each option. Once an option has been chosen, those recommendations not implemented can later be assigned an implementation status code of 4: works will not be done (see section 4).

Any major changes to the location during the study period which are likely to have affected the crash pattern should be coded as recommendations. They will either have implementation status 5: works done prior to study, or implementation status 6: environmental changes. Alternatively the study period can be amended to start after such works and they do not then need to be listed.

Each recommendation should only be coded once per location, regardless of how many times the recommendation is implemented. For example, if a curve warning sign was recommended for both northbound and southbound directions, code 'install, sign, PW18' only once. However, if you are recommending different signs, e.g. 'install PW18' and 'install PW19', code each separately.

3.6.1 Actions

Action number

Action numbers are listed from one to 15. A maximum of 15 recommendations may be coded. Note that you do not have to have 15 recommendations. Use only as many as you need. If there are more than 15 recommendations, record only those that will address the most crashes.

Action category

Action categories do not get coded on the form. They are listed on the recommendation coding sheet (pages 26 to 29) and are a guide to help users find the appropriate action code. There are five action categories:

- € install/add
- € remove
- € move

€ upgrade/maintain

€ modify.

Within the five action categories are the specific action codes which are used for coding recommendations.

Action code

Each recommendation must be assigned an action code from the recommendation coding sheet (pages 26 to 29). This information is also repeated in the crash reduction monitoring system quick reference chart (Appendix E). To select the action code first select the appropriate treatment category then select the action code. Not all action codes are available for particular treatment categories.

3.6.2 Objects

Within each treatment category there are specific object codes that can be used on the PR form. If a specific object you want is not listed use the treatment category code instead.

Object code

Each recommendation/action must be assigned an object code (or a treatment category code) from the recommendation coding sheet (pages 26 to 29).

For example, the recommendation is to 'widen the left turn bay'. On the recommendation coding sheet:

1. Locate the treatment category which would be most likely to contain the object you want. In this case, use category 100, Surface and layout.
2. Go across to the right to find the action category which relates to the treatment – in this case the *modify* block of actions. Go to the right and find the action, in this case 'widen' which has action code = 55.
3. Find the object you want, in this case 'left turn bay' which has the object code = 106.

The above example would be coded:

1.1.1 3.6 Recommendations			
Action no	Action code	Object code	Traffic sign code
1	55	106	

If you can't find the specific object you want, code the most suitable treatment category, eg 100 – Surface and layout, or write the object in using words and it will be coded for you. See Appendix A for definitions of keywords (pages 37 to 48).

Traffic sign code

Traffic sign codes are only used if the recommendation involves the treatment category 400 Traffic signs. All actions involving traffic signs have object code 400. The traffic sign code is used to specify which sign is involved. The traffic sign code is the sign number in the *Manual of Traffic Signs and Markings, Part 1: Traffic Signs*.

If signs will be installed but you are not sure which signs (e.g. PW18 or PW19) simply code the object code as 400 and code one type. This can be updated later, on the implementation report, if a different sign is used.

For example, 'install a Stop sign' would be coded:

1.1.2 3.6 Recommendations			
Action no.	Action code	Object code	Traffic sign code
1	11	400	RG5

Effect

The effect code is used to give an estimation of the likely safety effect the recommendation will have on crashes at the crash location. This effect may be:

- € 1 = major – this recommendation is expected to have a major effect on the problems identified
- € 2 = minor – this recommendation is expected to have a small effect on the problems identified
- € 3 = none – this recommendation will likely not have much effect on the crashes at this location, but was made in keeping with good engineering practice, or to bring the location up to standard.

For example, the following recommendation, 'widen physical left turn bay', is expected to have a major effect on crashes. This would be filled in as follows:

1.1.3 3.6 Recommendations				
Action no.	Action code	Object code	Traffic sign code	Effect
1	55	106		1

This code is used in analysis so recommendations which will have a greater effect can be assessed rather than those with little or no effect.

3.7 Linking

Linking is the relationship between the identified problems and the recommendations made to address the problems. Each recommendation/action which has an effect of 1 (major), or 2 (minor), must be linked to at least one of the problems identified (crash type coded). An actual recommendation may address more than one problem.

For example, three problems have been identified at a location. Two recommendations were made to address these problems. Recommendation 1 addresses problem numbers 2 and 3 and is expected to have a minor effect on the crashes, while recommendation 2 addresses problem number 1 and is expected to have a major effect on the crashes. The form would be filled in as follows:

3.6 Recommendations					3.7 Linking
Action no.	Action code	Object code	Traffic sign code	Effect	Links to problem no
1	54	108		2	2, 3
2	11	400	RG5	1	1

Note: The link is between the action number and the problem number, not the crash type. For example, if recommendation 1 is linked to problem number 1 which is crash type 5 (lost control – bend) the linking is to problem number 1 not crash type 5.

3.8 Implementation

The PR form allows the implementation status and date to be entered for each recommendation/action if known. Safety improvement works that have been implemented or planned during the study period, and will have an effect on crashes, should be added to the list of recommendations. The date these works were done, or will be done, should be known and needs to be recorded in the monitoring system. Record the status and implementation date of these improvements.

Status

Refer to the implementation status table in section 4, page 31. The status will normally be one of the following codes:

- € 2 for study recommendations
- € 5 for works implemented separately from the current study
- € 6 for works classified 'effect 3'.

Date

Implementation dates (in the format year, month, ie YYYYMM) are required for all recommendations/actions with status 1 or 5. Do not enter any dates for recommendations with status 2.

3.9 Estimated cost of recommendations

Estimate what the total cost of all recommendations for the entire crash location will be.

Note: If recommendations for more than one option have been provided, record the cost of the highest cost option. The estimate can be updated once an option has been selected and implemented.

Crash data

This gives a record of both injury and non-injury data used.

3.10 Total crashes

Enter the total number of reported injury and non-injury crashes in the study period specified on the CL form. This is normally the complete five calendar years before the year of the study. Record injury and non-injury data separately.

3.11 Number of crashes addressed

Enter the number of reported injury and non-injury crashes in the study period which are to be addressed by the recommended remedial works. Record the number of addressed injury and non-injury crashes separately.

3.12 Crash savings

Enter the estimated number of reported injury and non-injury crashes which are expected to be saved by the proposed works. Use the same timeframe for the estimated crash savings as the study period. For example, if a five-year study period was used, the estimated saving should be for five years. Enter injury savings and non-injury savings separately. This is the number of crashes not a percentage saving.

3.13 Description of addressed crashes

Enter a simple text description of the crashes which are addressed by the recommendations, eg 'all night-time crashes' or 'downhill loss of control crashes'. This could include crash problems or situations that had not been recorded in the study period but would also be addressed by the improvements.

Problem coding sheet

Crash type		Optional details	
All/general	1	Darkness	1
Overtaking	2	Wet road/ice	2
Head-on (bend)	3	Struck roadside object	3
Head-on (straight)	4	Speed	4
Lost control (bend)	5	Cyclist	5
Lost control (straight)	6		
Rear-end/obstruction	7		
Crossing	8		
Turning	9		
Merging	10		
Pedestrian	11		
Other	12		

Note: The crash type list above is a list of crash movement types.

The appropriate movement codes associated with each of the above crash types are shown in section 3.5 as well as illustrated in Appendix A1, pages 33 to 36.

Recommendation coding sheet

TREATMENT CATEGORY	ACTION CATEGORY	ACTION	Action Code	OBJECT	Object Code	
SURFACE & LAYOUT – 100	Install/add	Install	11	SURFACE & LAYOUT	100	
		Seal	13	Bridge	101	
				Carriageway/lanes	102	
	Move	Move	31	Crawler/passing lane	103	
	Upgrade/maintain	Upgrade	41	Driveway	104	
		Re-seal	42	Flush median (see category 200)		
	Modify	Ban/close	51	Intersection	105	
		Extend	52	Physical bay – left turn	106	
		Shorten	53	Physical bay – right turn	107	
		Narrow	54	Physical bay – parking	108	
		Widen	55	Ramp	109	
		Lower	56	Shoulder	110	
		Raise	57	Taper	111	
		Re-design	58	Very high friction surfacing	112	
	MARKINGS & DELINEATION – 200	Install/add	Install	11	MARKING & DELINEATION	200
Paint/mark			12	Bridge end marker	201	
Apply textured / ribbed			16	Bus stop	202	
				Centreline – dashed	203	
Remove		Remove	21	Centreline – solid	204	
Move		Move	31	Chevrons – single curve indicators (see category 400, PW67)		
		Re-align	32	Chevrons – full (see category 400, PW66, RC5, etc)		
Upgrade/maintain		Upgrade	41	Continuity line	207	
		Maintain paint	43	Diagonal markings	208	
		Replace	45	Edgeline	209	
Modify		Extend	52	Edge marker posts	210	
		Shorten	53	Flush median	211	
		Narrow	54	Guard rail (see category 600)		
		Widen	55	Hatched/painted island	212	
		Lower	56	Hazard marker	213	
		Raise	57	Lane markings – general	214	
		Increase (# of)	59	Lane markings – arrows	215	
		Add backing board to	66	Lane markings – cycle	216	
		Reflectorise		67	Lane markings – left turn	217
					Lane markings – right turn	218
					Lane markings – roundabout	227
					Limit lines	219
					No overtaking line	220
				No stopping line	221	
				Parking space–painted	222	
				Pedestrian crossing	223	
				RRPMs	224	
				Sight rail	225	
				Words	226	

TREATMENT CATEGORY	ACTION CATEGORY	ACTION	Action Code	OBJECT	Object Code	
LIGHTING – 300	Install/add	Install	11	LIGHTING	300	
	Remove	Remove	21			
	Move	Move	31			
		Re-align	32			
	Upgrade/maintain	Upgrade	41			
		Repair	44			
Replace		45				
Modify	Extend	52				
TRAFFIC SIGNS – 400	Install/add	Install	11	TRAFFIC SIGNS	400	
	Remove	Remove	21			
	Move	Move	31			
	Upgrade/Maintain	Repair	44			
		Replace	45			
	Modify	Lower	56			
		Raise	57			
		Increase (# of)	59			
Decrease (# of)		60				
Enlarge		61				
Add backing board to	66					
KERBS, ISLANDS & MEDIANS – 500	Install/add	Install	11	KERBS, ISLANDS, MEDIANS	500	
		Paint/mark	12			Bulbous kerbs
		Seal	13		Flush median (see category 200)	502
	Remove	Remove	21		Kerb	
		Move	Move		31	Median barrier (see category 600)
	Re-align		32		Pedestrian refuge	
	Upgrade/Maintain	Re-seal	42		Raised median	504
		Maintain paint	43		Roundabout (see category 800)	505
		Repair	44		Seagull/splitter island	
		Replace	45		Speed hump	506
	Modify	Extend	52		Throat/fishtail island	507
		Shorten	53		Threshold/gateway/platform	508
		Narrow	54			
		Widen	55			
		Lower	56			
		Raise	57			
Reflectorise		67				

TREATMENT CATEGORY	ACTION CATEGORY	ACTION	Action Code	OBJECT	Object Code
GEOMETRIC ALIGNMENT – 900	Move	Re-align	32	GEOMETRIC ALIGNMENT	900
	Upgrade/Maintain	Upgrade	41	Crest	901
		Modify	Extend	52	Curve
	Increase		59	Depression	903
	Decrease		60	Sag	904
	Ease		65	Super elevation/camber	905

Quick reference chart

Appendix E includes a smaller two-page version of the above. These two pages can be copied back to back and then folded into three to make a simple quick reference chart for use when completing monitoring forms or implementation reports.