OBT

ROUNDABOUTS – STEEP GRADES, PEDESTRIANS and CYCLISTS

Presentation by Andrew O'Brien

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40 Years of Roundabouts

- Steep Grades
- Grading
- Pedestrians
- Cyclists

Summary of Presentation & Paper

Paper describes some of the safety issues at roundabouts with respect to:

- roundabouts on steep grades
- inward or outward sloping of circulating roadways
- pedestrians
- cyclists
- the safety outcomes for pedestrian-involved & cyclist-involved crashes, by severity, at roundabouts and signalised intersections in the greater Melbourne metro area

Roundabouts on steep grades

Roundabouts on ruling grades of up to 12%

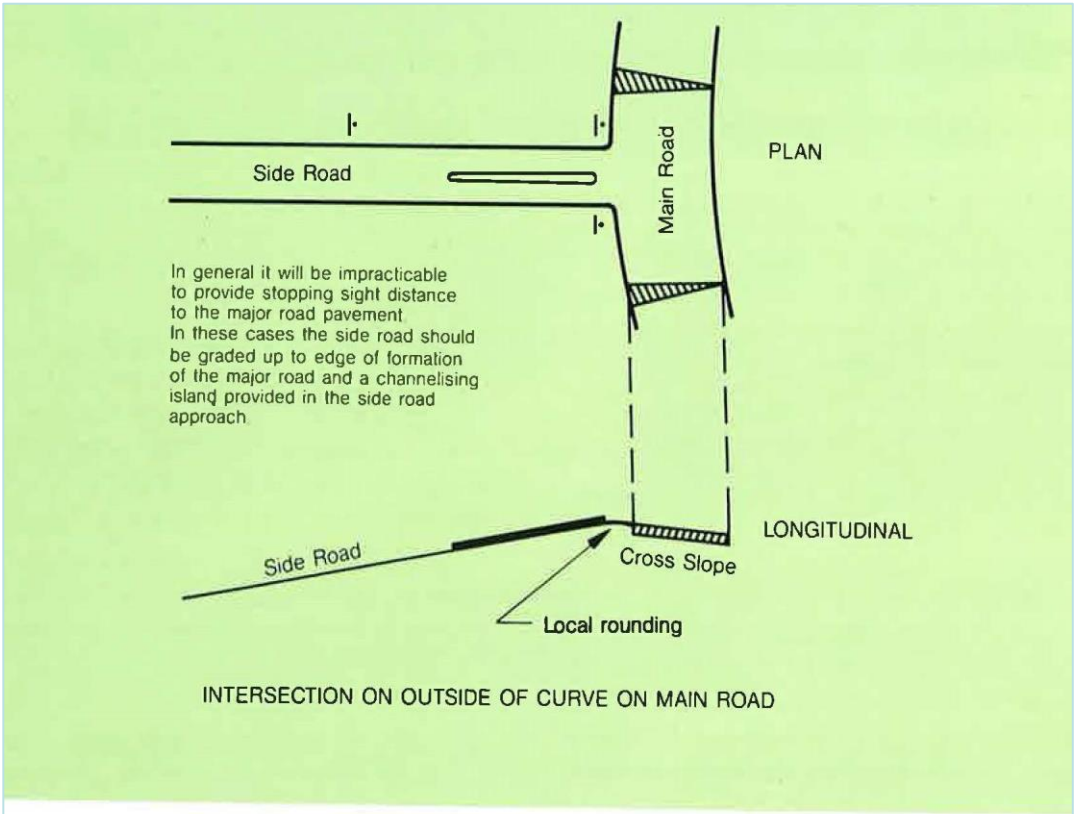
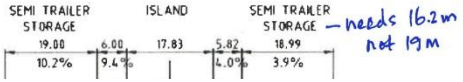


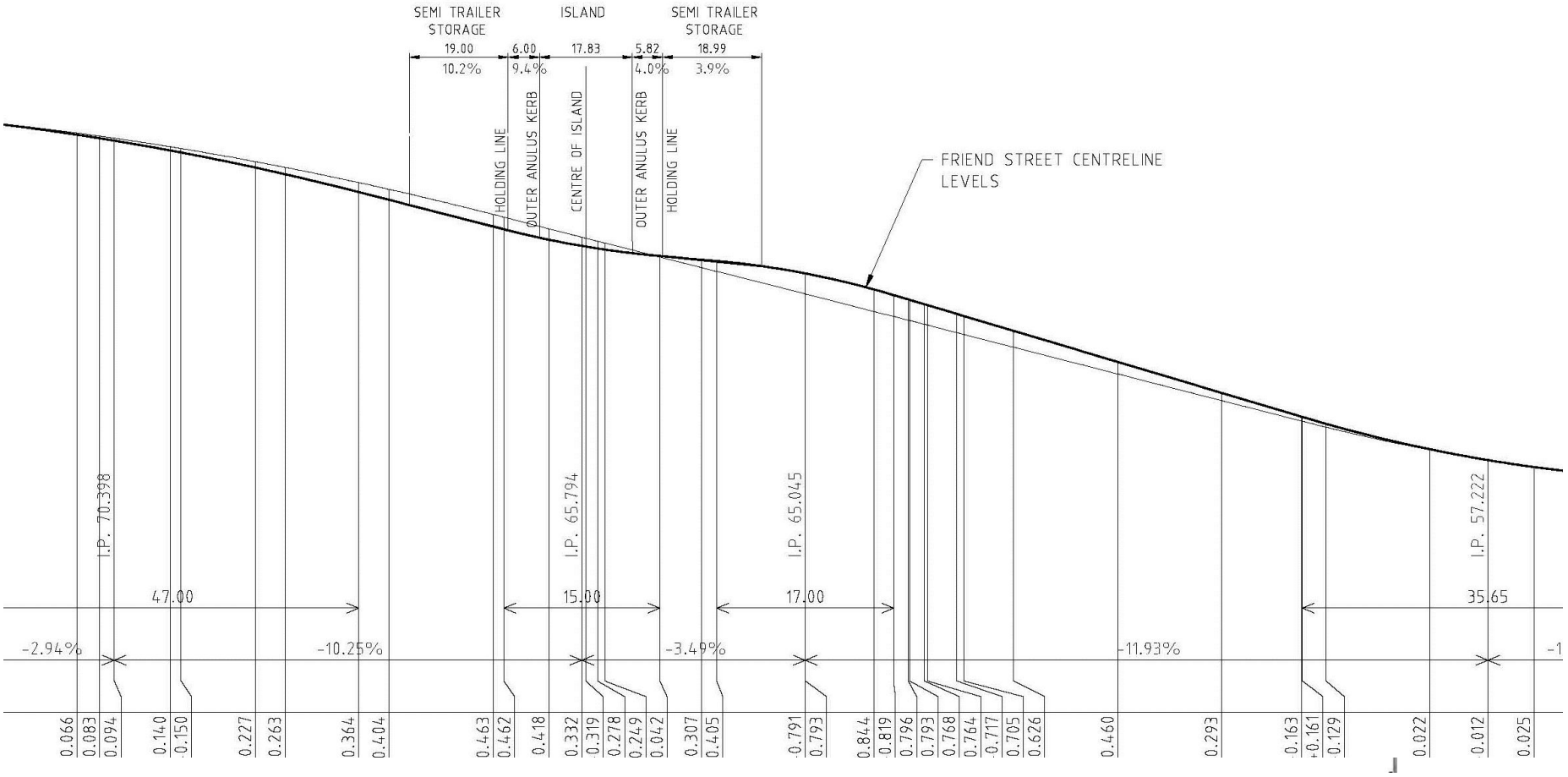
FIGURE 5.3 Main Road Intersections - Approach Grading on Side Roads

- Grading sharp changes at rural intersections
- Apply same principles at roundabouts where necessary.
- Important to see the approach geometry, then
- Important to see roundabout ‘layout’ from near holding line.

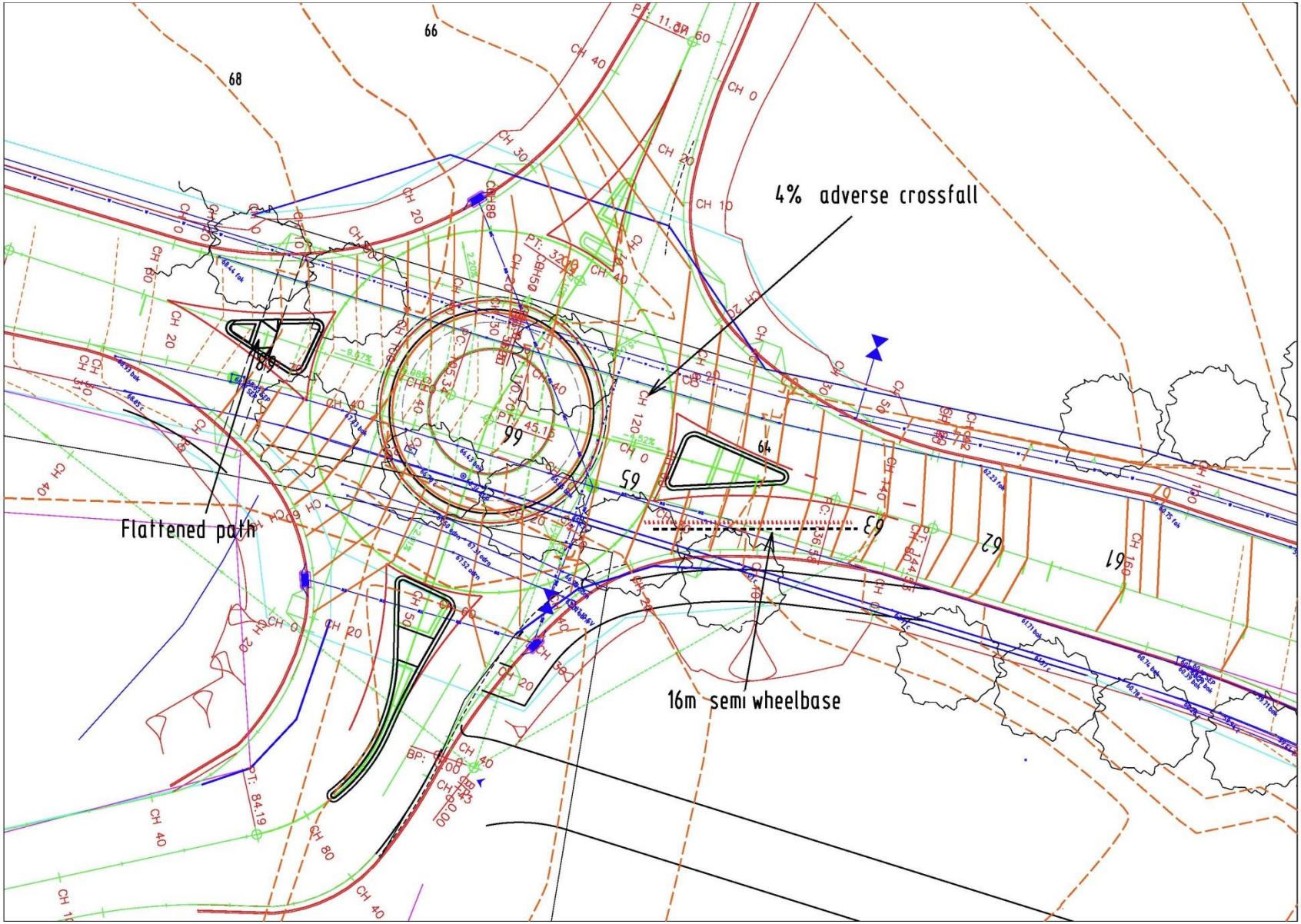
Roundabouts on steep grades - examples



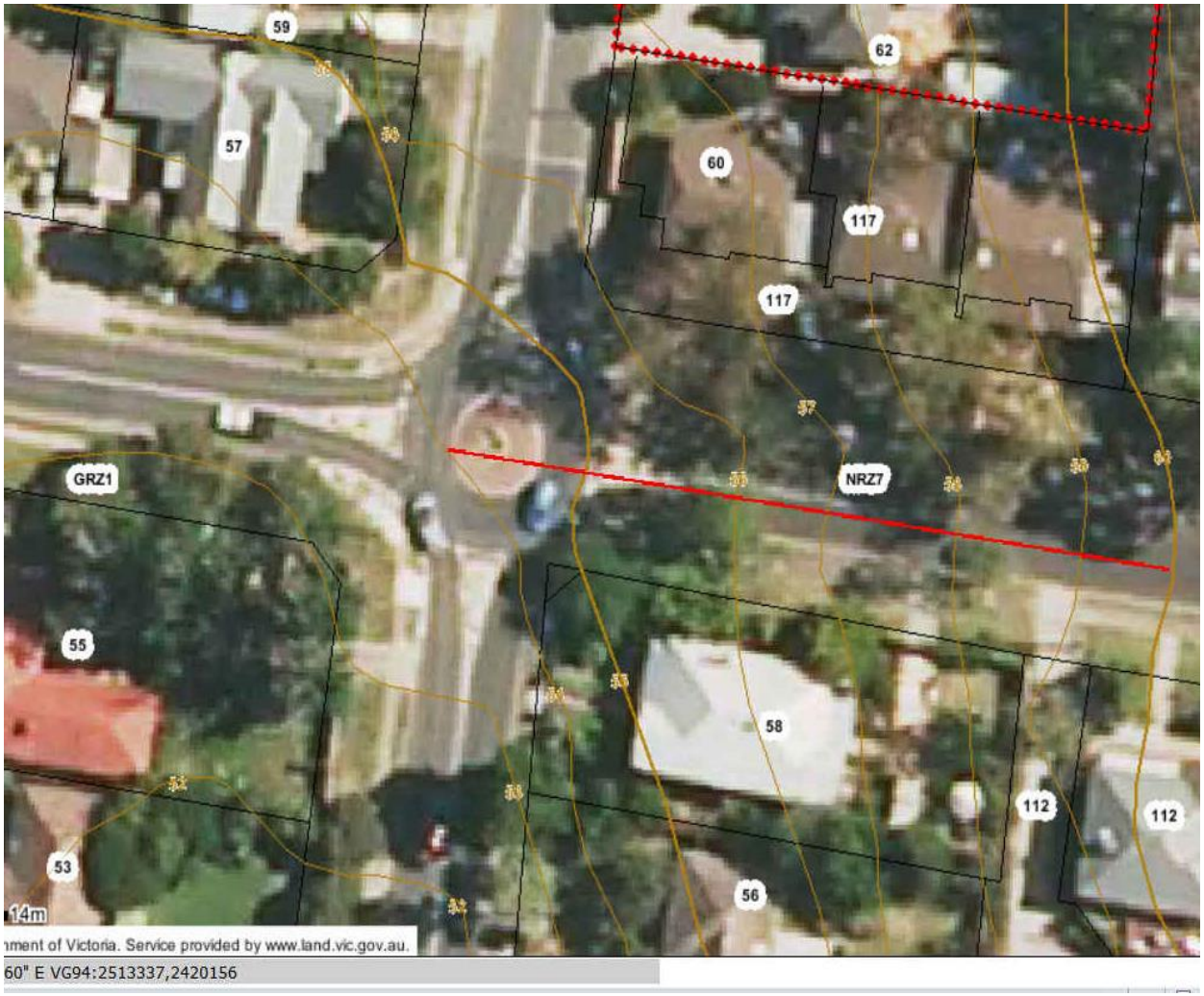
REVISED VERTICAL PROFILE
7-8-2015



Roundabouts on steep grades - examples



Roundabouts on steep grades - examples

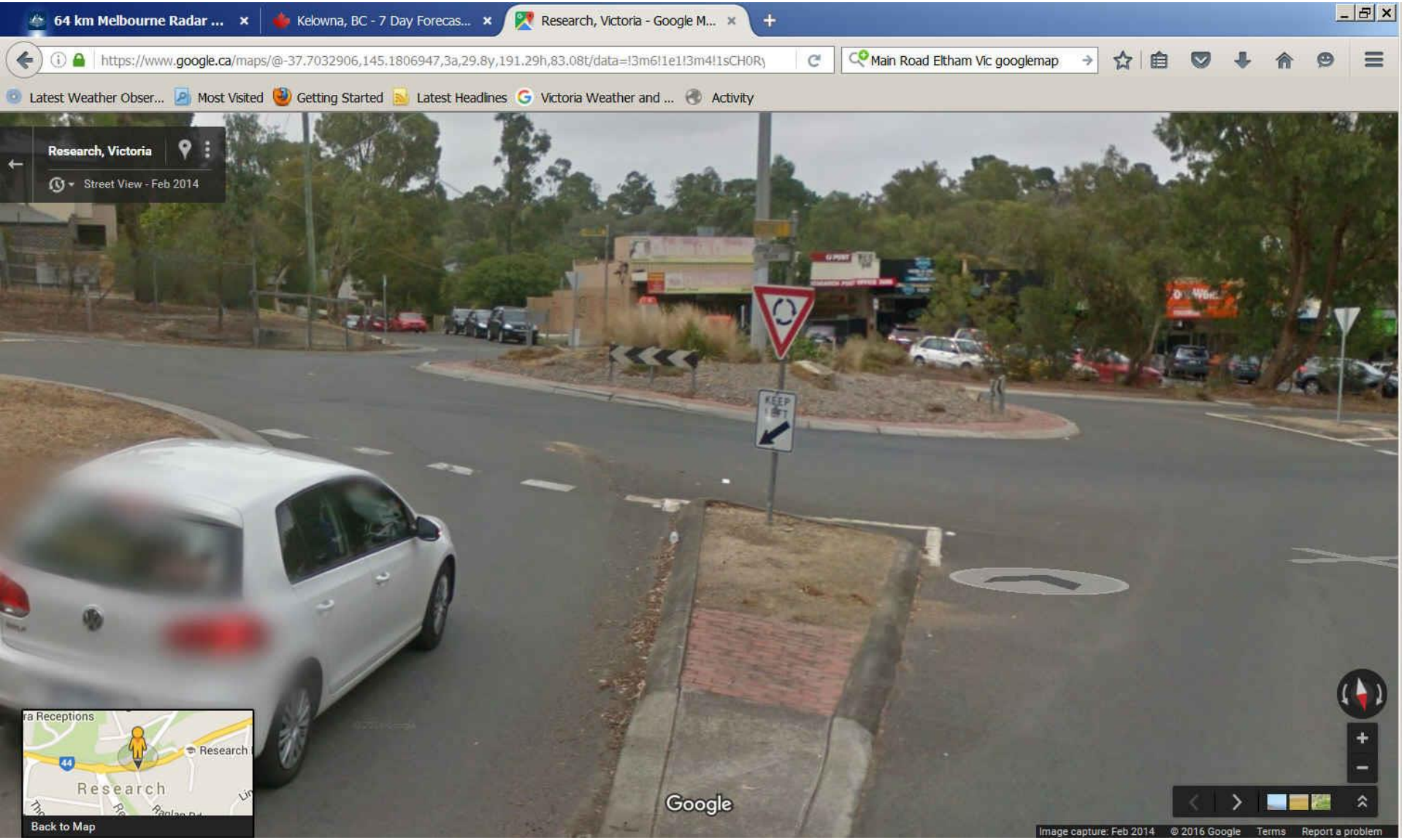


- a 10% grade entering the roundabout from the east

Roundabouts on steep grades - examples

- a ruling 8% grade entering the roundabout from the east (right hand side roundabout)

Roundabouts on steep grades - examples



Inwards or Outwards?

Safety and operational outcomes of grading circulating roadways of roundabouts:

- Inward sloping:
  - appears to have originated from ‘rotaries’ where radii were large to accommodate weaving & high speeds;
  - Common in Queensland, Tasmania and Christchurch area (NZ) (Pommy influence);
  - safety outcomes – high single vehicle crash rate;
  - Problem of semi’s “unhitching” on rapid slope changes (Victoria)
  - Often cannot view central island kerb – build wall?

Inwards or Outwards?

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Inwards or Outwards?

Safety and operational outcomes of grading circulating roadways of roundabouts:

- Outward sloping:
  - Reaction to smaller roundabouts and terrain (follow the slope)
- Tilted plane/folded plane:
  - Common sense!
  - Determined by terrain (follow the slope)
- Central island visibility is key

Pedestrian Safety Outcomes

NZ experience

"Appearing to affirm that roundabouts are not a serious safety problem for pedestrians in New Zealand, a search of the New Zealand Crash Analysis System (CAS) showed that nationwide there has been no pedestrian fatality (and 24 serious injury) at any urban roundabout for the five year period 2004-2008, compared to 11 fatal (and 160 serious injury) at urban traffic signal intersections. These statistics are inferring that traffic signals may be presenting considerably more safety problems for pedestrians than roundabouts". (Improved Multi-lane Roundabout Designs For Urban Areas (Draft) 2010)

Safety Outcomes

Melbourne metro area experience – Signals & Roundabouts

	1998-2003			
	Fatal	Ser Inj	Oth Inj	Total
ALL Sigs	101	3714	10168	14063
(%)	<1	27	73	100
All Rbts	7	302	1196	1505
(%)	<1	20	79	100

	2004-2009			
	Fatal	Ser Inj	Oth Inj	Total
ALL Sigs	90	4104	7201	11395
(%)	<1	36	63	100
All Rbts	15	499	1045	1559
(%)	<1	32	67	100

Safety Outcomes

Melbourne metro area experience – Signals & Roundabouts

- Melbourne has about 2500 signals, and 4500-5000 roundabouts in a metro area of 4m population.
- The growth in roundabout numbers is far greater than for signals - mostly in new subdivisions at collector and local street intersections
- Most roundabouts are at local or collector intersections
- Exposure based crash rates are typically lower for roundabouts
- On average there would be far higher numbers of pedestrians using signals

Pedestrian Safety Outcomes

Melbourne metro area experience – Signals & Roundabouts

	1998-2003			
	Fatal	Ser Inj	Oth Inj	Total
Sigs	31	651	876	1558
(%)	2	42	58	100
(%of all)	31	17	9	**11**
Rbts	2	16	33	51
(%)	4	31	65	100
(%of all)	29	5	3	**3**

	2004-2009			
	Fatal	Ser Inj	Oth Inj	Total
Sigs	37	708	703	1448
(%)	3	49	49	100
(%of all)	41	17	10	**13**
Rbts	2	29	31	62
(%)	3	47	50	100
(%of all)	13	6	3	**4**

Pedestrians

Cyclist Safety Outcomes

Melbourne metro area experience – Signals & Roundabouts

	1998-2003			
	Fatal	Ser Inj	Oth Inj	Total
Sigs	3	168	354	525
(%)	<1	32	67	100
(%of all)	3	5	4	**4**
Rbts	1	51	169	221
(%)	<1	23	76	100
(%of all)	14	17	14	**15**

	2004-2009			
	Fatal	Ser Inj	Oth Inj	Total
Sigs	8	236	454	698
(%)	1	34	65	100
(%of all)	9	6	6	**6**
Rbts	1	103	245	349
(%)	<1	30	70	100
(%of all)	7	21	23	**22**

Cyclists

Pedestrian Safety Outcomes

‘Uncontrolled’ pedestrians have NO RIGHTS at Australian roundabouts (since uniform road rules – 2007?)

Melbourne metro area experience – treatments

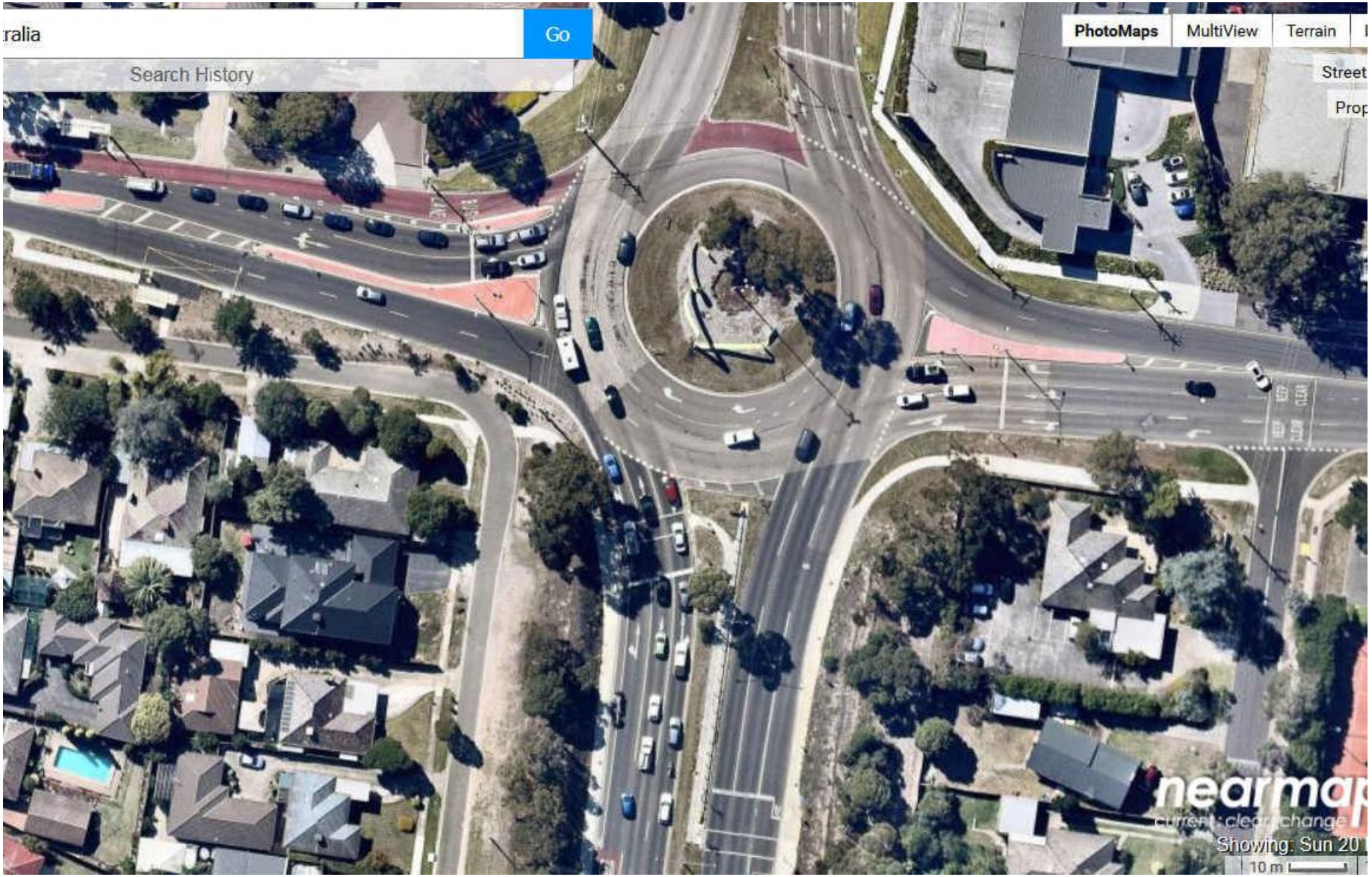
- ‘pram crossings’
- Zebra crossings (walking legs)
- Signalised pedestrian crossing
- Pelican crossing – signals that flash yellow to vehicles during flashing DON’T WALK period

Pedestrian Treatments – pram crossing

Pedestrian Treatments – pram crossing

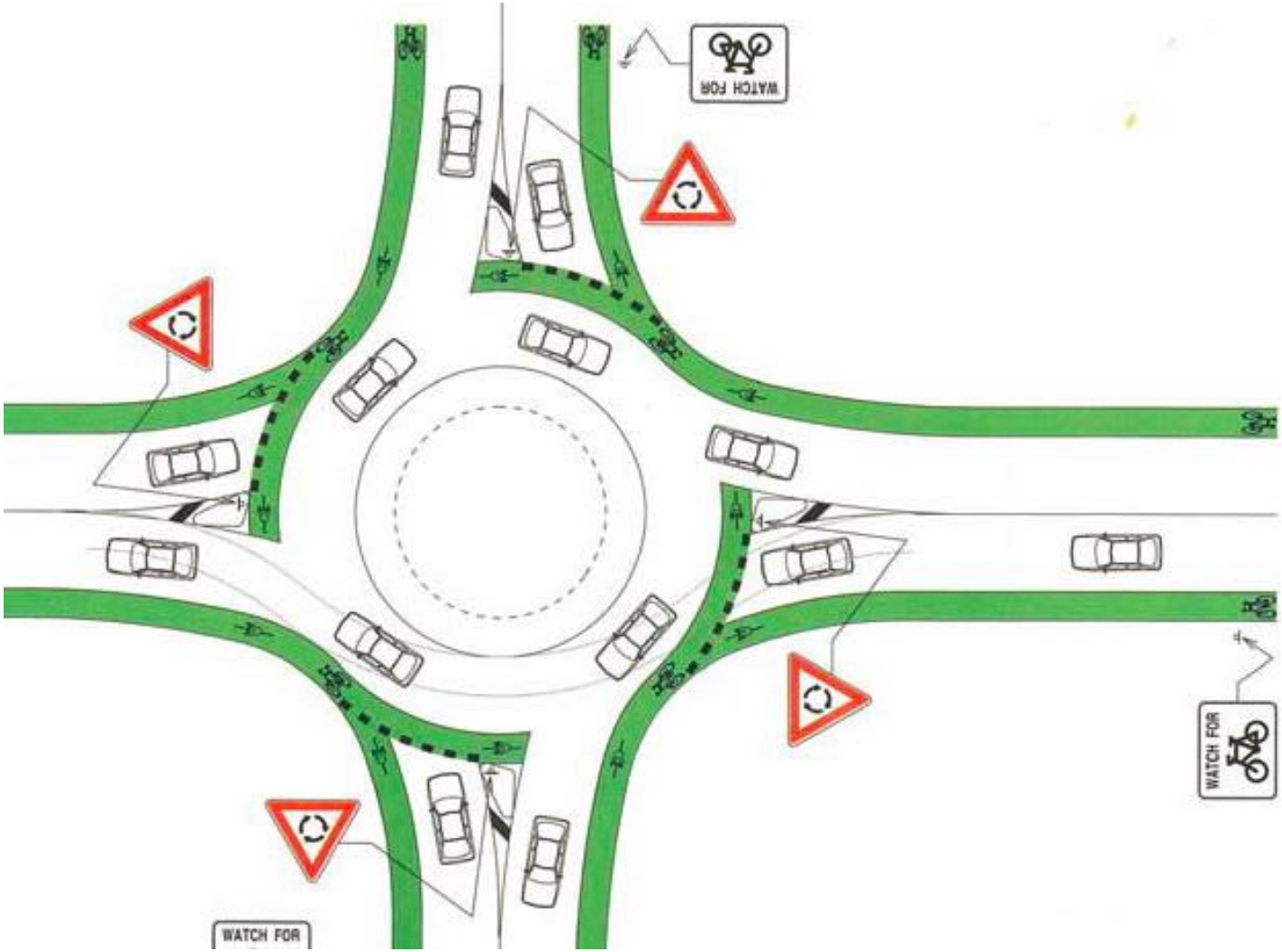
Zebra on speed hump at mini-roundabout

Pedestrian Treatments – signalised crossing



Pedestrian Treatments – PELICAN crossing

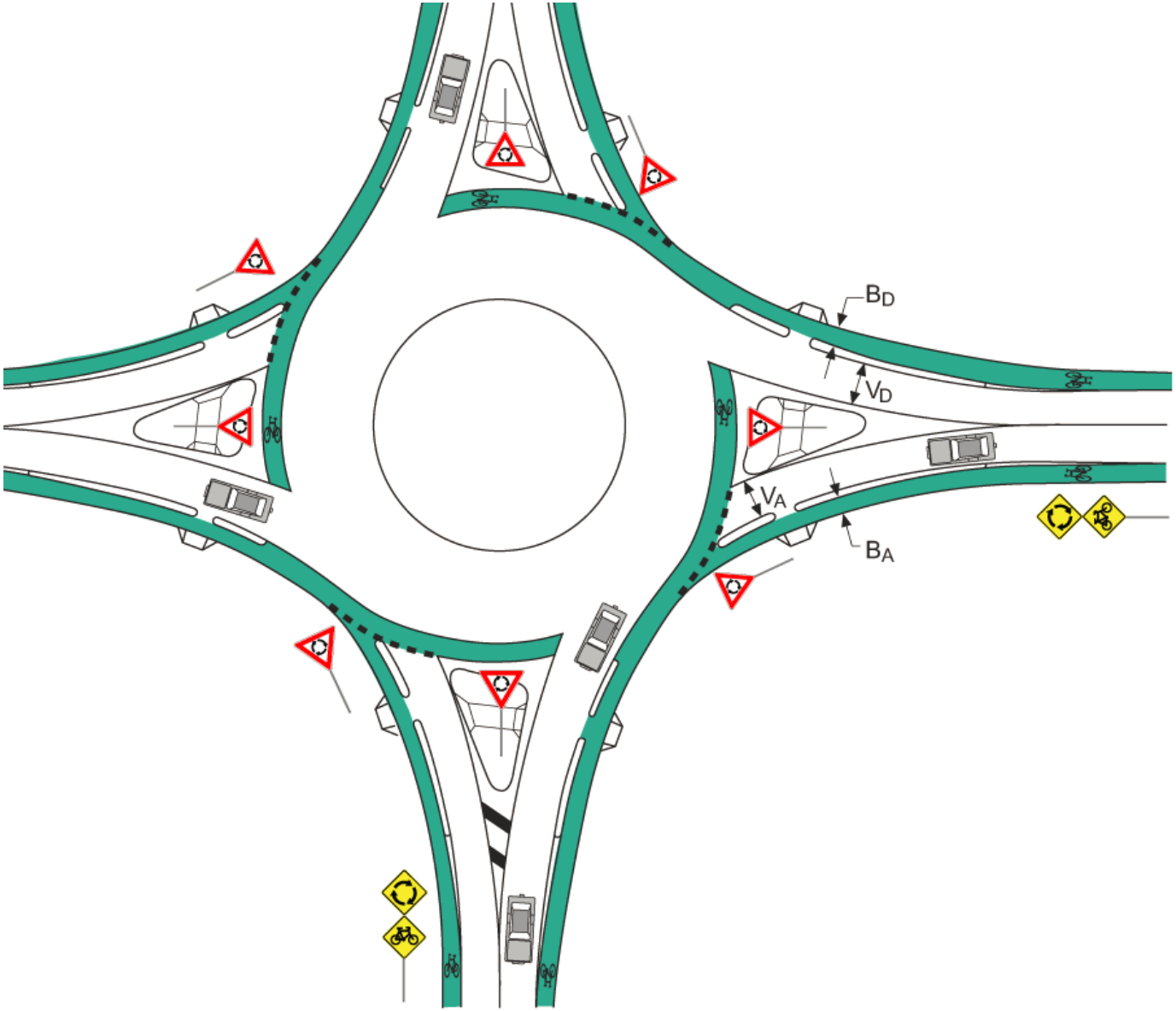
Bike Treatments – Austroads Guide 2009



Local street roundabout

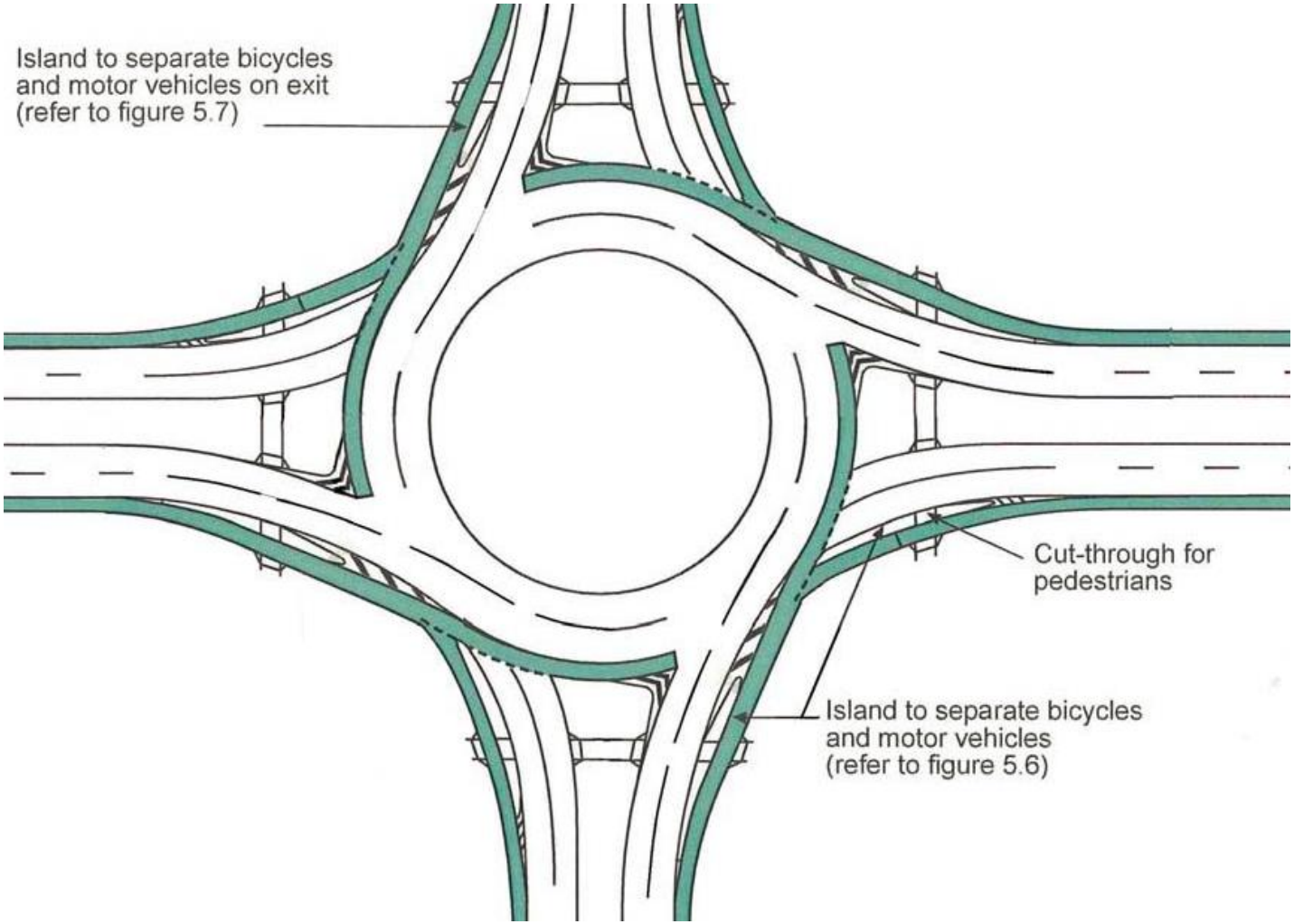
Figure 5.4: Two bicycle routes crossing at a single-lane roundabout with no physical separation of bicycle lanes

Bike Treatments – Austroads Guide 2009



Single lane roundabout

Bike Treatments – Austroads Guide 2009



Multi-lane roundabout

'Protected'

Bike Treatments –

ndabout

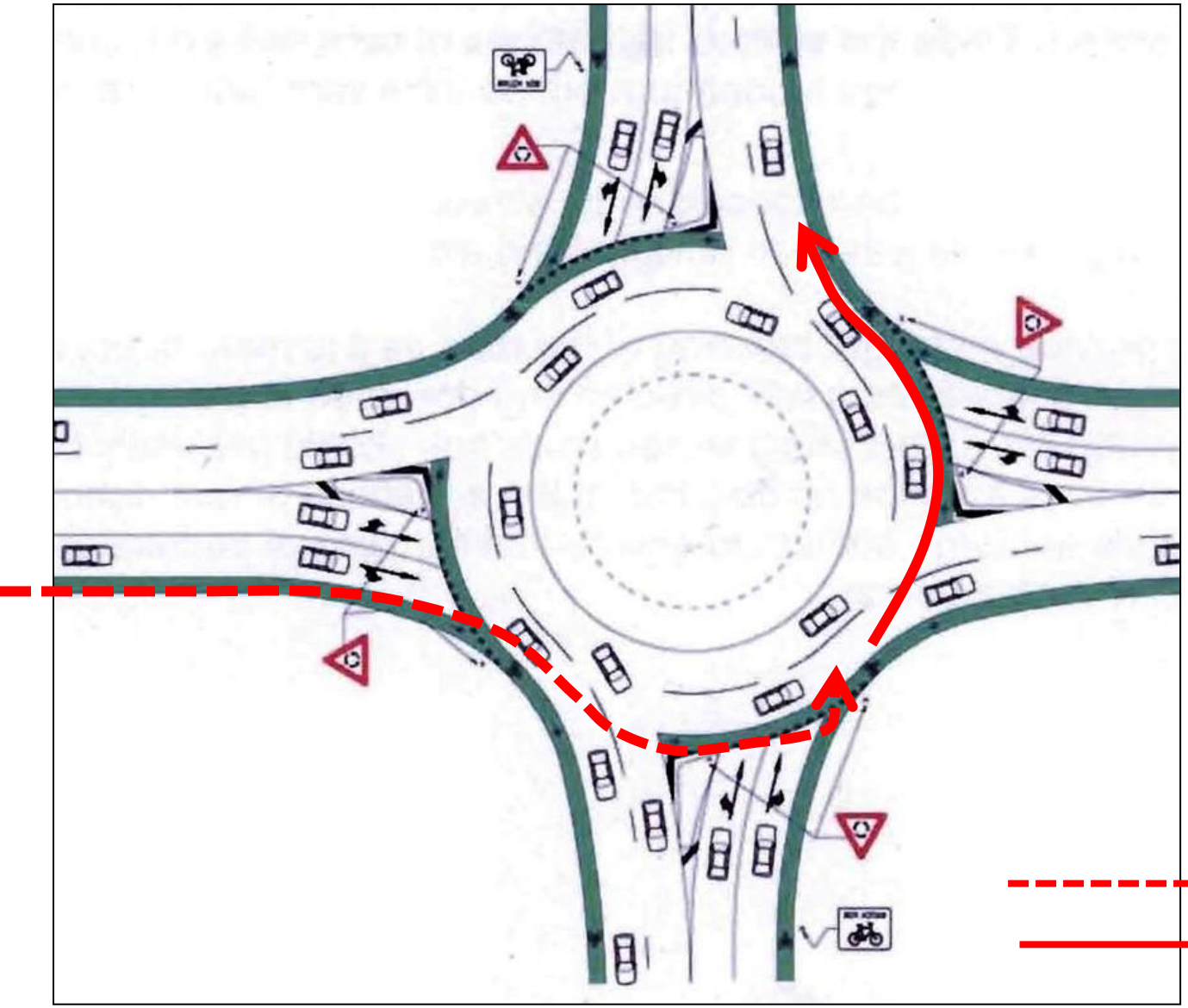
Bike Treatments –

Before

After

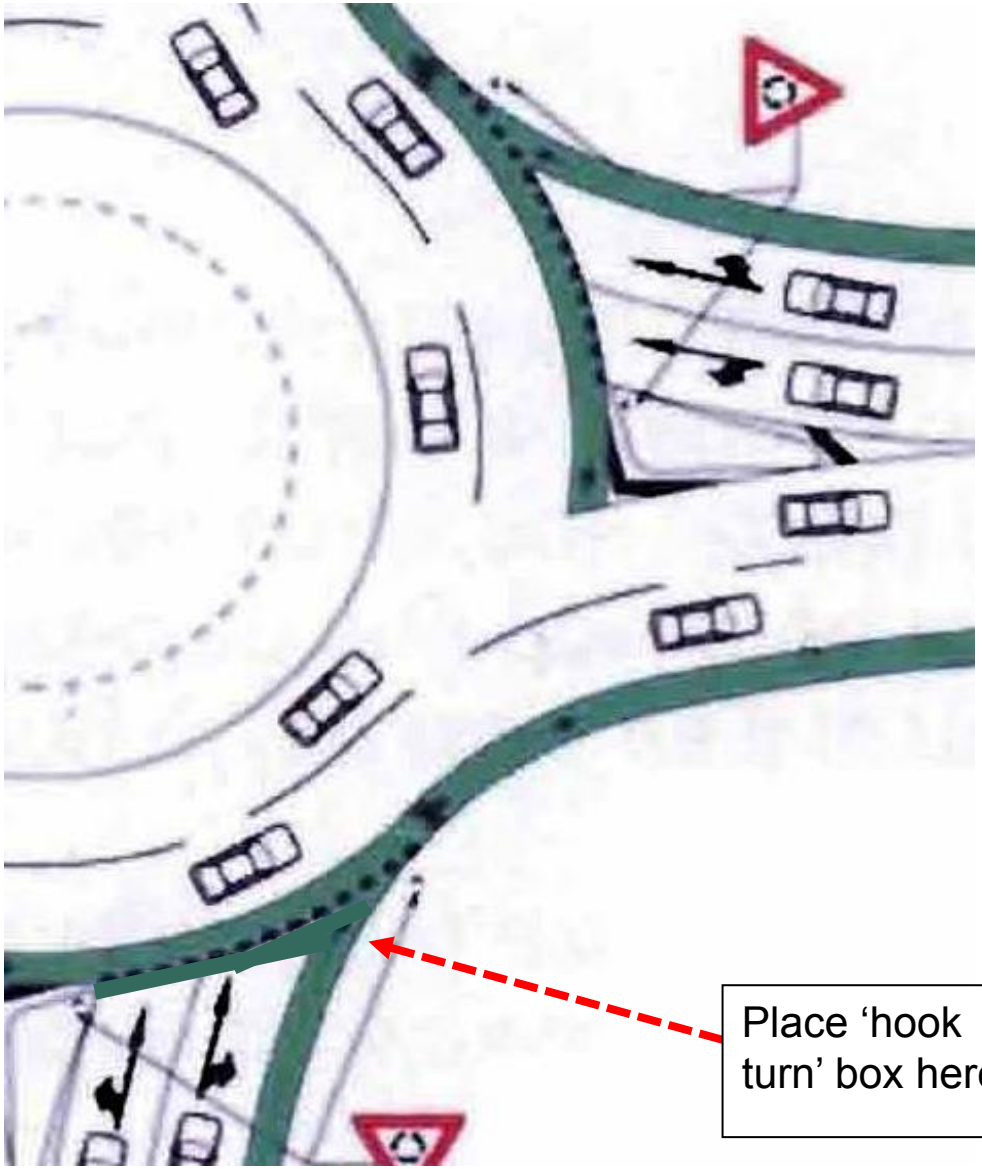
Bike Treatments – Innovations

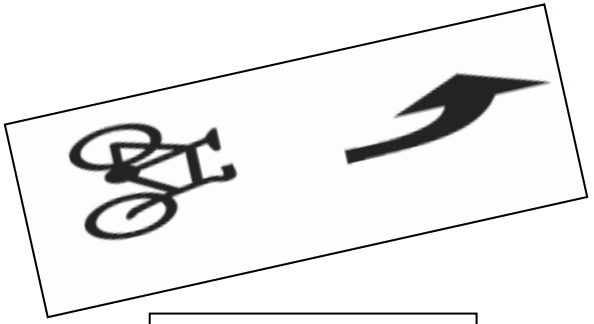
Hook-turn



Bike Treatments – Innovations

Hook-turn





‘hook turn’ box

What to do with 10,000 cpd!

Bike Treatments -

Bike Treatments -