Creating more livable cities with raised safety platforms

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Trafinz - 13 November 2018

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Creating liveable, vibrant and healthy cities

Safety is a critical foundation for movement

Equitable and balanced use for all is a challenge in urban areas and regional centres

Place and Movement

- Places importance on defining road function
- Safe Mobility

Manage potential crash energy by ensuring that traffic speeds match road function, road infrastructure and road use

- “Engineer Up” to ensure safe operation at higher speeds including protection / separation of vulnerable users
- Reduce speed limits where the quality of infrastructure is not appropriate for current vehicle speeds


25
15

Raised Safety Platforms at Traffic Signals

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A Raised Safety Platform is not the same as a traditional "Speed Hump"

The ramp profile is generally much softer and designed to match Safe System speed thresholds

Safe System Biomechanical Injury Limits

Boundary Conditions

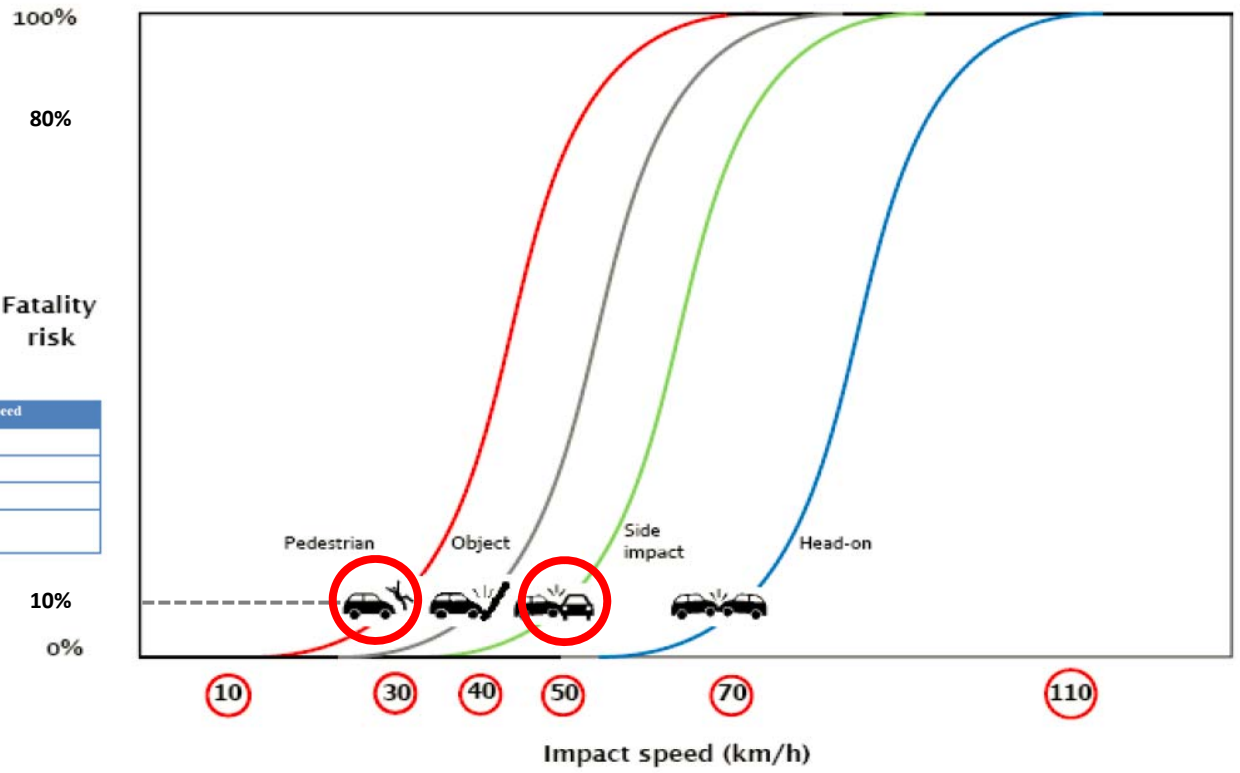
Vehicle speeds should be kept below the following for each conflict type:

- Side Impacts ≤50km/h
- Pedestrians ≤30km/h

Table 5.1. **Safe impact speeds for different situations**

Road and section types combined with road users	Target Safe System speed
Roads and sections used by cars and vulnerable users	30 km/h
Intersections with possible side-on conflicts between cars	50 km/h
Roads with possible frontal conflicts between cars	70 km/h
Roads with no possible frontal or side-on conflicts between vehicles and no vulnerable road users	≥ 100 km/h

Source: ECMT, 2006.



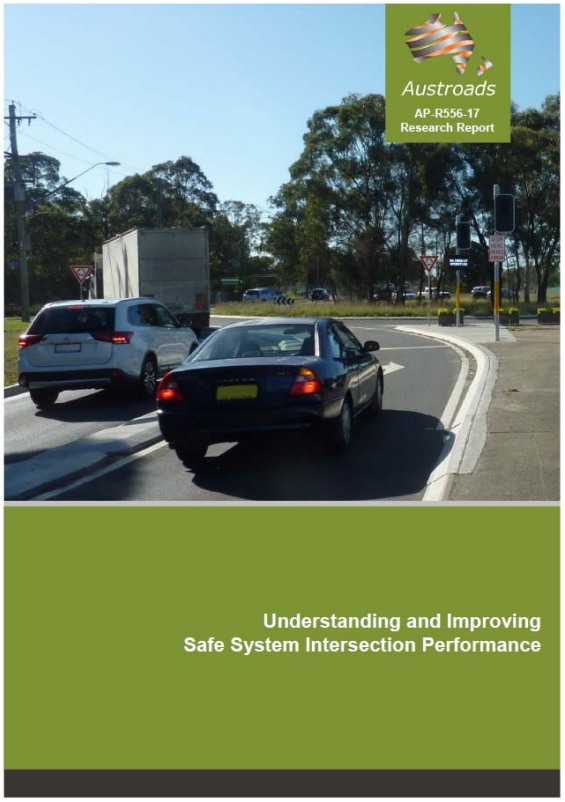
Safe System Intersections

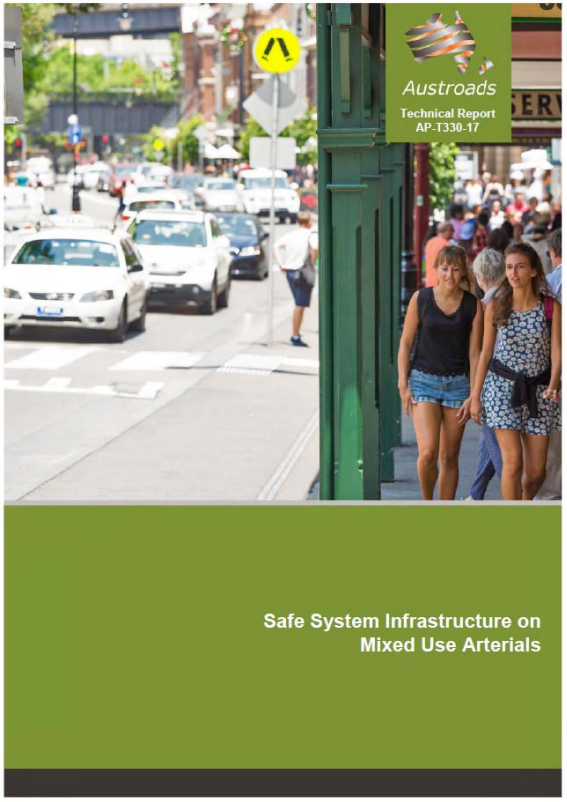
Managing crash energy

Raised safety platforms are increasingly seen as a road safety treatment to manage speeds at potential conflict points towards Safe System levels:

- intersections
- mid-block (pedestrian crossings)
- traffic calming

Traffic signals fitted with raised safety platforms not as safe as well-designed roundabouts but can be expected to reduce serious casualty risk by around two-thirds.





The Netherlands

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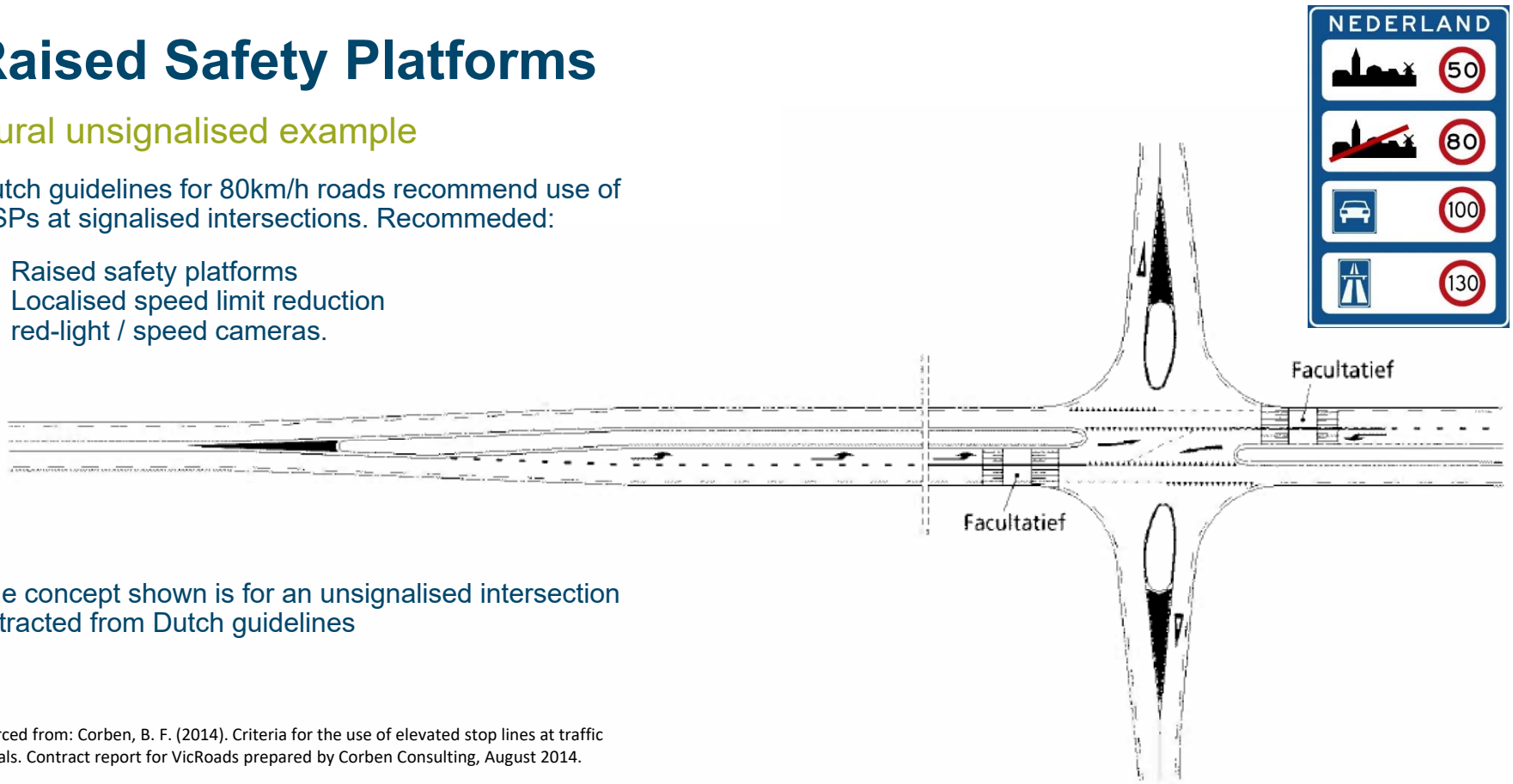
Raised Safety Platforms

Rural unsignalised example

Dutch guidelines for 80km/h roads recommend use of RSPs at signalised intersections. Recommeded:

1. Raised safety platforms
2. Localised speed limit reduction
3. red-light / speed cameras.



The concept shown is for an unsignalised intersection extracted from Dutch guidelines

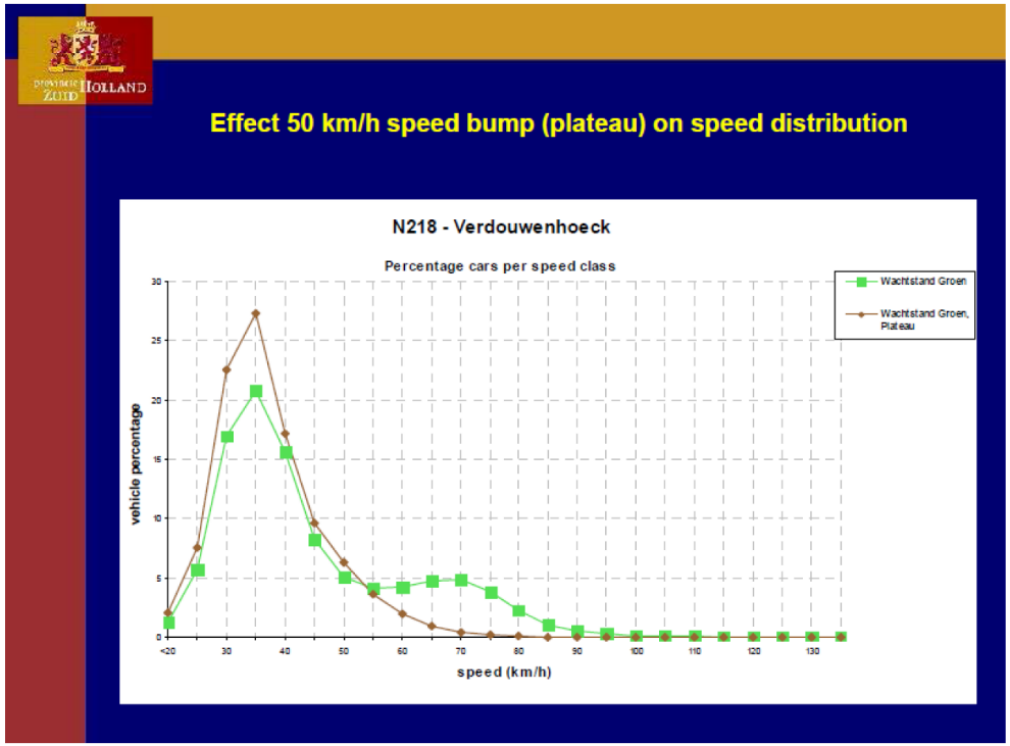
Sourced from: Corben, B. F. (2014). Criteria for the use of elevated stop lines at traffic signals. Contract report for VicRoads prepared by Corben Consulting, August 2014.

Raised safety platforms

Effectivess

Change in speed distribution at an example treated intersection

“In very busy intersections an increased capacity can occur.”



Sourced from: Corben, B. F. (2014). Criteria for the use of elevated stop lines at traffic signals. Contract report for VicRoads prepared by Corben Consulting, August 2014.

Raised safety platforms

Effectiveness

40-50% reduction in injury crashes (statistically significant)

Table 1. Safety effects of speed reducing facilities at signalised intersections

	'Intersection years'	Injury crashes per intersection year	Total number of crashes per intersection year
Before (3 years)	120	1.23	7.01
After (4 years)	90	0.74	4.50
Effect in %		-39.6	-35.8
χ^2-test		12.0	54.4
Significance level		0.05	0.00

Notes:

1. **Intersection year: sum of all (before or after) periods of the 40 intersections involved**
2. **Injury crashes: all types of injuries including minor injuries.**

When two highly-congested intersections were removed from the sample of 40 intersections being evaluated, the reduction in casualties increased from 40% to 50%.

Sourced from: Corben, B. F. (2014). Criteria for the use of elevated stop lines at traffic signals. Contract report for VicRoads prepared by Corben Consulting, August 2014.

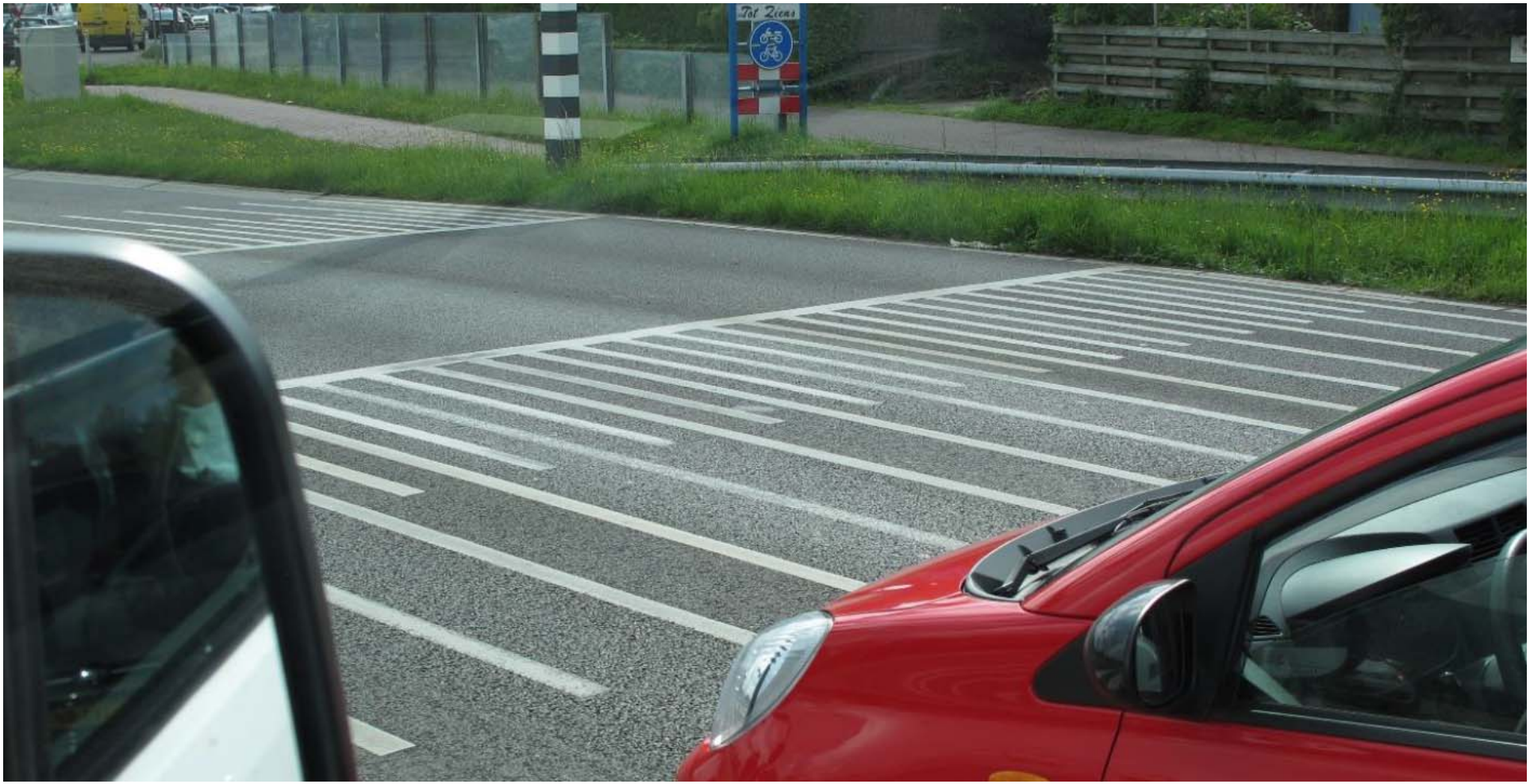

let op!
drempels
50
let op!
drempels
50


Kemper b.v.
Constructie
waterdicht
horen bij elkaar
VS-94-FX
1.1


REVI
GROENTE- EN FRUITTRANSPORT
let op!
drempel
50
NS-GV-54


REVI
NS-GV-54
74-LP-RP


HOTEL
VAN DEN BROEK LOGISTICS
kuiper
Transport Heerhugowaard
TRANSPORTER
10-BX-XK



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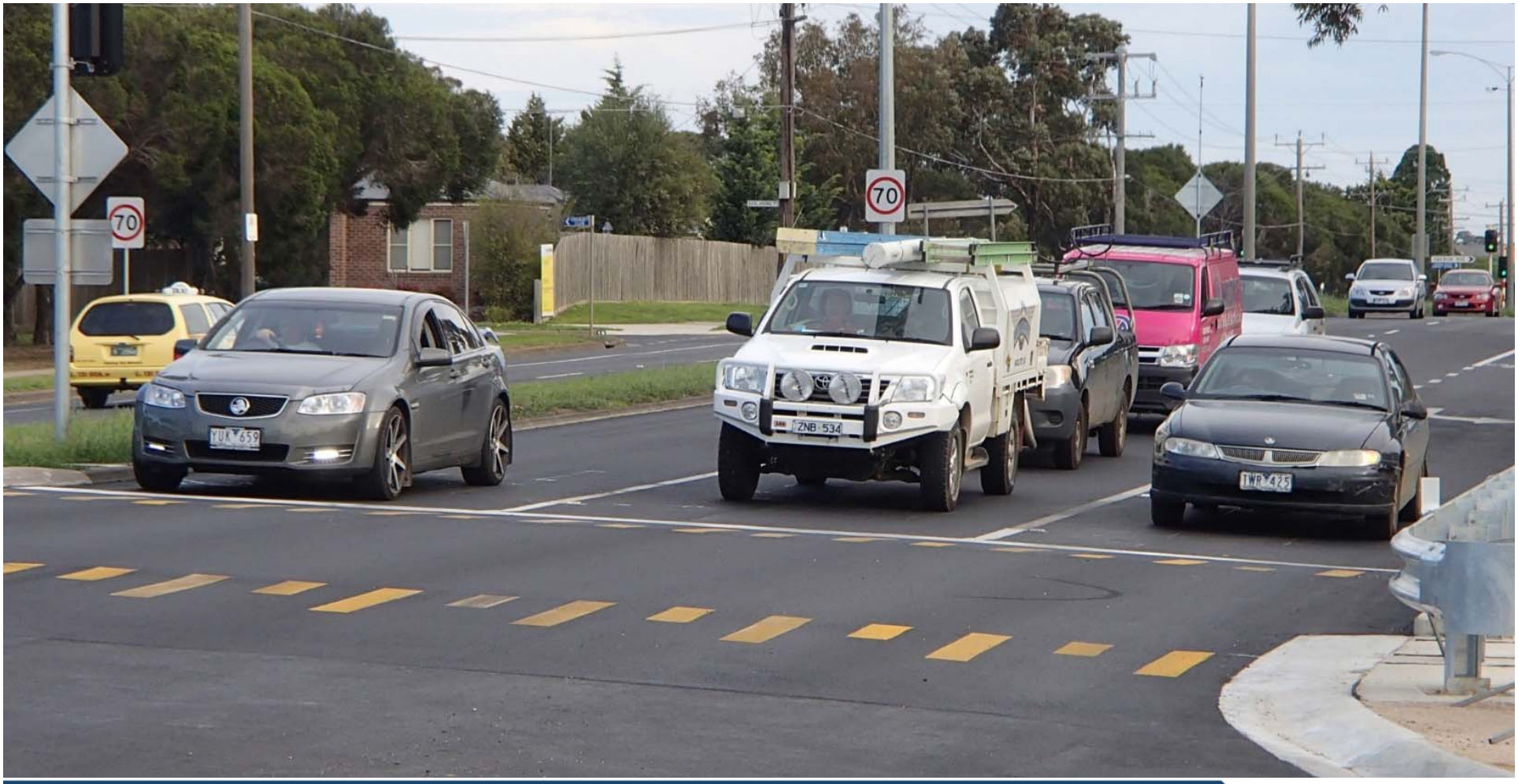
Victoria, Australia


LL Visuals
vicroads


50
km/h
airush


50
50


50
km/h
60
KERR'S HIRE
50
km/h


70
70
YUK 659
ZNB 534
TWR 425

Belmont Site

Deemed a success

- Previously unsignalised (70km/h)
- RSPs implemented in combination with new traffic signals and 60km/h
- Achieved Safe System speed levels
  - Before: 64 km/h (mean) and 69 km/h (85%ile)
  - After: 43 km/h (mean) and 55 km/h (85%ile)
- Some initial overshooting of stop line (calmed down over time)
- No significant noise issues raised
- Anecdotal positive public response


GIVE WAY
50
km/h

Victoria

Design Guidance

Raised safety platforms (RSPs)

Road Design Note RDN 03-07

https://www.vicroads.vic.gov.au/-/media/files/technical-documents-new/road-design-notes/road-design-note-0307-raised-safety-platforms-rsp-oct-2018.ashx

vicroads

Road Design Note

Raised Safety Platforms (RSPs) RDN 03-07 September 2018

1. Purpose

This Road Design Note (RDN) provides guidance for the design of Raised Safety Platform (RSP) treatments, including:

- site selection considerations
- ramp profile and location
- signing and linemarking
- design and construction considerations
- post implementation monitoring and evaluation.

The guidance provided in this RDN is based on information currently available and best practice. As RSPs are considered an innovative treatment and are a relatively new treatment on arterial roads, this document is expected to continually evolve over time. The principles behind their use are the same as that applied by councils when using "speed humps" or "raised intersections" on the local road network. Users are advised to seek the latest version via VicRoads website.

2. What is a raised safety platform?

VicRoads' approach towards a Safe System requires practitioners to recognise that humans, as road users, are liable to errors and will continue to make mistakes. In a Safe System, roads should be designed to reduce the severity of injury when crashes inevitably occur.

RSPs are speed management treatments capable of reducing the maximum comfortable operating speed for a vehicle, thus lowering the overall speed of vehicles to a Safe System collision speed (i.e. should a collision occur, impact forces are within human tolerances).

RSPs may be designed for a range of vehicle speeds and types. Design speeds ≤ 50km/h are encouraged to reduce the side-impact severity for a vehicle to a survivable level. Design speeds ≤ 30km/h are encouraged to reduce the severity of any pedestrian or cyclist related crashes to a survivable level.

Image 1: Artist's impression of RSPs at Surf Coast Hwy / Kidman Ave, Belmont

The implementation of RSPs can involve the following:

At intersections:

- placing platforms on the approach to an intersection (often referred to as '**Approach Platforms**' or 'raised stop bars')
- raising the entire intersection so that motorists ascend on the approach to, and descend on the departure from, the intersection (often referred to as a '**Raised Intersection**')

At mid-block locations:

- placing platforms mid-block as a traffic calming device or to improve safety at pedestrian crossings (suitable for local roads and low speed arterial roads)

The merits and considerations for each type is discussed further in Sections 5 and 6 of this document. Supporting treatments should be considered where necessary to achieve desired safe speeds.

3. Scope

This RDN provides guidance around installing RSPs at intersections with posted speeds ≤ 70km/h. Similar principles can be applied to placing RSPs at mid-block locations.

Table 1: Recommended ramp grades for various speeds

Operating Speed (km/h)	Divided Carriageway		Undivided Carriageway	
	Approach Ramp Grade	Comfortable Max. Speed (km/h)	Approach/ Departure Ramp Grade	Comfortable Max. Speed (km/h)
50	1:15 *(6.7%)*	30*	1:20 *(5%)*	40
60	1:20 *(5%)*	40	1:25 *(4%)*	50
70	1:25 *(4%)*	50	1:25^ *(4%)*	50

Note: *Desired max. speed for a pedestrian or cyclist related crash.
^May result in increased motorist discomfort, consult VicRoads SSE Team for further guidance
- RSP should achieve an equivalent change in grade if longitudinal grade of site is not flat
- Refer VicRoads Supplement to Austroads Guide to Road Design Part 3 for the definition of 'operating speed'

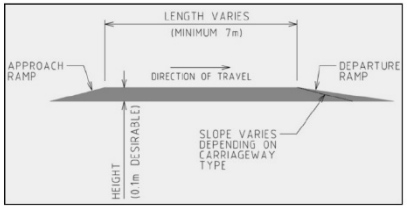


Figure 2: Typical RSP Shape

Victoria

Design Guidance

Raised safety platforms (RSPs)

Road Design Note RDN 03-07

https://www.vicroads.vic.gov.au/-/media/files/technical-documents-new/road-design-notes/road-design-note-0307-raised-safety-platforms-rsp-oct-2018.ashx

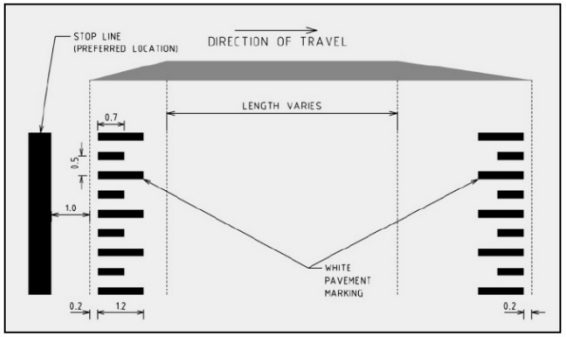


Figure 15: Typical RSP Linemarking at Intersections
(Stop Line positioned prior to RSP)

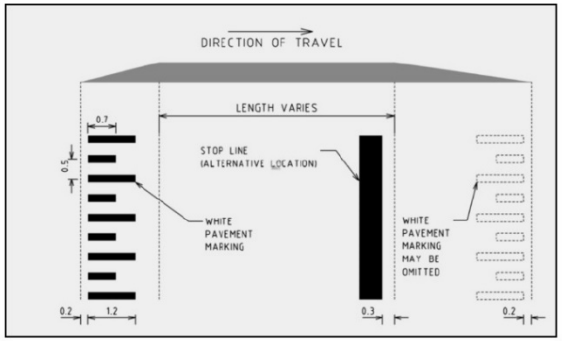


Figure 16: Typical RSP Linemarking at Intersections
(Stop Line positioned on RSP)

1. prior to the beginning of the RSP ramp (preferred), or
2. on the platform, prior to the beginning of the departing ramp (for platforms) or pedestrian crossing (for Raised Intersections).

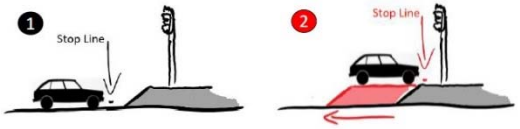


Figure 3: Illustration of stop line placement impacting position of RSP ramp

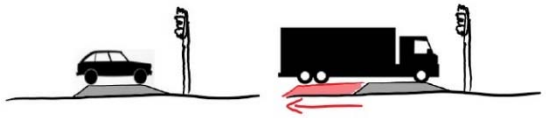


Figure 4: Illustration of modifying profiles for HV's impacting position of RSP ramp

New Zealand

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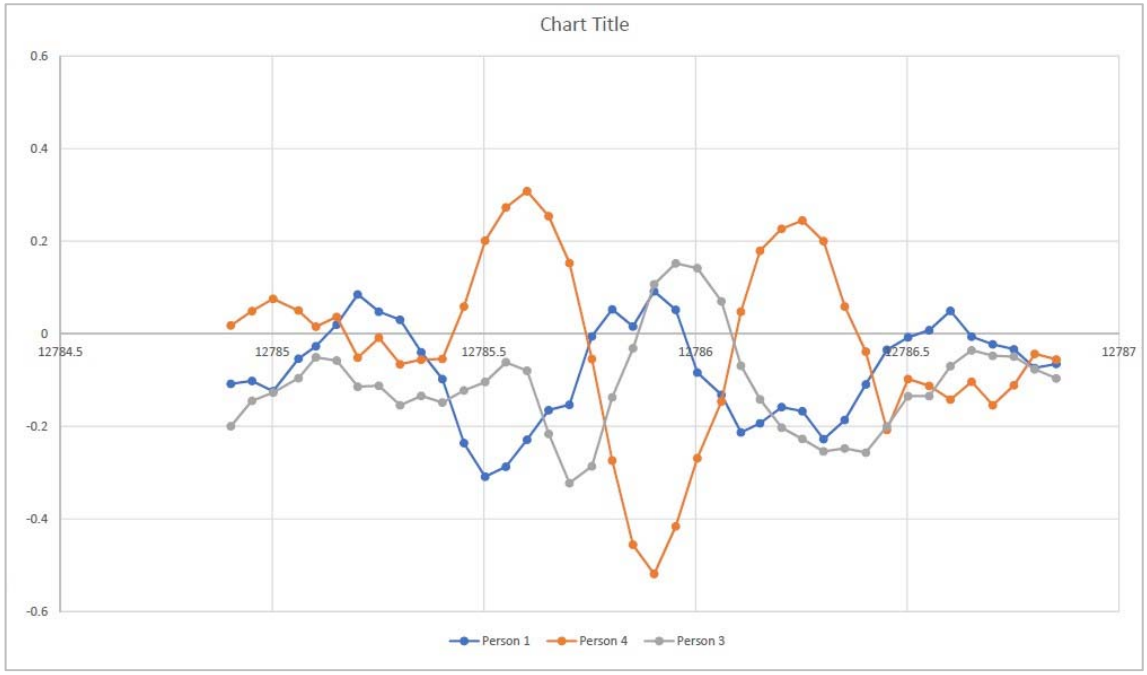
Design element	Dimension	Comment
Approach ramp gradient	1:15 for 30 km/h platform speed 1:20 for 40 km/h platform speed 1:25 for 50 km/h platform speed	Suggested ramp grades to achieve the target speed limit/advisory speed, based on the comfortable maximum ramp speed
Departure ramp gradient	1:35 (maximum)	Can be flatter, but consideration needs to be given to how far this would set the RSP back from the intersection
Platform length (minimum longitudinal length of plateau section)	6 m	Length to be confirmed to ensure it suits long-wheelbase vehicles typically used in NZ
Height of platform (maximum)	100 mm (above pavement). (Generally to top of kerb).	Platforms over 100 mm high may damage low-floor vehicles 150 mm may be considered for low speed (less than 50 km/h) and low traffic volume environments
Total width of raised platform	Width of the approach carriageway, including any shoulders and cycle lanes.	

Ramp profiles

Auckland Transport



Focus Group Survey

Developing NZ Guidance

- overall support for the raised traffic signal concept and appreciation for safer speeds through intersections;
- Sharks Teeth markings were clearly preferred over Piano Key markings;
- participants clearly understood the meaning of the signs approaching the intersection
- the lower speed limit and advisory signs seemed reasonable
- some had issues with the speed limit and advisory speed being the same

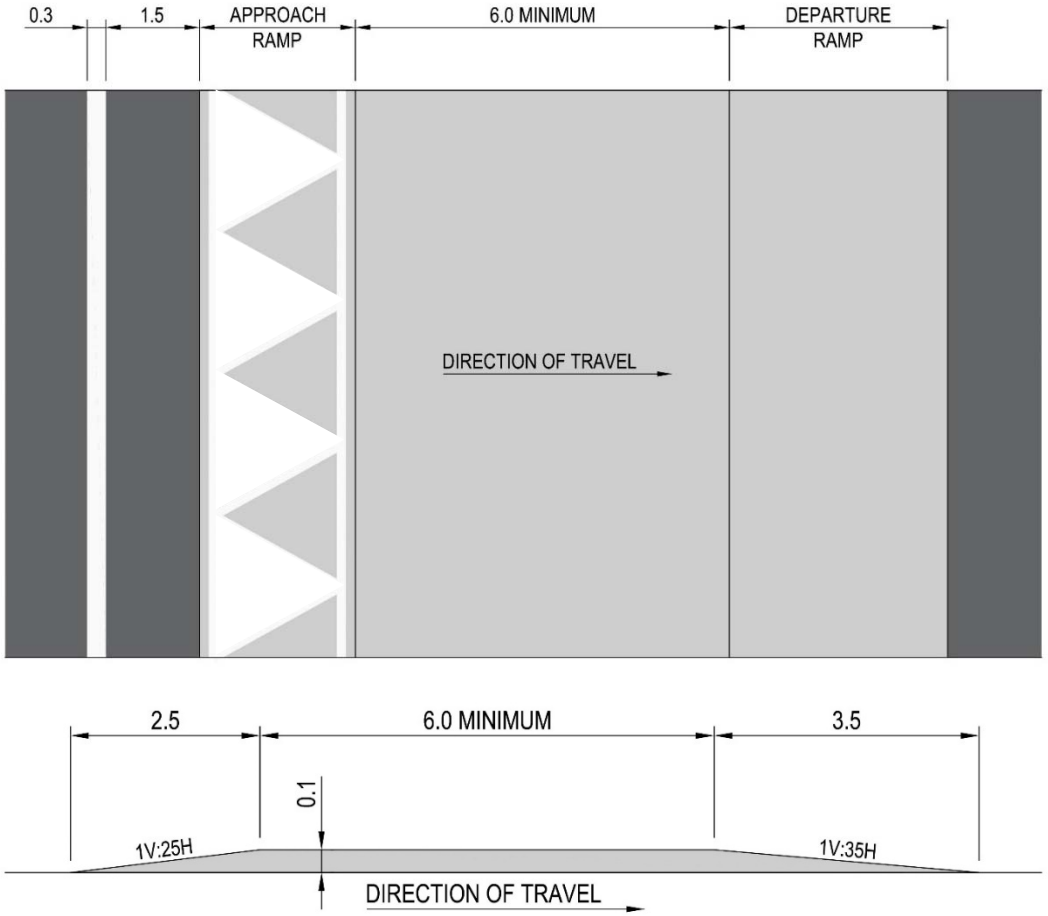


Figure 4: *Advance warning signs*

Figure 5: *Warning signs at ramp locations*

Thomas / Gordonton

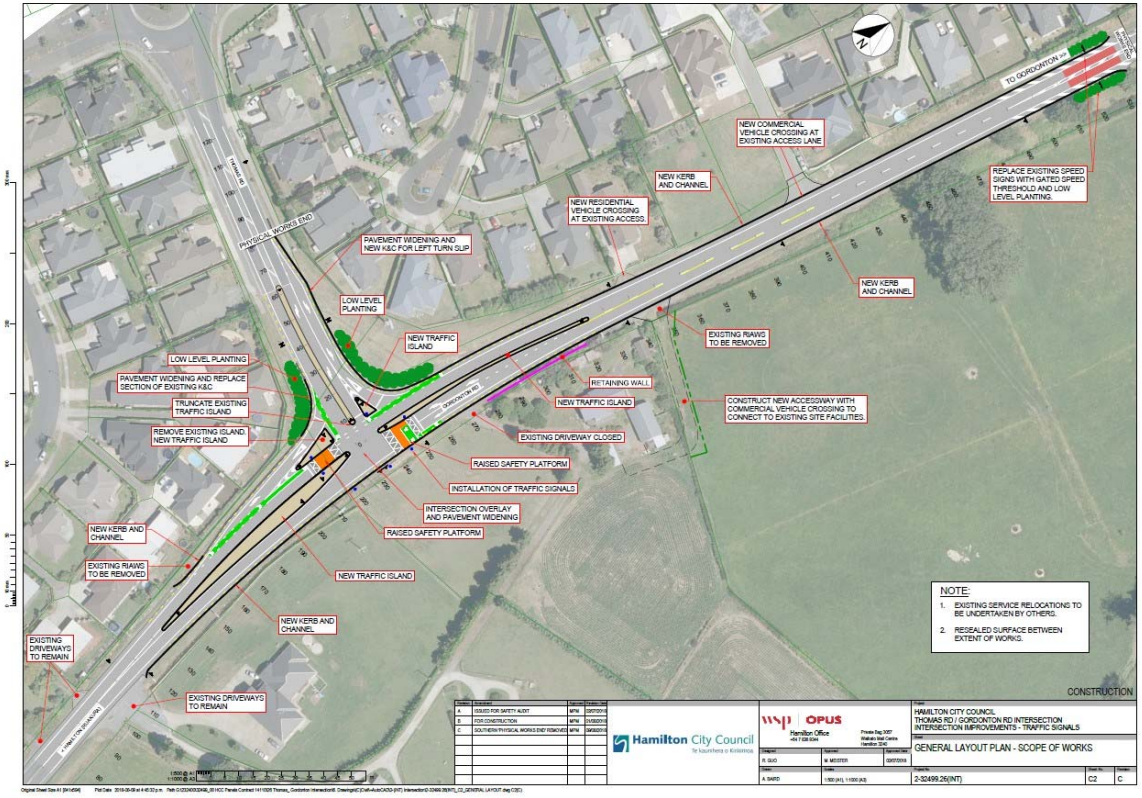
Hamilton City Council - WSP Opus

First NZ trial being developed:

- New signals
- Raised safety platforms (50km/h)

Supported by:

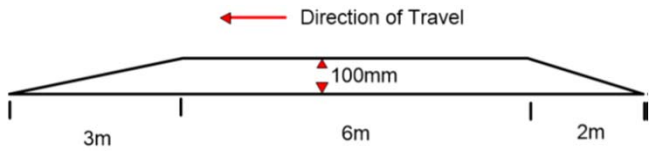
- New road environment
- Lower speed limit (60km/h)
- Speed thresholds
- Warning signs
- Electronic feedback signs



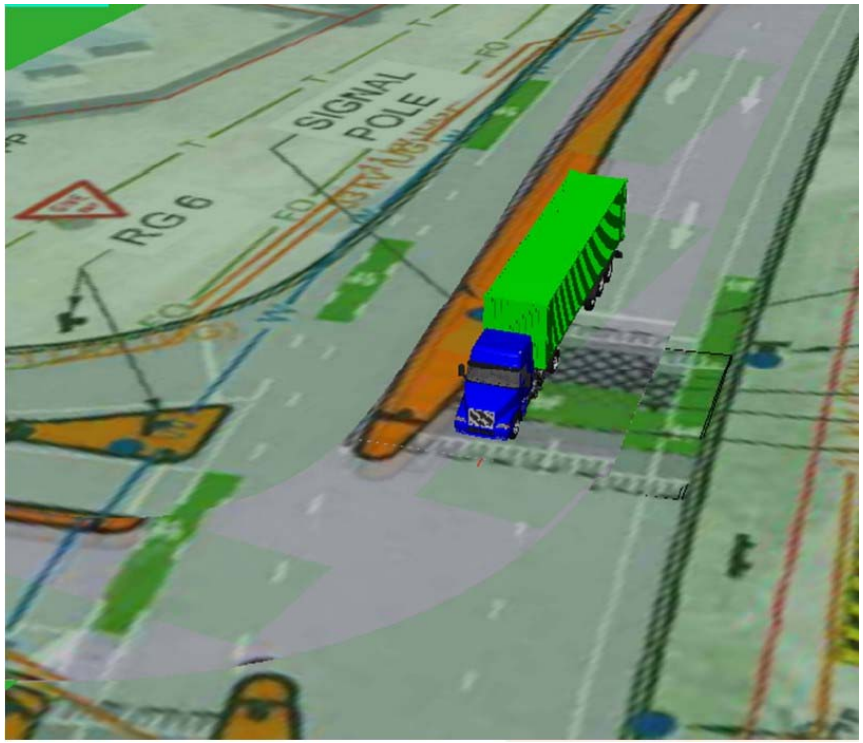
Heavy Vehicle Stability

Simulation

1. constant speed: RSP had negligible effect on changing the critical rollover speeds
2. constant acceleration from a stationary position: RSP had negligible effect on changing the critical rollover accelerations



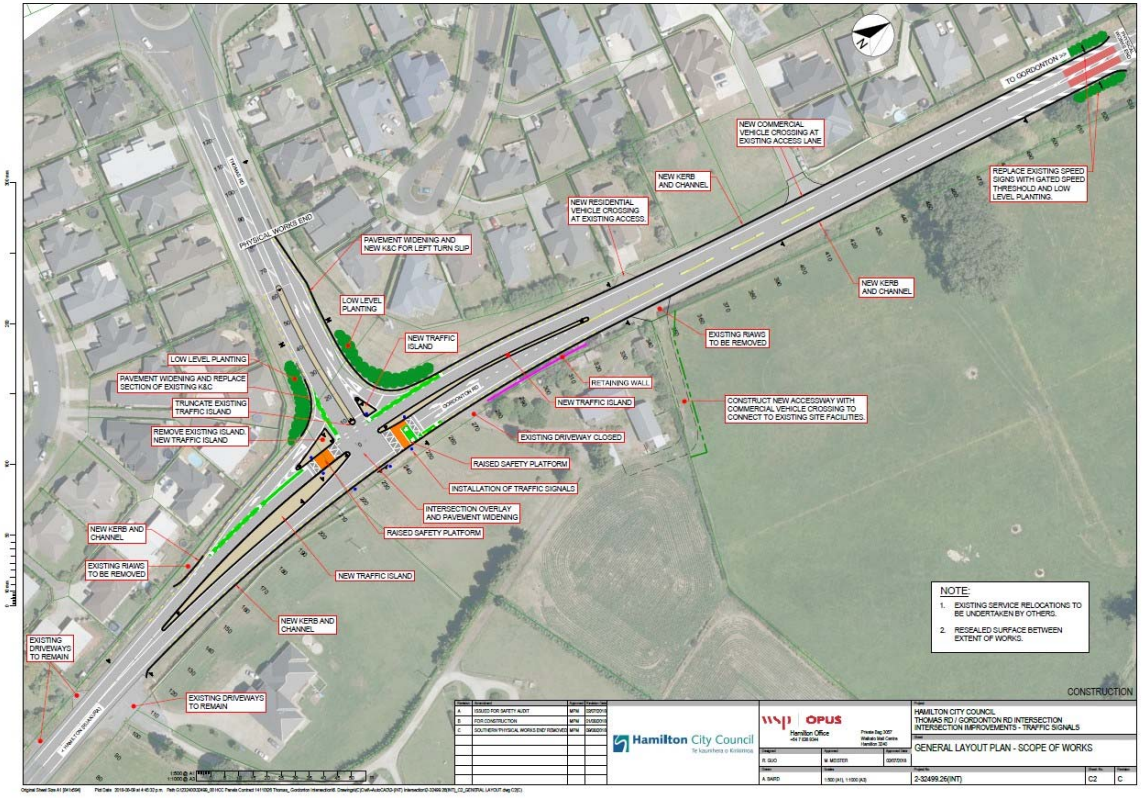
Opus Research Report 18-232499.26



Raised Safety Platforms

Ongoing Monitoring

- Safety Performance
- Speed Management
- Public Acceptance
- Traffic Flow / Capacity
- Noise
- Large Vehicle Stability
- Drainage
- Constructability



National Safer Intersection Working Group

Looking for more trial sites !!!

Contact: fabian.marsh@nzta.govt.nz

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