ROAD TO ZERO

POST-VISIT ACTIVITY:
SAFER ROADS WHERE WE LIVE

Linked to the study of motion, students work in small groups to undertake an investigation into a road they believe is unsafe in the area around their school or where they live. They draw on their learnings from the *Road to Zero* experience to describe road safety concerns for different road users with the existing speed limit and with the road environment. Students then use examples of safe system treatments from the *Road to Zero* experience, and others they may identify through research, to design a safer road environment with an appropriate speed limit.

Learning context

Science classes

Victorian curriculum learning areas and level

Science	**Level 9–10**
Capabilities	**Level 9–10**

- Critical and Creative Thinking
- Personal and Social

Victorian curriculum strands and sub-strands

Science	**Science Understanding** ***Physical sciences*** • Newton's laws of motion can be used to quantitatively analyse the relationship between force, mass and acceleration of objects (VC2S10U17) **Science Inquiry** ***Questioning and predicting*** • Investigable questions, reasoned predictions and hypotheses can be used in guiding investigations to test and develop explanatory models and relationships (VC2S10I01)
Capabilities	**Critical and Creative Thinking** ***Questions and Possibilities*** • Challenge previously held assumptions and create new links, proposals and artefacts by investigating ideas that provoke shifts in perspectives and cross boundaries to generate ideas and solutions (VCCCTQ045) **Personal and Social** ***Social Awareness and Management*** • strategies for constructing and managing effective teams; when and how to evaluate collaboration and make recommendations for improvements (VC2CP10O04)

Learning intention

To build understanding of the need to manage speed in order to create safer road environments

Success criteria

- Investigate and identify safety concerns with the road environment for different road users for a location in the local area
- Provide recommendations for road safety engineering treatments together with a rationale for how each treatment will improve safety
- Present findings of the investigation and recommendations to others
- Work effectively in a small group and evaluate contributions by self and others to group tasks

Resources

Student investigation sheet	**Safer roads where we live**
Information sheet	**Common crash types**
Information sheet	**Road safety engineering treatments**

Learning activity description

1. Organise students into small groups of three-to-four.
2. Distribute the *Student investigation sheet: Safer roads where we live* and explain the task.

Investigate

3. Read through the requirements and explain how groups should identify a suitable location and/or length of road. Each group can identify their own location for investigation or you may prefer to assign specific locations that you have identified.
4. Note that the investigation could be set as a homework task or carried out during class by taking a local excursion.
5. Discuss the need to observe the location and do this, if practical, at different times and on different days. To calculate the speed of vehicles students could use the method described in the *Road to Zero* resource: *Calm down! Speed and road treatments investigation*. Ask why they think traffic conditions and road use may vary on different days and at different times.
6. Distribute *Information sheet: Common crash types*.

Develop recommendations for road safety treatments

7. Distribute information sheet titled *Road safety engineering treatments*. Explain where else they may find information about suitable road safety engineering treatments.
8. Discuss the importance of speed limits in determining the effectiveness of different treatments. Ask students to reflect on what they learned at *Road to Zero* and provide recommendations regarding maximum speed limits for different types of treatments.

Feedback on your investigation findings

9. Explain how they should present the findings of their investigation to the class and when this will occur.

Present recommendations

10. Explain the different modes available for presenting their findings and recommendations.
11. Discuss the audience for the presentation. This could be the rest of the class, the wider school community, a representative from the local council (e.g. a local traffic engineer) or VicRoads. Note that local roads are managed by local councils, whereas VicRoads is responsible for main (arterial) roads, highways and freeways.

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INVESTIGATION SHEET: SAFER ROADS WHERE WE LIVE

Undertake an investigation into a location or section of road you believe is unsafe in the area around your school or where you live. Based on your findings your group will develop recommendations for road safety engineering treatments, including changes to the speed limit, to improve safety for all road users. Your group will present the recommendations for the speed limit and treatments.

Investigate

Use group discussion to agree on the location (e.g. an intersection) or section of road that you will investigate. Investigate your location by making some observations. It is useful to do this at different times of the day, such as in the morning and later in the day, and on weekdays and weekends. Complete the following:

1. Show the location on a map and draw a detailed plan of the section of road.
2. What is the current speed limit at this location? Do vehicles appear to be mostly travelling at, above or below the speed limit?
3. Who are the different road users that use this road? (e.g. car drivers and passengers, truck drivers, motorcyclists, pedestrians, cyclists)
4. Are there any specific high-risk groups (e.g. older pedestrians, children or cyclists) that use this road?
5. Describe how much traffic is at this location and whether this varies according to the day and time.
6. Describe and draw a diagram of the most likely crash types that could happen at this location? Refer to *Information sheet: Common crash types*. Give reasons why your group believes these crash types could occur at this location.

Feedback on your investigation findings

Present the findings of your investigation to the rest of the class and seek comments and suggestions. Use the feedback to make any changes.

Develop recommendations for road safety treatments

1. Drawing on your experience at *Road to Zero,* consider what should be a safe speed limit and explore different treatments using Information sheet titled *Road safety engineering treatments*. You may need to research other examples of treatments – the following will be a useful starting point:
   - *Towards Zero*: towardszero.vic.gov.au
   - International Road Assessment Program (iRAP): toolkit.irap.org

   You need to make sure that the speed limit and treatments you recommend will reduce the risk of the crash types you identified and/or minimise the chance of injuries if a crash occurs.
2. Give reasons why the recommended speed limit will be effective.
3. Explain how each recommended treatment will reduce the risk of a crash and/or minimise chance of injuries if a crash occurs.

Present your recommendations

Use an effective tool (e.g. PowerPoint presentation) to present the findings of your investigation and your recommendations. The audience for this presentation could be the rest of the class, the wider school community or a representative from the local council.

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INFORMATION SHEET: COMMON CRASH TYPES

The following are common crash types that were explored during the *Road to Zero* experience.

Higher speed roads: rural highways and main roads

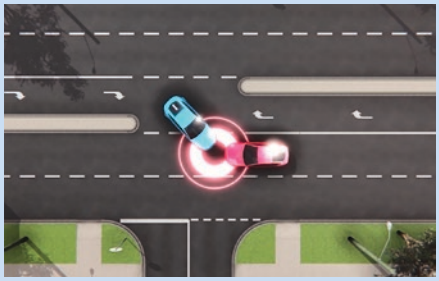
Head-on or veer into oncoming traffic

- Fatal head-on and run-off-road crashes are more common on rural roads than on city roads.
- Higher speeds lead to greater risk of fatality.
- The risk of fatality is greater on undivided roads.

Run-off-road crashes

- Fatal run-off-road crashes are more common on rural roads.
- Higher speeds lead to greater risk of fatality or serious injury.
- Can occur due to speeding, distraction, driving while tired or affected by alcohol or drugs.

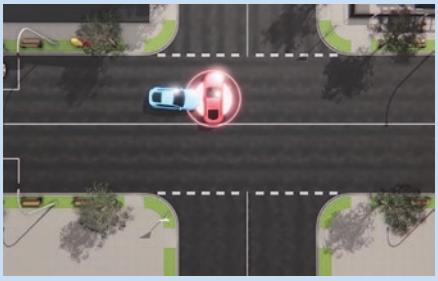
Crashes at intersections



- Many crashes at intersections involve vehicles turning, especially turning right.
- Often caused by misjudging gap in traffic, travelling too fast or not obeying signs.

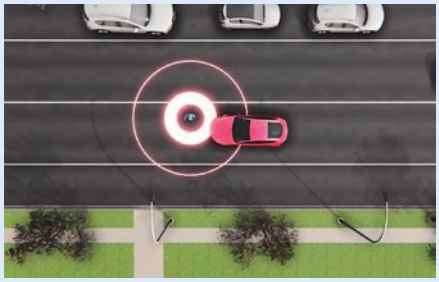
Lower speed roads: town/city centres and local roads

Crashes at intersections



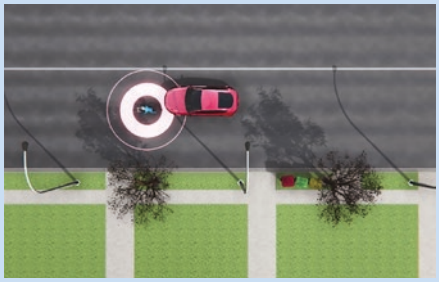
- Many crashes at intersections involve vehicles turning, especially turning right.
- Crashes between cars and cyclists, and cars and pedestrians are very common.

Midblock crashes with pedestrians



- 90% of pedestrians survive if the crash impact speed is 30km/h or less. But at 60km/h the chance of surviving is only 20%.
- Most pedestrians are hit while crossing the road. Pedestrian crossings lower this risk.

Midblock crashes with cyclists



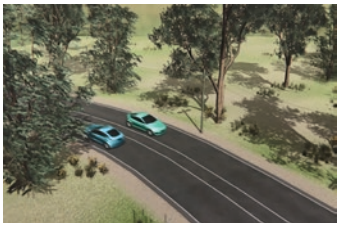
- Rear-end crashes result in the greatest number of cyclist fatalities.
- The faster the vehicle, the greater risk of fatality or serious injury to a cyclist.
- Poor visibility is a risk, especially at night or in wet weather.

ROAD TO ZERO

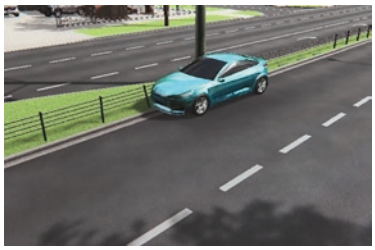
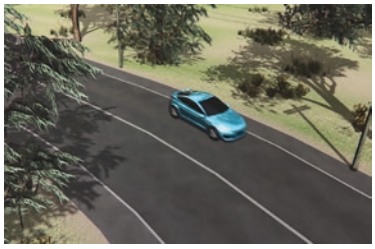
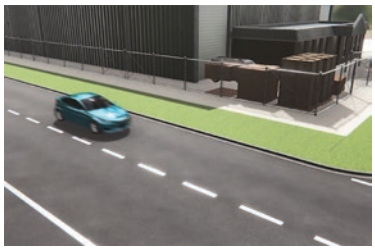
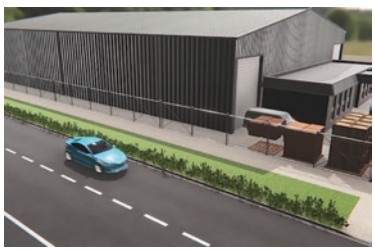
INFORMATION SHEET: ROAD SAFETY ENGINEERING TREATMENTS

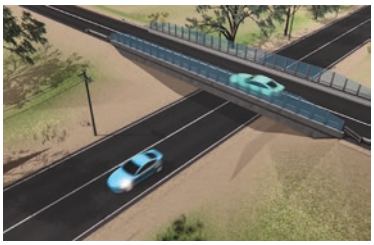
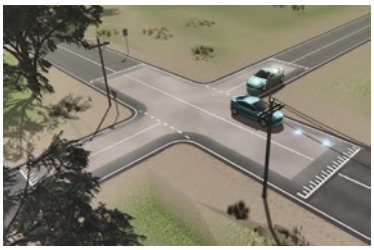
Road safety engineering treatments for higher speed roads

The following are examples of road safety engineering treatments for higher speed roads, such as rural highways and main roads, explored during the *Road to Zero* experience. Remember that the speed limit is a key factor in whether these treatments will be effective.

CRASH TYPE: Head-on or veer into oncoming traffic		
Continuous flexible mid-barriers		• Flexible mid-barriers stop vehicles crashing into oncoming traffic. • They also stop vehicles from running off the road to right. • If a vehicle hits the barrier then much of the crash energy is absorbed.
Painted centre median		• This helps drivers to stay in their lane by providing a visual cue for drivers. • It also reduces crash risk by increasing the separation between passing vehicles.
Tactile centrelines		• Tactile centrelines have raised or grooved patterns in the line. • They make a sound to warn a driver their vehicle is moving into the oncoming lane. • These can help prevent crashes where a driver is drowsy, inattentive or distracted.
Clear median hazards		• Removing median hazards involves clearing of any trees, shrubs and poles. • This removes objects that could cause injury if vehicles leave the road. • Removing objects on the median can also improve visibility for drivers.
Clear all median hazards and replace with small shrubs and energy absorbing poles		• Removing median hazards involves clearing of any trees, shrubs and poles. • This removes objects that could cause injury if vehicles leave the road. • Removing objects on the median can also improve visibility for drivers.

CRASH TYPE:
Run-off-road crashes

Continuous flexible roadside barriers		• These stop cars running off the road and crashing into a tree, pole or embankment. • If a vehicle hits the barrier then much of the crash energy is absorbed. • Flexible barriers can reduce the number of run-off-road crashes by 80–90%.
Sealed road shoulders		• Sealed road shoulders let tyres grip the road more easily than gravel. • Vehicles straying from their lane often lose control on loose gravel.
Clear roadside hazards for 10m		• Removing roadside hazards involves clearing of roadside trees, shrubs and poles. • If a vehicle runs-off the road it can allow a driver to avoid crashing. • Removing roadside objects can also improve visibility for drivers.
Clear roadside hazards for 6m		• Removing roadside hazards involves clearing of roadside trees, shrubs and poles. • If a vehicle runs-off the road it can allow a driver to avoid crashing. • Removing roadside objects can also improve visibility for drivers.
Clear all roadside hazards and replace with small shrubs and energy absorbing poles		• Large trees, power poles and sign posts on the roadside can be a serious hazard. • These can be replaced by small shrubs instead of large trees. • Poles and posts can be used that absorb crash energy and collapse or break away.

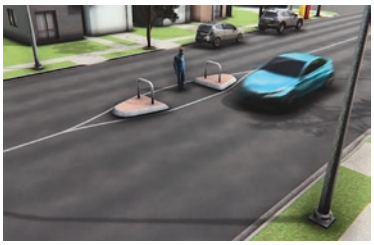
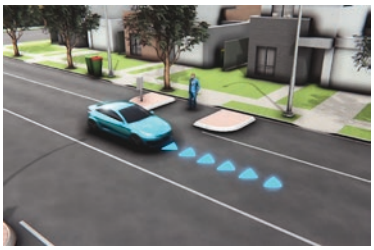
CRASH TYPE: Crashes at intersections		
Grade separation		• Uses an overpass or interchange to separate roads. • Most effective way to stop crashes between vehicles at an intersection. • Very costly.
Roundabout		• Reduce the risk of a serious crash by slowing vehicles and directing traffic in one direction. • If a crash occurs, the angle of impact is less severe, reducing risk of injury.
50 km/h safety platforms		• Make drivers more aware of the intersection. • Reduce vehicle speeds.
Traffic signals		• Coordinate the flow of traffic and reduce crashes. • Make it safer and easier for pedestrians to cross.
Traffic signals with 50 km/h safety platforms		• Traffic signals coordinate the flow of traffic. • Safety platforms reduce speed. • Together they reduce the risk of crashes.

Road safety engineering treatments for lower speed roads

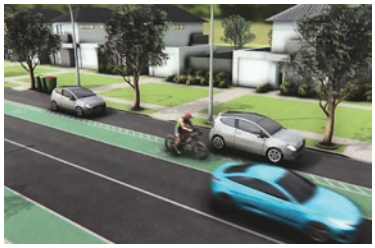
The following are the examples of road safety engineering treatments for lower speed roads, such as town centres and local streets, explored during the *Road to Zero* experience. Remember that the speed limit is a key factor in whether these treatments will be effective.

CRASH TYPE: Crashes at intersections		
Roundabout with wombat crossings		• A roundabout slows vehicles, reducing the risk of a serious crash occurring. • It reduces possible collision points, because traffic travels in one direction. • Wombat crossings for pedestrians have raised safety platforms to slow traffic.
30 km/h safety platforms		• Safety platforms make drivers more aware of the intersection. • They reduce vehicle approach speeds and speed through the intersection. • At 30 km/h risk of a pedestrian or cyclist fatality or serious injury is very low.
Stop signs with traffic islands		• Stop signs coordinate traffic and reduce the risk of a crash. • Vehicles must come to a complete stop at a stop sign. • At a give-way sign, vehicles do not need to stop if the intersecting road is clear.
Traffic signals with signalised cross-walks		• Traffic signals coordinate the flow of traffic in intersections and reduce crashes. • Signalised cross-walks provide a safer way for pedestrians to cross. • Separate signals and phases for pedestrians reduce their risk of crash involvement.
Traffic signals 30 km/h safety platforms		• Traffic signals coordinate the flow of traffic and a safety platform reduces speed. • Together they reduce the risk of a serious crash occurring. • At 30 km/h risk of a pedestrian or cyclist fatality or serious injury is very low.

CRASH TYPE:
Midblock crashes with pedestrians

Wombat crossings between intersections		• Wombat crossings for pedestrians have raised safety platforms to slow traffic. • Raising the road also makes drivers more aware of pedestrians on the crossing.
Zebra crossings between intersections		• A 'zebra crossing' can help pedestrians to cross safely. • Drivers are required to stop and give way to a pedestrian using a zebra crossing.
Pedestrian refuges		• Pedestrian refuges are raised median islands. • They provide space for pedestrians to wait safely on the road for a gap in traffic. • They make crossing the road easier and safer.
Kerb outstands		• Kerb outstands reduce the road crossing distance for pedestrians. • Pedestrians have a better view of traffic and are more visible to drivers. • By reducing the road width, traffic speeds are lowered.
Fencing or barriers between intersections		• Used on the side of the road or the median to stop pedestrians crossing midblock. • Fencing is often used to direct pedestrians to a safer formal crossing point • Parking may need to be removed with pedestrian fencing on the side of the road.

CRASH TYPE:
Midblock crashes with cyclists

Segregated bicycle path		• A separate bicycle path provides physical separation from vehicles on the road. • Bicycle paths may be alongside a road or take a completely different route. • These almost eliminate the risk of a crash between a cyclist and a vehicle.
On-road bicycle lane clear of parked cars		• Painted bike lanes give cyclists a designated space on a road, reducing crash risk. • Cyclists must use lanes provided and these improve driver awareness of cyclists. • Having clearance to parked cars is important because of the risk of 'car dooring'.
Marked bicycle route		• The road markings guide cyclists on safer routes through streets with less traffic. • The road markings also warn drivers that cyclists use the road.

Shared space in a town/city centre or local street

- Low speed limits help pedestrians and cyclists use the roads freely.
- Drivers slow down and are more careful of people walking and cycling.
- Creates a liveable and attractive environment.
- Encourages people to be more active.
- Benefits for health and wellbeing, and the environment through reduced emissions.