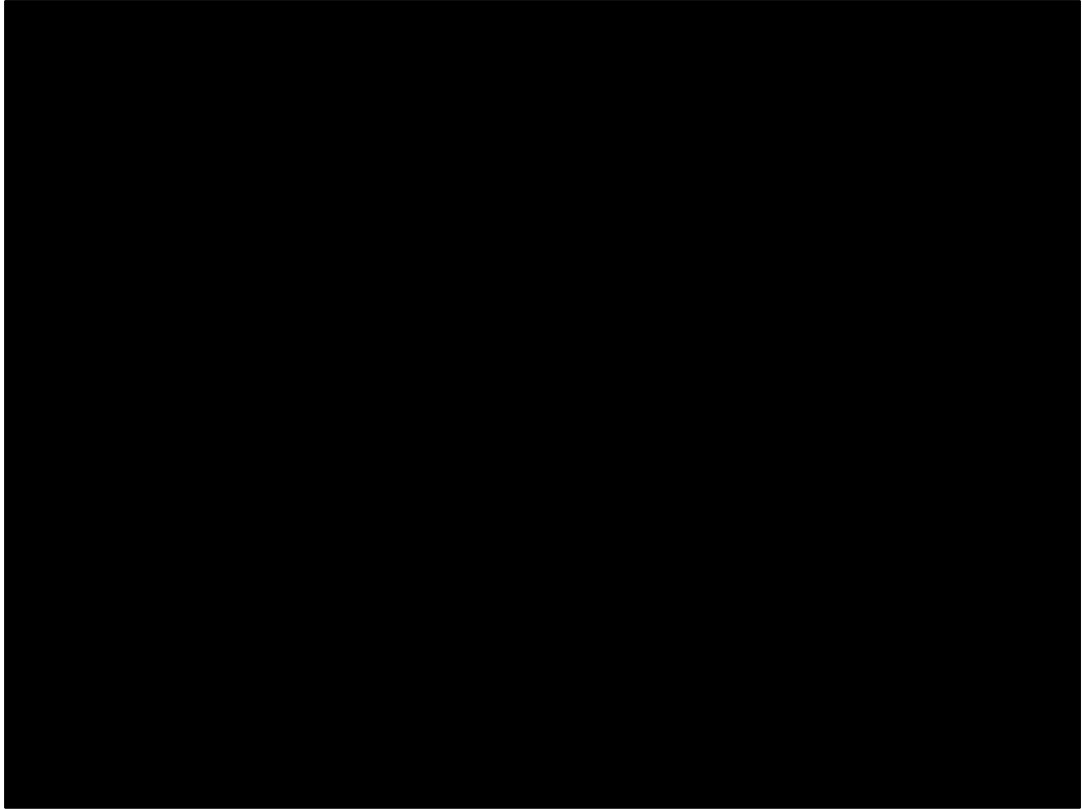




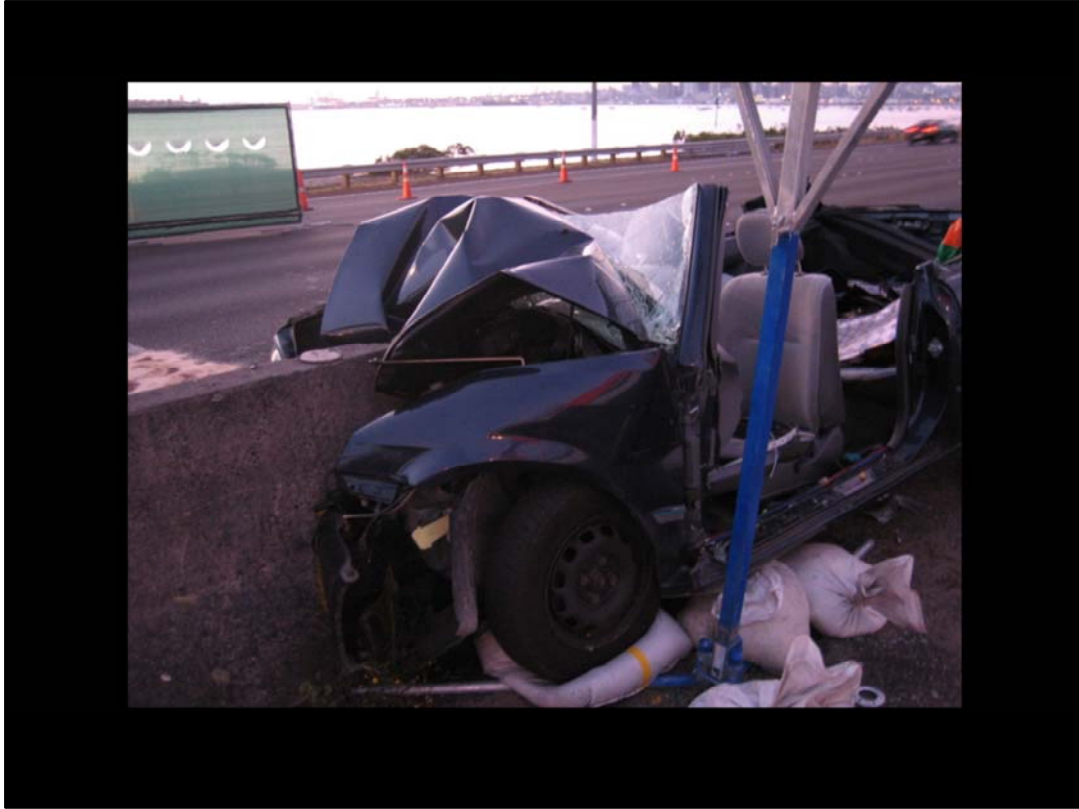
Good Morning

My name is Andrew Stevens. I am the Traffic Safety Manager for the Auckland Motorway Alliance (or AMA for short).

To start this presentation, can I ask you to take a moment to reflect on some pictures of crash scenes on our Network.



Start Slide Show



Jan 2009

An intoxicated young lady has killed herself after driving over the harbour bridge and impaling herself on the end of a barrier

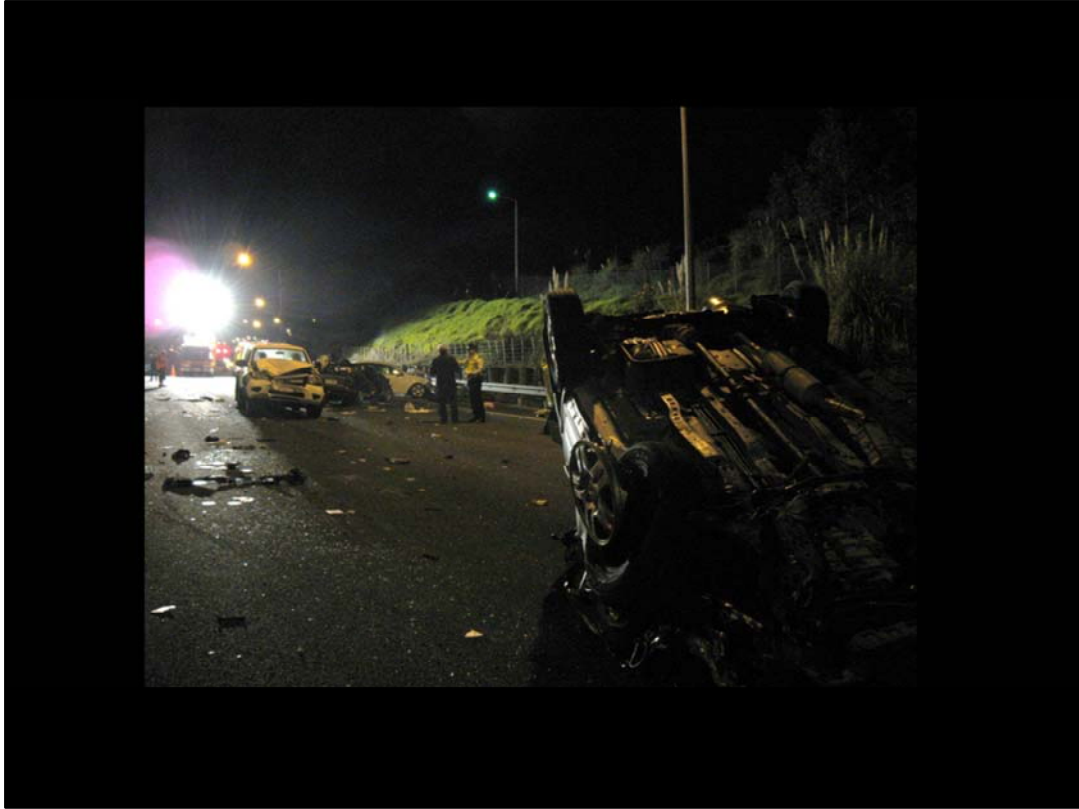




July 2010

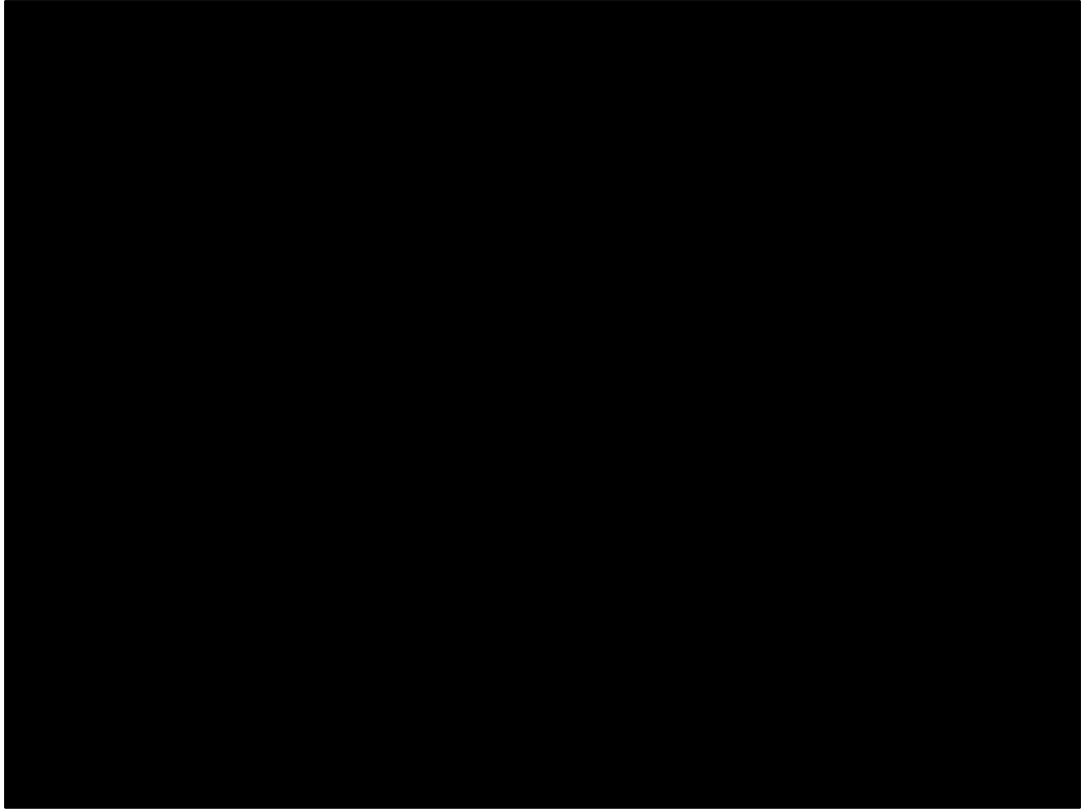
An elderly driver (not fit to drive) and his passenger are killed as they head home after an evenings outing.





July 2010

An elderly driver (not fit to drive) and his passenger are killed as they head home after an evenings outing.





Dec 2010

One of the few incidents I am aware of that has occurred during the daylight hours as there is generally too much opposing traffic during day time to enter against the flow – but there will be those that do succeed

The underlying issue here was due to a medical condition for the driver





Jan 2011

Alcohol impairment.

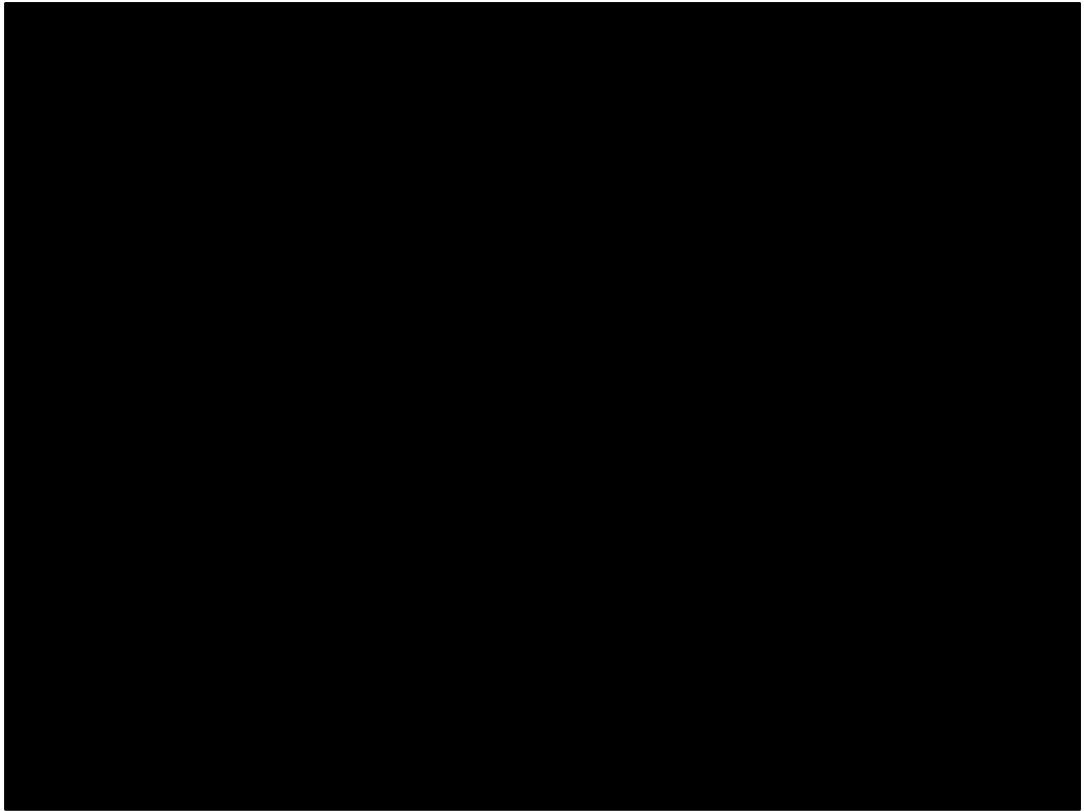
The driver only made it a short distance from Market Road to the Newmarket viaduct





Sep 2011 – Waikato Expressway

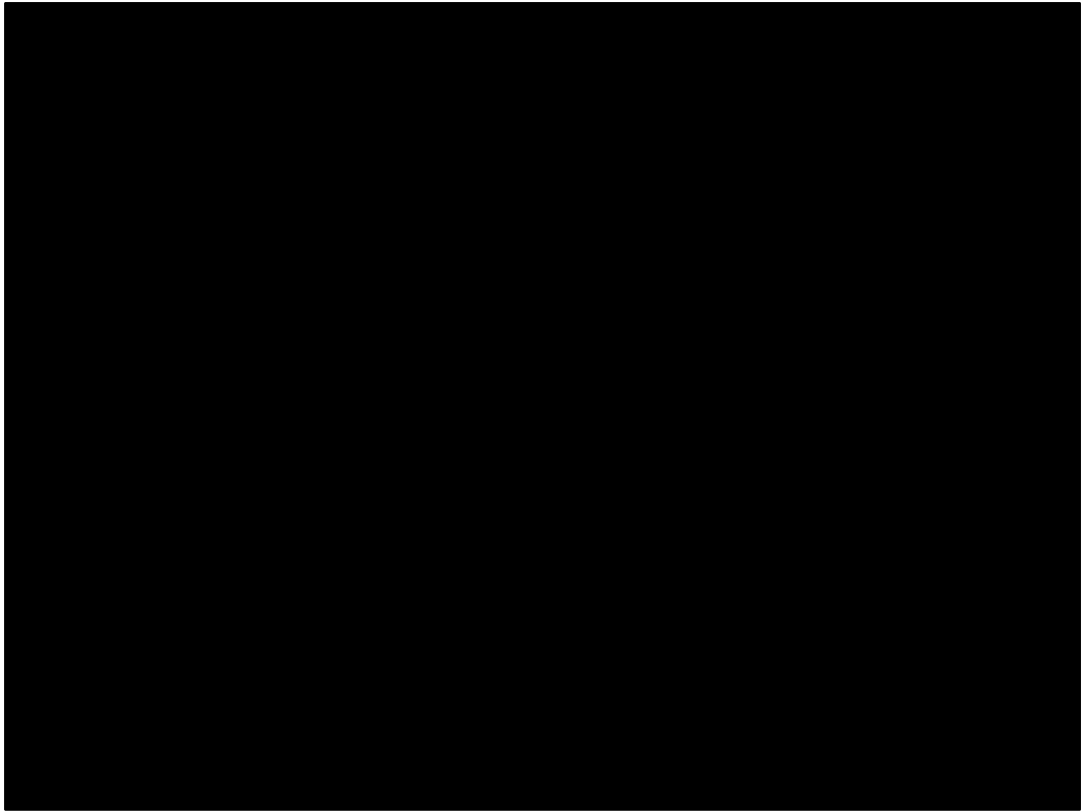
A confused (due to new interchange) elderly female driver enters the Waikato expressway the wrong way





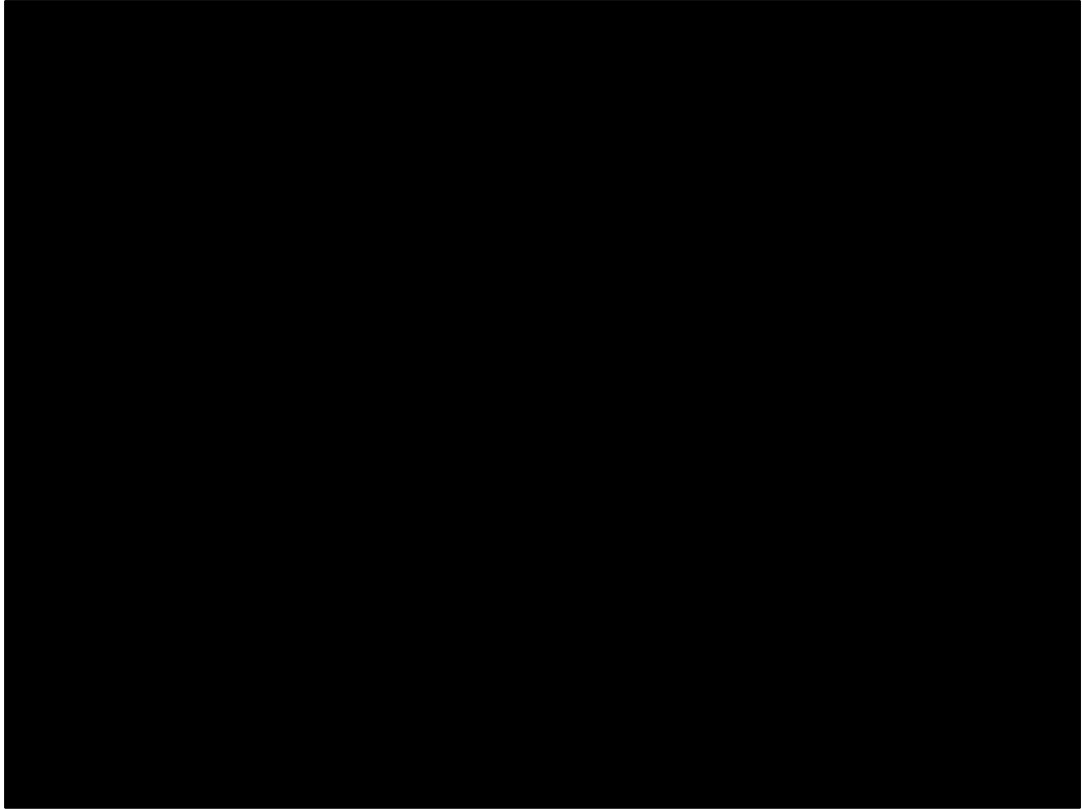
Jul 2012 – Hobson St off Ramp (alcohol?)

Minor incident





October 2013 – Serious – Lincoln Road

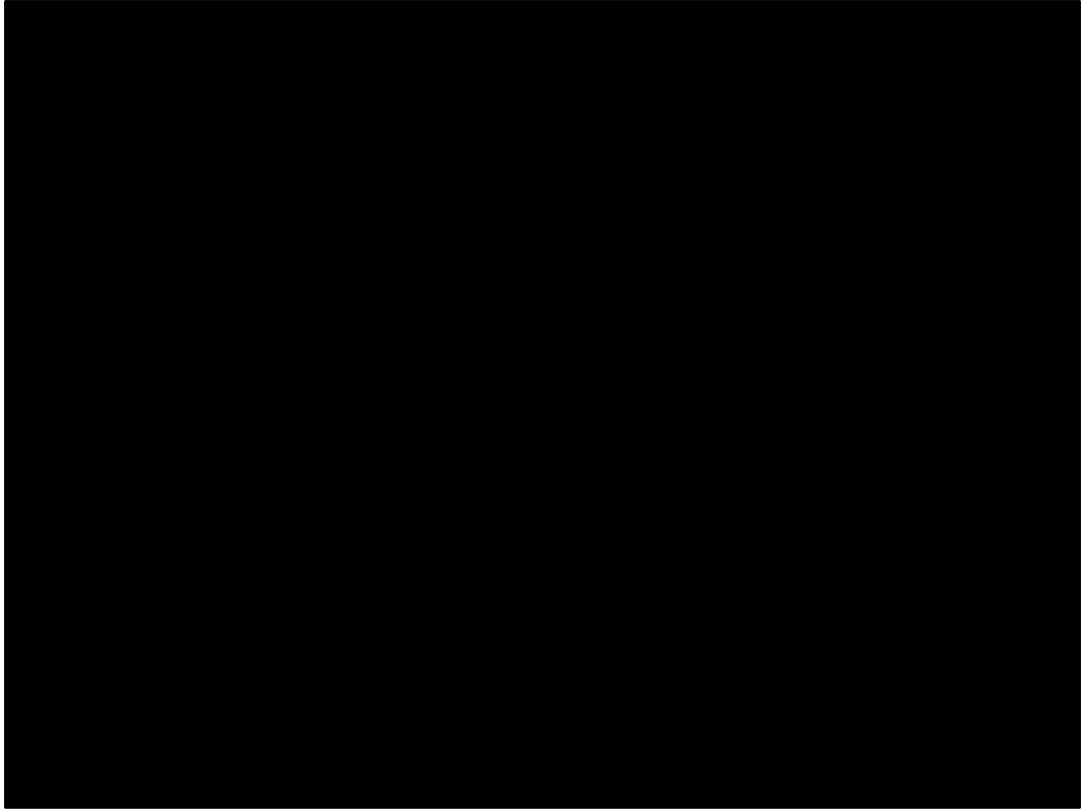




Apr 2014 - Fatal

East Tamaki

Heavily intoxicated young female driver





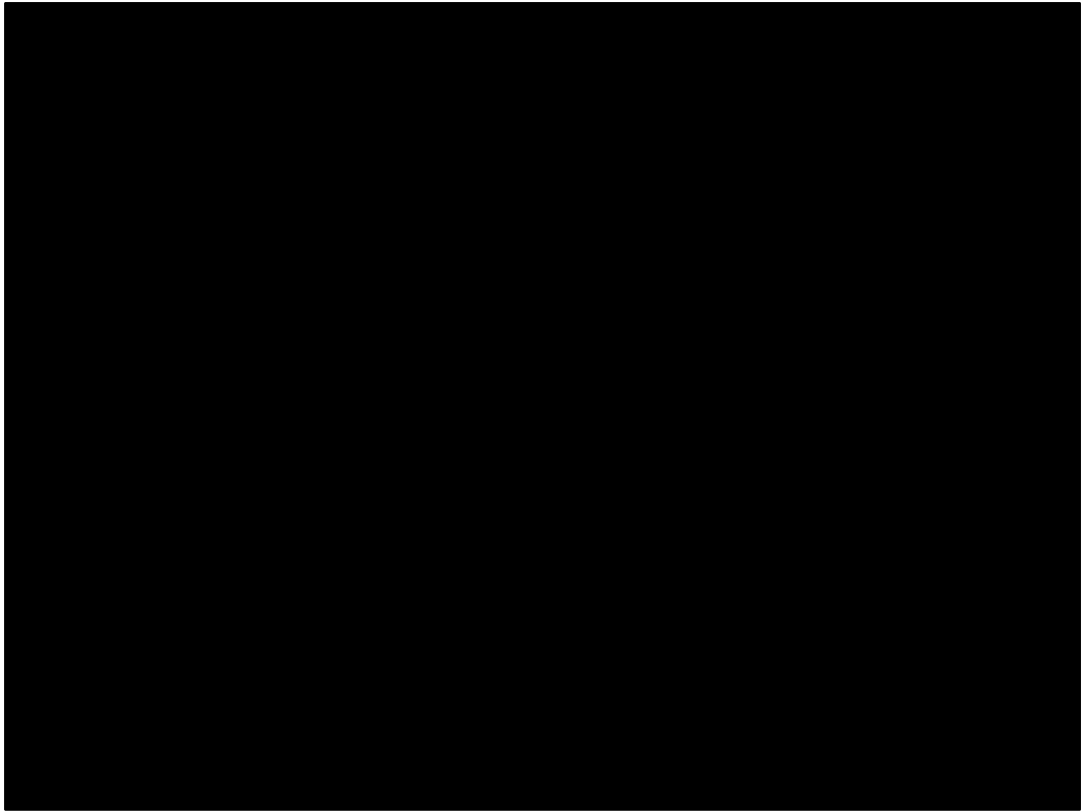
Jun 2014 AHB





Mar 2015

Te Irirangi





The AMA network is primarily a motorway environment; that is, a high speed, multilane, median divided carriageway.

Despite being only 220 center line km in length, it carries in excess of 1.2M vehicle trips each day (that is about 20% of all vehicle movements in Auckland).

Therefore it is a key part of Auckland's transport infrastructure. Thus, I am sure you can appreciate, any incident can have a significant impact on the resilience of the network, not to mention the maiming or loss of life that can occur.

Today, I am going to share with you some of our experiences, and actions that we have been taking to address the challenging issue of Wrong Way Drivers on our network.

For the purposes of this presentation, a WWD is defined as someone who either inadvertently or deliberately drives against the traffic flow on the wrong side of a divided carriageway.

The preceding images you saw, are but a selection of some Wrong Way Driving incidents that have occurred on the AMA network over the past few years.

The images speak for themselves in terms of the carnage caused.

It is fair to say, that when we started to consider this topic, we totally underestimated

the magnitude of the issue.

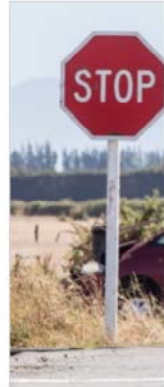
We were well aware of the 2 or 3 fatal or serious incidents that were occurring each year because of the ensuing crash that resulted.

However we were blown away when we interrogated the Police Comms database and that indicated in excess of 100 WW incidents, noted and recorded per year,

Even that now seems to be a massive underestimate based on the data we have gathered from the detection systems we now have in place.

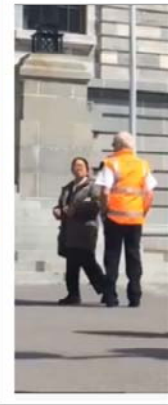
Tourists at fault in one in 12 South Island crashes

MYLES HUME, NICOLE M...
Last updated 07:36, Febru...



Foreign drivers petition will not sway Government

11:31 AM Tuesday Feb 14, 2017



Dad watches body count grow after latest foreign driver accident

11:24 AM Wednesday Mar 1, 2017

Air New Zealand Ltd

Bay of Plenty Times

Cars

SHARE:



The horror crash near Nelson on Monday where two people died. An American tourist has been charged over the accident. Photo supplied

In recent years we have been quick to jump on the foreign driver band wagon as soon as we hear about a motorist driving on the wrong side of the road.

However, for the our network, the foreign driver does not appear to be the one who should take the rap.

So, who are these people driving down our motorways the wrong way?



There seems to be 3 broad categories of WWD

There are those who will deliberately drive the wrong way in an attempt to evade police enforcement.

And, unfortunately for us, the media has done its socially responsible bit, and highlighted to the public that the Police will not follow a driver the wrong way down a motorway; thus this has now become an attractive escape technique for these drivers, in fact they will even try to bait the Police in an attempt to initiate a Police Chase!



Then there are the “Good” Drivers (that’s you and me)

We have a moments lapse in concentration, or some minor distraction, and we make a mistake

Fortunately we will recognise our error almost immediately and get ourselves out of harms way, like the example in this clip

Run Video

The cameras we have installed to record these WW movements trigger at an alarming rate of several times per week at many of the sites where they are installed.



However, the category of driver that is currently resulting in most of the Death & Serious Injury incidents involve those drivers who are impaired,

This impairment can be by way of

- Drugs and / or Alcohol
- Medical Conditions
- Or through impairments that we typically associate with the elderly

The driver on the left (coming towards you in this next clip) has made it some 40km from the city center.

Run Video

This is just one of many close calls this elderly gentleman had on his journey... his journey home. Apparently he thought he was still on the local roads in the city, and was simply waiting to turn left into his side street!!!

Fortunately in this case there was no crash, and everyone went home alive



However, the result is not always so good.

Again the WWD is the one coming towards you, on the LHS of the carriageway.

While not overly graphic, this clip does show what is a fatal crash, so if you do not wish to view this, please look away for the next 30 seconds.

Run Video

In this case it is a heavily intoxicated young female driver that has claimed the life of another young lady, the innocent party was in the vehicle travelling in the correct direction.

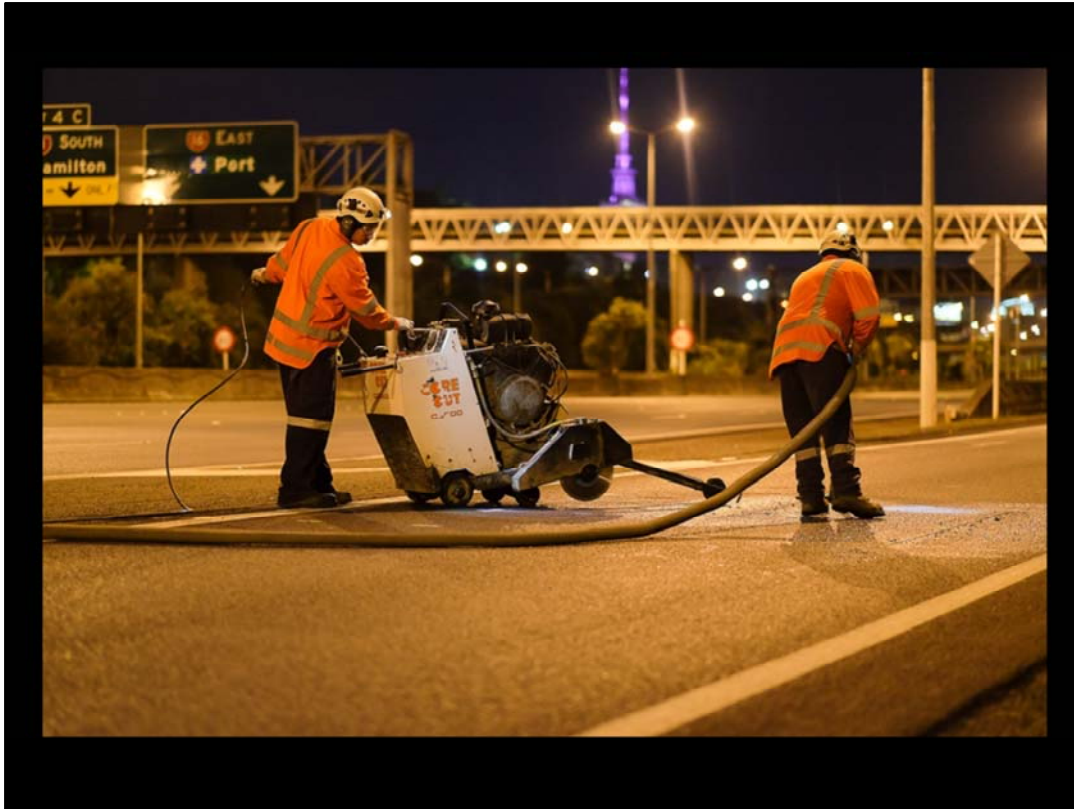


This is not just an Auckland issue. In fact WWD is also a significant international issue.

But despite this, there does not appear to be any simple, or even complex off the shelf fix due to the challenges faced in tackling this problem.

And that complexity starts with the drivers themselves.

This is because different treatments are required to target each of the distracted, impaired or deliberate wrong way driver groups, i.e. there is no one size fits all solution...



Most of the international literature that we have been able to review seems to focus on preventing vehicle to vehicle conflicts.

We have not come across any discussions that recognises that road crews are also in the line of fire from WWD.

Hence we have also given consideration to the protection of worksites when looking for solutions.



This next clip shows the sort of driver behavior that our crews have to contend with; and the number of close calls experienced over such a short section of road.

You will note a WWD enter from the top left of the screen.

Run Video

We have therefore set ourselves a goal to develop a complete and integrated safe system to protect all road users exposed to this risk; whether they be the WWD themselves, other motorists or those working on the road.

The starting point was an audit of our network with a team comprising both safety engineers and human factors specialists to better understand why motorists may be making mistakes.



First line of Defense

Reduce the likelihood of an error

Targets **Distracted** and **Impaired** drivers

Surprisingly much of what we found seemed relatively simple to address.

One simple example, is the squaring up of edge lines at the intersection of off ramps and local roads;

In this example, viewing the image to your top right, the visual cues seem to indicate that a left turn may be possible.

In squaring up the edge lines, with reference to the lower right image, it also effectively visually closes up the throat of the intersection, further reducing the likelihood of a WW movement occurring.



Another example is the replacement of the green aspect on a traffic signal with a straight ahead arrow.

The idea here is to reinforce the expected behavior, i.e. tell drivers what they are supposed to do, rather than relying on a myriad of signs telling them what they can't do.

This also opens the opportunity to remove the 'no right turn' signs and hence eliminate some sign clutter.

Reduced clutter should in turn should help enhance other visual cues at the intersection.

We recently trialed this initiative of changing the signal aspects at one of our interchanges.

The site we choose had experienced some 19 WWD activations in the previous 10 months (Puhinui).

Since this simple change was made, there have been no further recorded incidents of WWD at this site.

Providing the right visual cues at our interchanges is therefore our first line defense; that is, to minimise the risk of an error occurring in the first place.



However, being human, we accept that mistakes will occur.

Therefore our second line of defense is to highlight to the driver that they have made an error so that they have an opportunity to self correct.

To this end we have developed a radar and camera based detection and monitoring system.

This activates flashing lights on detecting a WWD movement so to attract the attention of the driver.

A camera also records the activations to enable us to better understand how the error may have occurred, this allows us the opportunity to seek insights into how or why our first line of defense was breached.

We have also lowered the height of the WW signs to about 1.0m above the road surface bringing them more into the line of sight of the driver.

International experience indicates that this simple act of the lowering signs can help reduce incidents by around 60%.



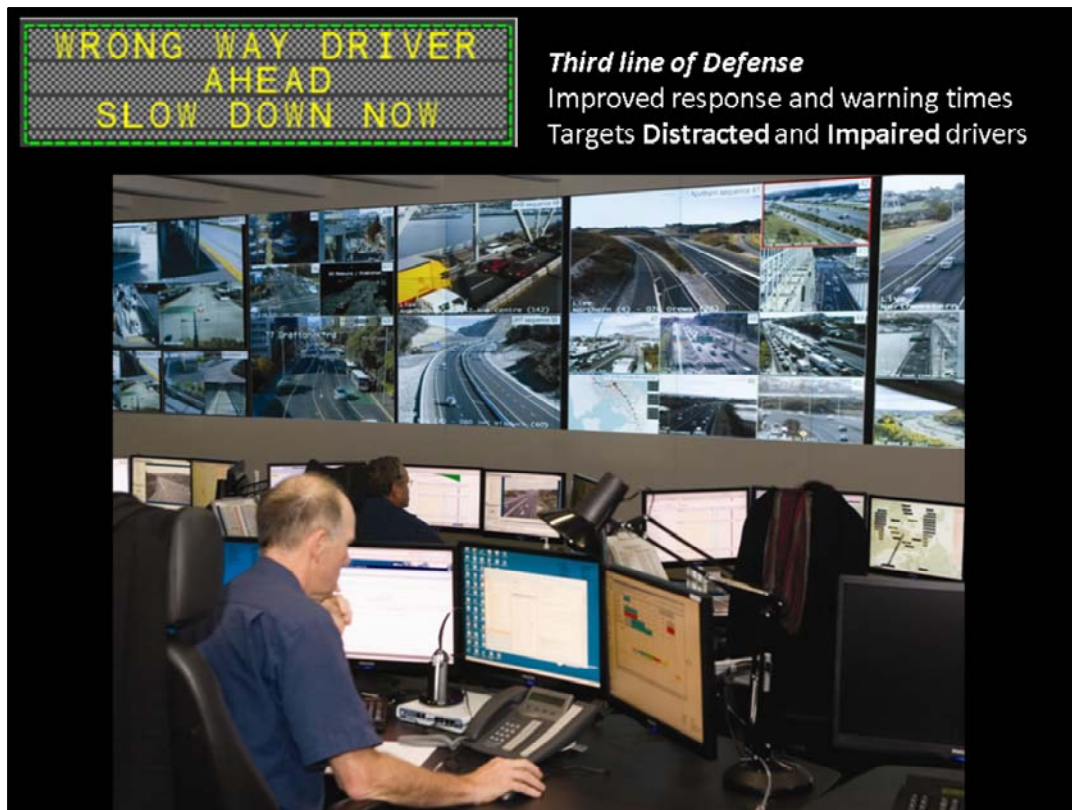
In this video clip you will see a driver turn left from the local road onto an off ramp (Tristram Ave northbound off ramp).

You will note the brake lights come on, and the corrective action taken following the activation of the flashing warning lights on the WW signs.

Run Video

This is potentially another life saved...

Excepting deliberate WWDs, we are not aware of any other driver passing beyond the activated lights were we have them installed.



Previously it would be a matter of chance that a WWD was noted by the Traffic Operations Centre; and then it could take upwards of another 3-4 minutes to activate VMS warning signs alerting other drivers to the risk ahead.

Recognizing that time is critical in the case of a WWD incident, we set about to develop an automated response system should a motorist proceed beyond the activated warning signs.

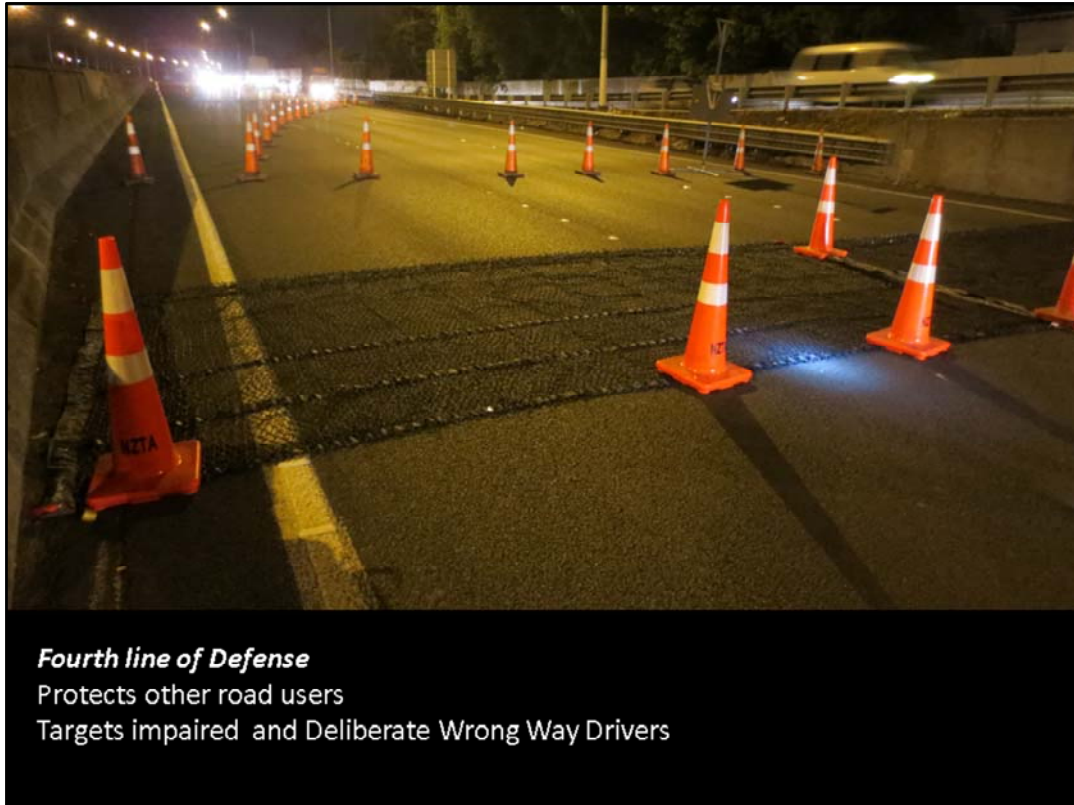
This is our third line of defense

This is initiated when loops are activated at the bottom of the off ramp.

While we have not been able to develop a fully fail safe detection system, by linking the second trigger to the primary trigger we can have a high degree of confidence that a WWD is about to enter the mainline.

When this trigger activates:

- The Traffic Operations Centre will get an early alert to enable them to start coordinating their response
- CCTV cameras will re-orientate to preset positions, this will save valuable time confirming and tracking the incident
- VMS signs will be activated to warn other motorists of the oncoming risk, and
- Road crews will get an early warning to vacate their work sites to remove themselves from the line of fire



Still to be developed, and the final piece of the puzzle, is the integration of an automated means to disable a vehicle that passes the second trigger point.

One of our current thoughts is to look at a means to automatically deploy an X-Net across the bottom of an off ramp on a positive WWD trigger.

The X-net is a military developed tool primarily for use at check points. It can best be described as a cross between a cargo net and a set of road spikes.

But unlike road spikes that simply puncture tyres, these spikes stay imbedded within the tyres and then wrap the attached net around the wheels disabling the vehicle.

This should greatly reduce the risks posed by deliberate WWDs, bringing them to a quick and controlled halt.

In the mean time, and as shown in this image, and in what we understand to be a world first application of the X-Net, we are manually deploying them at the entry to our road work sites to protect our crews.

Presently AMA work sites experience 2 or 3 breaches per month by motorists; this also includes those travelling in the correct direction of travel.

To date, for the sites that we have deployed the X-Net, no breaches have been recorded. Whether this is a matter of luck, or a result of the heightened target value of the setup

that has deterred breaches, we are unsure.



This video shows the X-Net in action.

Run Video



In conjunction with the X-Net we are also deploying the 'Intellicone' system at the start of worksites.

The Intellicone is a light and sensor unit that is placed on top of a standard road cone that sends out an alarm to those on the site when it is knocked over.

This system can be linked back to the Traffic Operations Centre and be remotely activated when the triggers on the off ramps are tripped. This should give an extended warning time to our road crews, significantly reducing the risk posed to them.



It has taken us the past five years to test, trial and refine the various systems I have highlighted. It has been a complex project in overcoming the challenges of bringing together many standalone aspects and systems to create an integrated safe system.

But we now have a system, that can:

- Firstly, help minimize the chance of someone making a mistake
- Secondly, alert drivers to their error should it occur
- Thirdly, provide for a more streamlined response, saving valuable time, and
- Finally, be integrated into future work to enable the automatic disabling of a vehicle

Before I finish, and on a final note, you may recall that in the two videos I played of WWDs on the mainline, that they were both travelling in the outside, or 'fast' lane. To these impaired drivers, your 'fast' lane is in fact the LHS of the carriageway to them, the natural side of the road one drives on in NZ.

Hence, it is in this lane that you are most likely to find impaired WWDs.

And the time you are most likely to find these drivers on the network is during times of low traffic flows.

Therefore, the simple action by you, of not sitting in the fast lane at times of low traffic flows can lessen your risk to this hazard.

A very simple action to protect yourself and your family...