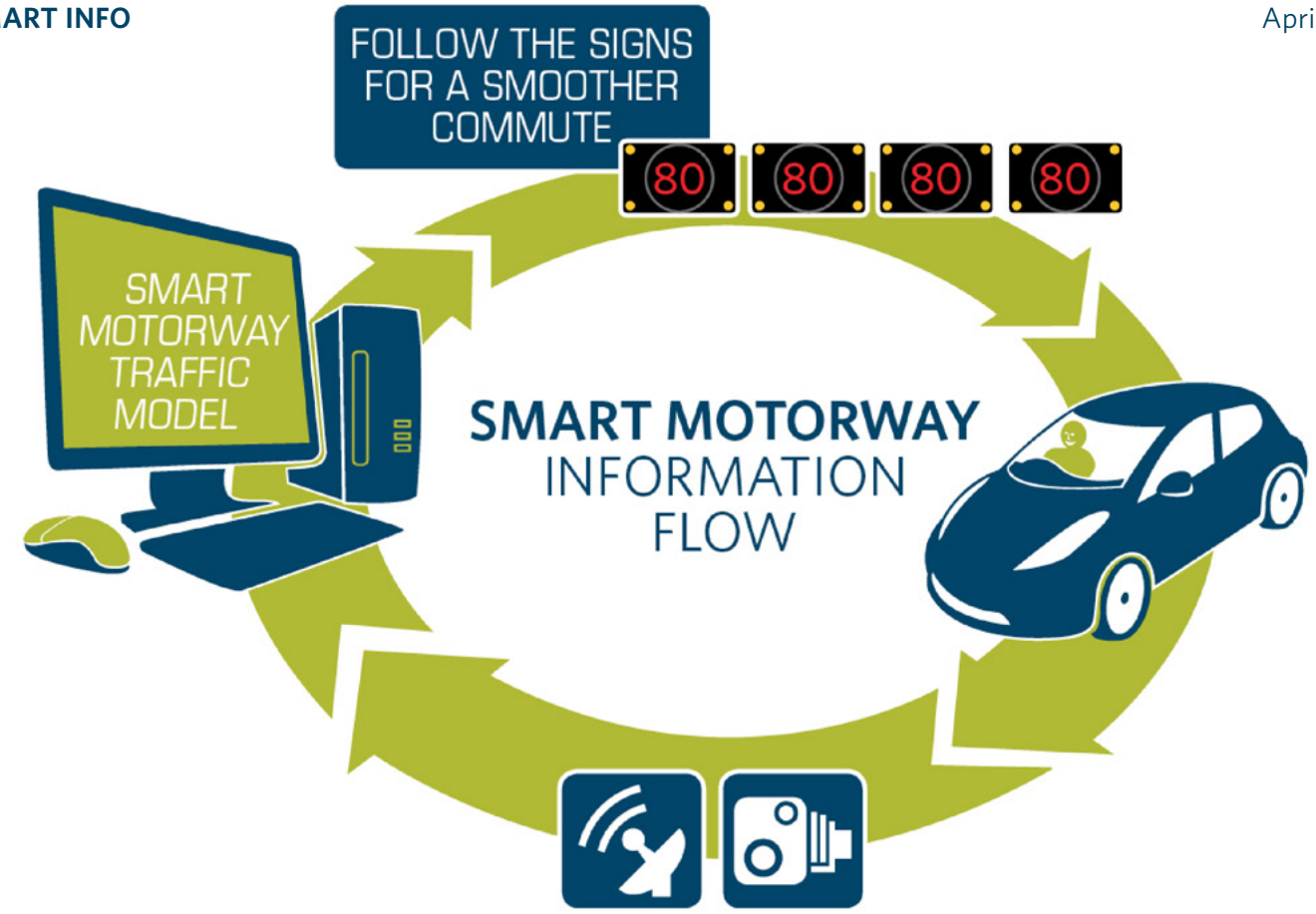
THE SMART EQUIPMENT BEHIND WELLINGTON'S SMART MOTORWAY

SMART INFO

April 2016



The smarts behind Wellington's motorway comprise a network of equipment that measures what's happening on the road, processes the data, and then translates and displays it as real-time information for drivers.

The smart motorway aims to pace traffic entering the area between Johnsonville to the Terrace Tunnel to ensure the traffic stream keeps moving smoothly. This improves safety, reduces congestion and improves travel time reliability.

Detectors under the road and radars mounted on lighting poles and gantries continually count the number of vehicles in each lane and the speed they're travelling. The smart system calculates the rate at which the road is getting congested, factors in what's likely to happen based on past traffic conditions, and adjusts the speed limit to pace the traffic and delay queues being formed.

The most critical time the system can influence congestion is when the volume of traffic is beginning to build up, ie before the road becomes congested. It's at this pre-peak time that the system will slow traffic entering the smart motorway area so vehicles already there can flow smoothly through and out of the area.

DETECTORS

Loops – a traffic loop is a powered wire that's cut into the road. It resonates at a constant frequency which creates a magnetic field. When a vehicle moves over the loop, the frequency changes which the detector senses and counts.

Radar - traffic radars consist of a radio transmitter and receiver. They send out a radio signal in a narrow beam, then receive the same signal back after it bounces off the target object. Due to a phenomenon called the Doppler effect, if the object is moving toward or away from the radar, the frequency of the reflected radio waves when they come back is different from the transmitted waves. From that difference, the radar calculates the speed of the object from which the waves have been bounced. The faster a vehicle is travelling, the more it will change the frequency of the radio waves.

> The Doppler effect can be described as follows – the length of a sound wave changes if the object which is emitting the sound is moving towards or away from the receiver of the sound waves.

TRAFFIC MODEL

The existing Wellington traffic model has been combined with new technology that continuously collects traffic speed and volume data and uses it to predict what's likely to happen in the next few minutes. The traffic model translates its data outputs into the optimum speed to keep traffic moving and displays this speed in real-time to drivers via the lane control signs.

Note: during the first few months of the smart motorway's operation, we'll be validating and calibrating the smart system to ensure it's managing the motorway effectively and efficiently.

We'll test the model's predictions by observing the impact on the traffic flow and wider network.

The model needs to be validated because although traffic models are proven to be effective, the real world may or may not react exactly as the model predicts.

DIGITAL DISPLAY SIGNS

There are two types of electronic signs that display information to drivers:

- Large **variable message signs** which display useful and important information to drivers so they can make informed decisions about their journey. This could include the location of roadworks, or another event. Messages are set by operators at Wellington's Transport Operations Centre.
- Square **lane control signs**. The square lane control signs have three display options:

  1. **Variable speeds** – changing the speed limit to pace traffic is at the heart of a smart motorway. The speed limit displayed on the electronic speed signs is the legal speed limit.
  2. **Red X** – the Red X means don't drive in that lane. When an incident occurs or work is being carried out on the road, the Red X is displayed to close the affected lane. It's potentially very dangerous to drive under a Red X.
  3. **Arrow** – directs drivers to change lanes when required.

CONTACT

Email us and/or sign up for our newsletter at **ntaq@nzta.govt.nz**

Find out more at **nzta.govt.nz/smartmotorway**

Sign up for Twitter updates **@nztawgtn**

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Better tomorrow