

# Ramp Metering Reduces Congestion and Delays, and Improves Peak Hour Traffic Flows

## Scenario:

Major congestion and substantial delays experienced by peak hour motorists using Melbourne's most trafficked freeway.

## Solution:

The Transmax STREAMS ITS solution deployed intelligent motorway on-ramp metering to manage the upstream demand to not exceed the freeway capacity.

## The Benefits:

The system exceeded expectations by reducing delays, improving reliability and increasing traffic throughput. Before and after studies demonstrated peak hour flow increases exceeding 10% and average speed increases of 20 km per hour during the peaks.

The daily economic benefits (travel time savings and vehicle operating cost savings) have been estimated at \$94,000 per day. Consequently, the payback period relative to the pilot project cost of \$1 million was just 11 days.

The city of Melbourne, like most major Australian cities, has been battling the growth in traffic congestion as increasing vehicle numbers choke the main arterial roads in peak travel periods.

In 2007, VicRoads decided to investigate the potential benefits to be gained from the deployment of motorway on-ramp metering, in an effort to regulate the flow of vehicles onto the motorways in peak times. The objective: maintain high vehicle throughput rates and thereby reduce travel times for peak hour commuters.

VicRoads commissioned Transmax to implement a coordinated ramp metering trial system on a 15 km section of Melbourne's most congested freeway, the Monash Freeway (M1) in April 2007. The purpose of the trial was to test the effectiveness of the HERO/ALINEA ramp metering algorithms developed by the University of Crete. VicRoads adopted this suite of algorithms after a comprehensive evaluation of tried and tested options worldwide.

The system exceeded expectations by reducing delays, improving reliability and increasing traffic throughput. Before and after studies demonstrated peak hour flow increases exceeding 5% compared to the existing system.

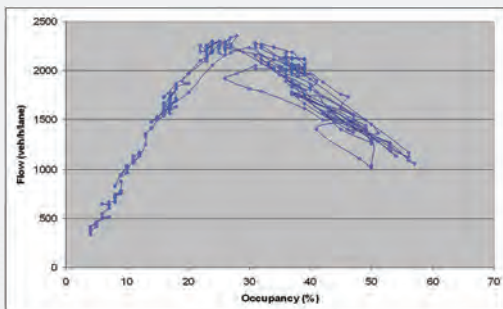
This equates to travel time savings achievable by adding almost an extra freeway lane, (based on a four lane cross section), but at a fraction of the cost. Demonstrable environmental benefits include daily fuel savings estimated at 16,500 litres of petrol and greenhouse gas reductions of 39,800 kg per day.



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## The Problem:

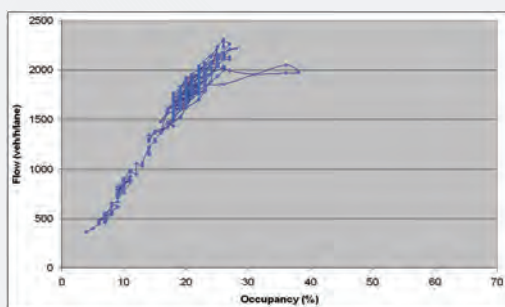
This graph shows the typical peak hour traffic flows prior to the installation of STREAMS Ramp Metering. As vehicle inflow from onramps causes traffic density to reach the critical level, flow breaks down and drops from 2,300 vehicles per lane per hour to as low as 1,000 vehicles per lane per hour, causing major congestion issues and substantial delays for road users.



Monash Freeway October 2007

## The Results:

Typical peak hour traffic flows after the installation of STREAMS Ramp Metering. STREAMS collects traffic, speed, flow and density data from on-road vehicle detectors, and feeds this data to the STREAMS Ramp Metering algorithms. STREAMS Ramp Metering then regulates the “drip-feed” of vehicles onto the motorway to balance the available capacity while maintaining optimal traffic flows. When the density approaches the critical threshold, ramp metering ensures that high flows are maintained and there is no flow breakdown.



Monash Freeway October 2008

The traffic engineers from the University of Crete have described this system as “... the most effective ramp metering system in the world.”

The Victorian Minister for Roads and Ports, Tim Pallas, said “the development of this technology puts the M1 project at the forefront of world congestion management strategies.”

VicRoads subsequently awarded Transmax a contract to install STREAMS to manage 75 km of the M1 (Monash, CityLink and Westgate freeways). The system will meter 64 ramps and manage 40 Lane Use Management Signal gantries. The system will be completed by December 2010.

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