

## Case Study

# STREAMS® Smart Motorways

One of the key challenges facing road agencies today is maximising road network efficiency while reducing impacts on the community. Increasingly, road agencies are turning to more sustainable solutions to manage growing traffic congestion as an alternative to traditional road infrastructure expansion.

Transmax's investment in the evolution of Intelligent Transport Systems (ITS) software and services has resulted in a world-class, integrated solution designed to optimise the entire road network. Transmax supports road agencies and traffic management operators to deliver community, economic, and social benefits to more than 10 million people using Australian roads by providing innovative ITS solutions through its award-winning ITS platform, STREAMS.

# STREAMS

## Smart Motorways ahead of its time



Road authorities around Australia have been using Transmax's smart motorways technology since the late 1980s. It all started with a traffic management system being installed in Brisbane, Queensland with features including ramp metering, graphical displays of traffic conditions, and automatic incident detection.

In 2007, South Australia's road authority engaged Transmax to develop and implement a system to manage three motorways and replace existing systems. One of the motorways was a fully reversible road which was changed between fully inbound and fully outbound twice per day.

In 2008, the Victorian state road authority, VicRoads, engaged Transmax to develop and implement an ITS that included ALINEA/HERO algorithms developed by the Technical University of Crete. This was successfully delivered in just eight months with a subsequent contract awarded to expand the system to cover the 80 on-ramps on the Monash Freeway.

In the same year, Transmax developed extended Lane Use Management System (LUMS) functionality. This functionality was adopted in the Queensland Motorways Gateway Upgrade project, and by VicRoads where it is used to manage responses to traffic events on the Monash and West Gate freeways.

Since the initial implementation at VicRoads, Transmax has continued to collaborate with road authorities across Australia and internationally to deliver new innovations in motorway management. This has seen the introduction of freeway to freeway ramp metering, queue detection and protection, dynamic variable speed limits, and motorway off-ramp management.

In 2022, STREAMS Smart Motorways was trialled by the Colorado Department of Transportation (CDOT) as part of a managed motorways Smart 25 pilot project along I-25 in the Denver metro area. CDOT worked with Transmax, WSP and Department of Transport and Planning to undertake this project. The aim of the trial was to demonstrate the effectiveness of managed motorways, specifically the coordinated ramp metering approach, to control traffic flows within the corridor to reduce congestion, improve safety, and increase the overall efficiency of freeway traffic flows.

The trial was a success and positive outcomes included a reduction in travel times, increased traffic flow, and improved safety.

A teal square graphic with the word "Scenario" written vertically on the left and a large white number "1" on the right.

Scenario  
1

# Outcomes for customers using STREAMS Smart Motorways

Like most Australian cities, the city of Melbourne had been battling the growth in traffic congestion as increasing numbers of vehicles choked the main arterial roads in peak travel periods. People driving on Melbourne's most travelled freeway were experiencing major congestion and substantial delays.



## Solution

In a bid to regulate the flow of vehicles onto motorways in peak times and maintain high vehicle throughput rates to reduce travel times for peak hour commuters, VicRoads investigated the potential benefits to be gained from the deployment of motorway on-ramp metering.

VicRoads commissioned Transmax to implement a coordinated ramp metering trial system on a 15 kilometre section of Melbourne's most congested freeway, the Monash Freeway (M1). The STREAMS ITS solution deployed intelligent on-ramp metering to manage the upstream demand to not exceed freeway capacity.

## Outcomes

The system exceeded expectations by reducing delays, improving reliability and increasing traffic throughput. Before and after studies demonstrate sustainable peak-hour flow increases exceeding 50%.

# Other benefits

## MOBILITY

- » M80: travel time reduced by 42% (peak periods)
- » CityLink tunnel: travel time reduced by 48%

## SAFETY

- » M80: Accidents reduced by 30%
- » CityLink tunnel: Accidents reduced by 60%

## ECONOMIC

- » Benefits estimated at \$2 million per day
- » Reduced fuel consumption and costs

## ENVIRONMENTAL

- » Greenhouse gas emissions reduced by 11%
- » Daily fuel savings estimated at 16,500 litres of petrol

## SOCIAL

- » Community satisfaction through perceived improvement, financial savings, increased comfort, and improved availability and quality of information on road networks

The STREAMS Smart Motorways solution in use today in Victoria includes intelligent motorway on-ramp metering, automatic incident detection, dynamic variable speed limits, and lane use management. Individual road users and the broader community continue to benefit from the management of Melbourne's motorway network through STREAMS Smart Motorways, including more reliable travel times and safer traffic flows. Since the introduction of STREAMS Smart Motorways technology, there has been on average a 31% reduction in crashes on Victoria's M1.





# Outcomes for customers using STREAMS Smart Motorways

In Queensland, southbound traffic on the Bruce Highway between the Gateway Motorway and Caboolture was highly congested during weekday morning peak periods.



## Solution

As part of the Bruce Highway managed motorway project, ramp metering signals were installed on five on-ramps. The ramps were configured to implement the ALINEA/HERO ramp metering algorithm, developed by the Technical University of Crete.

## Outcomes

A study by the ARRB Group analysed the performance of the ramp metering solution by calculating the cost of congestion as expressed in average daily vehicle-kilometers travelled (VKT). The study found that the daily congestion cost was reduced by 26% on a typical weekday. A bulk of these cost savings originated from reduced excessive delay cost, which experienced a 39% reduction. In addition, the travel time reliability cost dropped by 7%.

Additionally, the study noted that, when normalising by VKT to control for the effects of natural traffic growth over time, more significant cost savings were identified, especially during morning peak when ramp metering was active. Reductions per 1,000 VKT were total congestion (30%), excessive delay (42%) and reliability costs (12%) during morning peak.

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Read more about STREAMS Smart Motorways or contact us for more information.




# STREAMS Smart Motorways capabilities

STREAMS Smart Motorways has a range of features that support the delivery of a complete traffic management system for road authorities nationally and internationally.

<b>COORDINATED RAMP METERING</b>	to regulate the rate at which traffic enters a motorway
<b>RAMP CLOSURE</b>	in the event of a major incident
<b>OFF RAMP MANAGEMENT</b>	to monitor queues at off-ramps for potential spill over onto the mainline and where required, intervene at off-ramp intersection to flush queue
<b>MOTORWAY SPEED MANAGEMENT</b>	including variable speed limit signs advising motorists when speeds have been changed
<b>LANE CONTROL</b>	to dynamically open and close lanes in response to current traffic conditions
<b>WEATHER RESPONSE</b>	appropriate speed advisory messages on variable message signs when environmental monitoring detects a change in weather conditions
<b>QUEUE DETECTION</b>	automatically detects and monitors traffic queues on motorways
<b>QUEUE PROTECTION</b>	algorithm makes speed recommendations using variable speed limit signs
<b>INTEGRATION</b>	with CCTV
<b>AUTOMATIC TRAVEL TIME ADVISORY</b>	uses vehicle detector or bluetooth data to calculate motorway travel time and shows it on signs along and around the motorways
<b>INCIDENT MANAGEMENT</b>	Smart Motorways' rules-based engine dynamically manages speed limits, lane closures, variable message signs, and ramp metering signs in the event of motorway incidents, planned events, and inclement weather conditions



## Contact Us

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## About Transmax

Transmax is the solutions provider of the international award-winning ITS platform STREAMS. We exist to improve people's lives by providing industry-leading transport solutions and help move millions of commuters around Australian road networks every day.

We place our customers at the centre of everything we do and work collaboratively to ensure our ITS solutions meet their needs. Transmax offers customers systems engineering,

software design and development, along with a range of consulting and support services throughout the entire ITS lifecycle, all delivered with customer service excellence.

With 50 years of experience developing, implementing and managing ITS for road authorities right across Australia, we support our customers to realise the community benefits of optimising transport networks by providing smarter, more sustainable ITS solutions.



