STREAMS®
smart
motorways

TRANSMAX

Case Study

STREAMS® Smart Motorways

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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 and in the CityLink tunnel.

Since the initial implementation at VicRoads, Transmax has continued to collaborate with road authorities across Australia in delivering 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 2015, the Colorado Department of Transportation (CDOT) in the USA undertook a feasibility study for the use of STREAMS Smart Motorways. CDOT, supported by Transmax, VicRoads and WSP, will be undertaking a pilot study of STREAMS Smart Motorways on I-25 northbound between RidgeGate Parkway and University Boulevard in Colorado in 2020.

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Scenario 1

Outcomes for customers using 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 Smart Motorways, including more reliable travel times and safer traffic flows. Since the introduction of smart motorways technology, there has been on average a 31% reduction in crashes on Victoria's M1.

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Scenario 2

Outcomes for customers using 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.

Read more about STREAMS Smart Motorways at **www.transmax.com/smartmotorways** or contact us for more information.

STREAMS Smart Motorways capabilites

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

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

TRANSMAX

A full-service ITS solutions provider

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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.

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