Smooth operator

Washington State DOT's **Morgan Balogh** tells **Nick Bradley** why there's something for everyone – and all pockets – in Advanced Traffic Management schemes, as deployed in the Seattle area

Images courtesy of Washington State DOT

Anyone who's been to Birmingham in England and Seattle in Washington will know that the two cities share little in common. Traffic congestion, though, is one binding agent and is what prompted the US Federal Highway Administration (FHWA) to fund several executives from a number of DOTs to fly to the UK's M42 and other European countries to see Advanced Traffic Management (ATM) in action. Although Washington State DOT's (WSDOT) Morgan Balogh was not one of those few lucky jet-setters, the fruits of that 2006 fact-finding mission have nevertheless put a smile on his face.

Smartly does it

To much fanfare, WSDOT launched its own twist on ATM, Smarter Highways, on I-5 in August 2010, and continues to roll it out on other busy freeways in the state, including I-90 and SR 520, the three of which are key routes into Downtown Seattle. "What we saw in Frankfurt, Copenhagen and Birmingham were strategies such as hard shoulder running, variable speed limits, lane control and ramp metering all rolled into one package to create smoother, safer and more efficient traffic flow during peak periods," reveals Balogh, a traffic engineer with WSDOT's regional operations. "We've had ramp metering here for 30 years, but we wanted to learn about some of the other techniques to see what we could adapt to our own specific needs."

Active traffic management tools have proved effective at reducing collisions and improving traffic flow in Europe, including the Highways Agency's Managed Motorways project in the UK

ATM is a fledgling concept in the USA, so new that standards are still yet to be finalized by the FHWA. Minneapolis was the first US city to adopt some of the components of ATM, although as Balogh reveals, even the system in Minnesota differs to the one in Seattle to some extent. "We don't have hard shoulder running yet, like the M42, although this would definitely have some added benefit when funding allows us to do more," he explains. "What we do have, though, is lane control and variable speed limits (VSL). We're warning motorists of incidents upstream that could have an impact on safety – stalled cars, an accident, or even just heavy traffic.

"The transition speeds smooth traffic and give road users time to switch lanes in a safe manner," Balogh continues. "To add to the complexity, though, we have a mixture of general purpose lanes and 2+ and 3+ HOV lanes for buses and car-pools, so in effect we've got

different speed limits in different lanes at any one time. They need to work in tandem because you don't want a situation where you've got traffic at near-standstill in the general purpose lanes while HOVs move at 60mph. Something else that separates us from schemes in Europe is that we carry the speed limit right the way through a congested area, whereas other systems we've witnessed slow you down from 60 to 50 and then to 40mph before switching off completely. Carrying the speed limit through gives us more variability and we get to provide more adjustment right through the busy area. Setting one speed for all our lanes simply wouldn't work for us."

First steps

I-5 was WSDOT's first foray into ATM, although the concept has since been extended to the SR 520 and I-90 bridges – all in all about 41 miles of freeways. As with many cash-strapped states, increasing capacity by adding more lanes wasn't on the cards. "To add lanes would have cost billions and likely required the construction of new bridges and tunnels, which probably won't happen in my lifetime."

ATM doesn't exactly come cheap either, though, and in Seattle required upward of 300 new gantries and five times the number of signs than you might find on a traditional freeway, in addition to all the necessary sensors, communications and software. Balogh describes the financing model of ATM on I-5 as an "interesting concept" as it was deemed a congestion mitigation tool to ease some of the traffic pressures resulting from improvements to the I-5 tunnel under Downtown Seattle, so funds came from the tunnel project coffers. Thereafter, a federal grant helped to pay for the work on I-90 and SR 520, a sure sign that the FHWA will loosen the purse strings for strategies that it feels deliver a return on investment.

Nearly a year after going live on I-5, concrete data about the effectiveness of ATM in improving safety and relieving congestion is still being generated, although Balogh and his colleagues in operations believe, anectdotally, they have seen a difference. "The most important thing is that the users are heeding the information on the signs and are acting accordingly. When we post an alert that a lane will be closed a mile or so ahead due to an accident, they're following the guidance. That gives us much better control around collisions. Previously, you'd just get a wall of traffic build up with cars getting to the scene of the crash then trying to change lanes, which created knock-on situations, whereas now they have the time and distance to sort themselves out. People are definitely driving more cautiously, mainly because I think we're not only telling them to act, but why they need to act. Hopefully by October/November, we'll have some firm data on accident statistics, which is something that the local media are very interested in. Visually, though, we're seeing much fewer conflicts."

The new signs post variable speed limits that will warn drivers of backups ahead and smooth out traffic as it approaches a lane-block incident

Balogh feels that one of the sub-contractors that supplied the signage and gantries deserves a special mention. "As a result of the work that was already ongoing on the tunnel, we needed to deploy ATM quickly," he reveals. "We put together a design-bid-build project due to the time that it takes to manufacture gantries and did a design-build project for the signs and communications. We created a prototype and discussed with Telegra some of the changes that we felt needed to be made – fabrication aspects such as temperature, how we control the sign, waterproofing, etc. They worked with us really well to develop a sign that does the job."

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Up to the standards

There has been much interest from other US states since Smarter Highways went live. "We've been to Fairfax in Virginia and they're keen to deploy it near the Washington DC area, and we've also been to New York to see how they can make use of it," says Balogh. "We've also had interest from Portland in Oregon, California and Florida – there's a lot of folks out there intent on pursuing components from the scheme.

"ATM is something that the FHWA is promoting, but one of the problems we found was that because we were at the leading edge, we didn't have any standards to guide us, so we worked closely with FHWA to come up with standards the best we could. In effect, we were setting the groundwork for all future deployments to follow. Standards are really important because you need that consistency across the states – you don't want each deployment to be different and states coming up with their own symbols, etc."

For the most part, Balogh is happy to report that the Smarter Highways project went smoothly from beginning to end, although he does admit to being filled with both excitement and trepditation when the system was switched on for the first time. "Whenever you do anything on the freeways, it's just ridiculously expensive, so you don't often get to do things like this," he says. "Our TMC operators were brought in right from the outset and their feedback went into the final product, so we knew we had built something they were confident could be used well on the roadway. It's also difficult to test a system like this because you might be posting information on the roadway that road users will follow. We therefore developed a series of coded messages that were meaningless to motorists but proved to us that everything was working.

"And there's always issues with software, right?" Balogh says while laughing. "At first, our speed jumped around a little too much for our liking, so we had to adjust our smoothing algorithms – it was just a question of finding the right balance. We're getting data every 20 seconds to post a message every minute, so when your system is that responsive you're always open to anomalies and too much variability is one of the side-effects. What's really neat is that because it's so responsive, we're getting data about an incident before it's been called via 911 into state patrol or we even know about it in the TMC. At the same time, though, you might get data about something that doesn't require any action at all, such as a slow truck. Such issues were all part of establishing that balance."

Scalable to your problem

Adamant that ATM was right for Seattle, Balogh is looking forward to adding other components in the future, including hard shoulder running, which might get its first airing in the city of Everett, north of Seattle. That said, the traffic engineer realizes that the "whole hog" as deployed on Birmingham's M42 might not be right for everyone, although it does impress him greatly. "There's a lot of opportunities and ways of deploying the numerous components of ATM, so other states considering it need to look at how these new approaches [for the USA] can help to solve their problems," he concludes. "If you don't have funding to do lane control and put up the gantries, you can still look at junction control, for instance. The beauty is that you can scale it to your problem. And with ATM, you'll find some excellent approaches to getting you out of a hole." ○