

# Wolverhampton lights up offence for drivers

*A novel bus lane deterrent system, part of a pilot being run by Centro, has gone live in Wolverhampton. A successful pilot here could be rolled out across the West Midlands.*



**A** new bus lane deterrent scheme has just gone live in Wolverhampton. It is part of a pilot which is being run by Centro, the West Midlands Transport Initiative. Centro, which is responsible for providing and developing public transport in the West Midlands metropolitan area, was looking for some ideas for bus demonstration projects and in particular innovative schemes to control the use of bus lanes.

Wolverhampton, as a very busy urban city, has many bus lanes. Virtually all arterial routes, except those constrained by the geometry of the site, have bus lanes and, in common with other areas, the level of misuse is

high. So for John Charles, team leader at Wolverhampton's UTC, this was a very welcome opportunity to put some new ideas into practice.

Three locations were selected which were known to have problems. These were surveyed to get an idea of the number and type of contraventions which, says John, gave them an ideal benchmark against which to develop their plans. Funding for the project has come from Centro.

The decision to go ahead was taken some 18 months ago but, says John, they didn't rush into the scheme. The difficulty that they faced was that the system that was envisaged involved a number of contractors and quite a lot of development work and it wasn't

until an agreement with Peek for traffic signals installation and maintenance partnership was in place that John says they were in a position to push ahead.

Peek took over the scheme as the nominated contractor and acted as the systems integrator. The final touches to the bus lane systems were being applied during March and it was expected that all three would be live and running from the beginning of April.

The important thing to note about the Wolverhampton system is that it is a deterrent system not an enforcement one. The purpose is to discourage people from entering bus lanes and to this end, says John Charles, they have chosen shock tactics. 'We

**Wolverhampton have chosen shock tactics. They want drivers to know that their number has been taken.**



**Above: As much processing as possible is done at the roadside. Right: a clear run of about 60metres is necessary to ensure that the driver will see the message.**



want drivers to know that we have taken their number plate and that we know who they are. We want them to think, "I shouldn't have done that".

But whilst the key priority was bus lane misuse, the scheme is also directed at a specific safety issue. John Charles explains that cars pulling over into the inside lane at the approach to a junction and at the point at which the bus lane ends, have been involved in accidents with vehicles that are illegally using the bus lane. 'Our bus lanes all stop 20 metres prior to the junction with arrows indicating that drivers can move into the nearside lane. They know that the bus lane has ended and because they don't expect to have a car coming up on their inside, they don't always check before they pull across.

'We believe that making sure that

there are no cars in the bus lane would help to reduce incidents like this.'

Public perception is very important in these matters. 'Given all the publicity that speed cameras have attracted recently, we didn't want this to be seen as another scheme to clobber the motorist. The fact that we are offering the added value of a road safety measure has helped to increase the acceptability of the scheme to the public.'

**The sites**

The three sites are:

- \* An inbound bus lane along Stafford Street
- \* A 4124 southbound near the junction with grove Street
- \* A 454 southbound near to the junction with Hurstbourne Crescent

These junctions were all known to experience significant numbers of bus lane violations but also had key characteristics that make this system possible, for instance a straight road for 60-70 metres, good visibility, well signed, and

towards the end of a bus lane to tackle the safety issue.

**The future**

The system (see System Overview) works at several levels. The hope, says John, is that when the driver sees his number flashed up on the VMS, he is going to think twice about doing it again. But, the data, which is sent to the central traffic control centre across a GPRS link, will also provide important intelligence.

'It will identify serial violators and we can pass their names to the police. And it will tell us about the pattern of violations, are they happening at a certain time of day. It means that we can inform the police on the best time periods to undertake enforcement of the bus lane. And we will get important information on driver behaviour and trends.'

The pilots will also be watched closely to make sure that they do not cause accidents. 'One of the things that we will be monitoring is how drivers react when they see their registra-

# Signs will flash up driver's reg no

Data Display has over many years provided high quality custom displays to a variety of markets, and is a recognised supplier of Highways Agency approved variable message signs (VMS). The company has implemented a number of parking guidance and traffic information systems throughout the UK and was selected by Wolverhampton Council as their approved supplier installing over 20 roadside VMS for their driver infor-

mation system over the past five years. When the bus deterrent system was being designed, Data Display were commissioned to provide three bespoke VMS, capable of meeting the HA's optical specification but also capable linking in with Pips Technology's ANPR and Peek's PRISM systems.

The VMS design - comprised of three lines of ten, 100mm characters optically designed to meet the HA's speci-

fication utilising high quality sunlight, viewable, light-emitting diode (LED) technology. The display once triggered by the system would then display the registration of the offending vehicle together with a message notifying the driver that an offence had been committed. The three VMS were designed and manufactured, which included system integration testing over a 12 week period.

## PRISM - a loop-based intelligent bus priority system

Peek Traffic's PRISM is a loop-based intelligent detection system. Using the proven Idris technology, developed by Diamond Consulting Services and distributed under licence by Peek, and industry standard Peek detectors the system requires no on-bus equipment. The PRISM equipment interfaces to the ANPR controller via volt-free contact closure outputs and is powered independently from the mains power supply. A contact closure output is provided to the controller each time a bus is detected.

Lack of standardisation in vehicles produces a unique opportunity for the idris technology. As each vehicle passes over the pair of loops in the bus lane, its inductance profile is

analysed in real time and compared against a library of unique vehicle definitions held in the non-volatile memory of the unit. The system may also be taught to recognise additional profiles in order to keep pace with ever changing design of public transport.

On-going field trials have shown that detection accuracies of >95% are achievable, with a false detection rate of <1% of the total traffic volume. Further enhancements, which include vehicle profiling from stationary vehicles and the elimination of errors caused by mini-type buses and/or hoppers, allow a detection rate of >99% to be achieved even in stop-start traffic.

### SYSTEM OVERVIEW

The key elements of the Wolverhampton system are:

1. The PRISM loop profile recognition system with two loops
2. The IR camera for plate image capture and colour camera for overview
3. The automatic licence plate reader (ANPR) Reader (supplied by Pips Technology)
4. The automatic licence plate reader (ANPR) Processor
5. The Variable Message Sign (supplied by Data Display)
6. The Control Office Offence Viewing and Decision System (OVDS)

When a vehicle enters the bus lane it passes over the inductive loops connected to the PRISM Detector. The inductive profile of the vehicle passing over the loop is analysed by PRISM. If the profile is recognised as a bus, from the library of stored profiles, then no further action is taken.

If the profile is unrecognised, then the PRISM unit produces a trigger to the ANPR system. The ANPR reader searches for a number plate passing through the field of view. Once identified, the number plate is compared to a white list of permitted vehicles eg taxis, emergency vehicles etc. If the number plate is permitted no further action will be taken.

If, however, the vehicle is not recognised by PRISM, and is not registered on the white list held in the

ANPR processor is not permitted a signal is sent to the VMS. The VMS will then display the number plate of the offending vehicle.

The system will also produce and store an Offence Record (OR), consisting of:

- Time /date /location
- Vehicle Registration Number (VRN)
- Confidence level of read
- Jpeg Image from IR camera
- Jpeg Image from colour camera

This OR will be sent periodically over a GPRS network to the OVDS at the Wolverhampton TCC, for viewing and any further action.

It is not intended at present that evidence from this system could be used as sole evidence in a prosecution.

### Offencing Viewing Data System (OVD)

This will be a PC in the Wolverhampton City Council Traffic Control Centre. The outstation is linked to the OVDS communications centre across the GPRS network.

The OVDS has the following functions:

1. Remote Monitoring and configuring of the Outstation equipment.
2. Downloading and storing offence records (OR) from the Outstation.
3. Selection and viewing of specific ORs This would include the text and image data.

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tion number on the VMS. For instance, if they over-react and pull sharply out of the bus lane, that could be the cause of accidents.'

The scheme is currently deterrent only - does John Charles expect it to become an enforcement scheme when the Traffic Management Bill passes through Parliament? He points out that the absence of a legal base was not the only reason for going for a deterrent scheme. 'The system was only designed as an initial attempt at using this technology as a deterrent. The system is unique and it does not have Home Office approval to be used as an enforcement scheme. It may be that Peek decide to apply for that approval but that is a commercial decision that they have to make.'

He emphasises that this has been a development project and as such has involved both a major investment in terms of money, but also in time and development work from the contractors. 'It has cost about £150-£160,000 (€220-235,000) to put the system in at three junctions but a large part of that investment has been made in the systems integration side and in the computer software. Clearly, now that work has been done, many more systems could run off the same control computer. If Wolverhampton were to decide they want to roll out this project to other bus lanes, then the cost of additional systems would be much less.'

Whether the scheme does indeed roll out locally and to the wider West Midlands will depend on the results that emerge from the pilot sites.



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4. Search capability by vehicle registration number (VRN). All ORs for that VRN for a selected time period could be displayed.
5. Any individual OR can be printed for further action.
6. Statistical report production (eg number of offenders/day, hours analysis etc).
7. uploading and download of white list to the outstations.

**Communications**

Each outstation will be equipped with a GPRS modem and antenna. An 'always open' connection, with the GPRS provider dynamically assigning the outstation an IP address. It is normally only possible for the outstation to initiate the connection. Each offence record will be approximately 50kb.

The outstation will transmit each offence record as it occurs, and thus minimising the requirements for local storage.

## Roadside recognition can cut costs

Pips Technology supplied the ANPR system for the new Wolverhampton bus lane deterrent scheme. According to Mike Dickinson, UK sales manager, the concept developed by Wolverhampton threw up a number of challenges for the technology suppliers involved. Actually capturing number plate data was not one of them - that, after all, is what Pips does. The unique thing, says Mike, was linking the ANPR system to the VMS. 'Once the number plate data has been captured it has to be sent to the VMS and displayed in time for the driver to see it. In a 30 mph zone you need a clear run of about 60 metres and the whole process has to take place in less than a second.'

Traditionally, says Mike, the video images from the camera are sent to a central processor where the recognition takes place. In this

system, however, the recognition takes place at the road side. 'The problem that you have with the traditional set up is the amount of data that is being moved around. This is normally using fibre optic cables, which are expensive to install and which can have high transmission costs. The approach that we are increasingly taking is to try to do the recognition as close as possible to camera and that means that instead of sending all the video signals back to the central processor, only those vehicle numbers details which are needed are sent back.'

So, in Wolverhampton, the ANPR camera takes the images, the processor carries out the recognition and checks the vehicle registration number against the white list, and if it doesn't find the number there assumes that the vehicles should not be in the bus-

lane. Simultaneously the Prism unit checks the loop detector to check if the vehicle is a bus of permitted type. If not a signal is sent to the VMS which then flashes up the message and it is only at that point that a message and image of the offending vehicle is sent by wireless link to the city's central control centre for their records, minimising the amount of data that has to be transmitted.

Mike Dickinson says that Pips have been aware of a growing interest in reducing the amounts of data which have to be transmitted to save costs and this was what prompted the development of Spike, a new product which combines an ANPR camera, overview camera, IR illuminator and ANPR processor in a compact single housing and which was launched in February 2004.