

**Executive**

**15 Jan 2008**

Report of the Director of City Strategy

## **Intelligent Transport Systems (ITS) Strategy**

### **Summary**

- 1 This report advises Members of the current position of the Council's ITS Strategy, which utilises the Urban Traffic Management and Control (UTMC) and Bus Location and Information Sub-System (BLISS) and the steps being taken to expand the system and improve reliability.

### **Background**

- 2 One of the core elements of the council's transport strategy adopted within its Local Transport Plan 2 is Innovation & Creativity. This incorporates the use of technology to manage traffic as well as providing quality information to the traveling public in a wide variety of formats. This is viewed as a major contributory factor to achieving higher public transport usage and further reducing reliance on private car travel. The need to increase access to public transport is also recognised by the Council at corporate level – "Increase the use of public and other environmentally friendly modes of transport" is one the Council's ten priorities.
- 3 Intelligent transport systems (ITS) have an important role to play in the effective management of the flow of traffic on the city's highways. The Traffic Management Act 2004 introduced a duty upon local traffic authorities to manage their networks to secure the expeditious movement of all traffic, and the continued use of such systems is recognised as assisting in fulfilling this duty.
- 4 City of York Council currently operates an Intelligent Transport System that consists of the Urban Traffic Management and Control (UTMC) and Bus Location and Information Sub System (BLISS), and which provides on-street real-time travel information to the public in areas such as bus arrival predictions, car park occupancy and network conditions. UTMC and BLISS also form the major part of the proposed development of ITS in the City. This report sets out the

current functions being performed by the UTMC and BLISS systems, current issues with them (and solutions), and proposes an ITS vision for their future development.

### **ITS in the wider context**

- 5 The Intelligent Transport Systems Strategy has a central role to play in the development of transport in the city and will be vital in meeting LTP aims of promoting public transport and cutting car use. Delivering real-time, accurate information to users of the transport system will increase in importance as a tool to reduce reliance on car travel, and the development of ITS is the tool by which this will happen.
- 6 Increasing levels of technology are available to the general public, and consequently there is an increasing expectation among the public that live, relevant and highly graphical information will be available to them in all aspects of life. Travel and transport must be a part of this. As transport authority City of York Council must be in a position to use such technologies to best serve the traveling public.
- 7 The development of ITS should therefore, be seen as a key element of York's overall strategy for improving access to transport and reducing transport's environmental footprint in the City. In summary, ITS aims to;  
  
*"Provide Travellers with the right information at the right time in the right format"*
- 8 To deliver this, the UTMC and BLISS elements of York's ITS will be developed in three main areas;
  - Increased use of high quality interactive displays on street and in public spaces;
  - Delivery of accurate real time information onto mobile devices and into people's cars and homes;
  - Provision of 'near future' predictions, using advanced data analysis techniques to offer improved predictions of public transport and highway operation and conditions.

### **Existing Systems**

- 9 **UTMC** Consists of a central computer system connected to a range of on-street equipment. The main public facing services provided by UTMC are:

- **Car Park Guidance Variable Message Signs** - uses the message signs located in the City Centre;
- **Car Park Counting** – counting equipment located in the City centre and Park and Ride site car parks that records the numbers of vehicles entering and leaving;
- **Driver Information Variable Message Signs** - uses the message signs on the outer ring road;
- **Dynamic web pages** - gives real-time travel information via the CYC website;

10 **BLISS** is the system that tracks buses running in the City. It provides bus location information, makes predictions about arrival times at stops and allows buses to get priority at traffic signal junctions. It consists of a satellite tracking and radio system installed on each bus monitored by BLISS, a central computing system, on-street displays and equipment in traffic lights. BLISS is also linked to other regional systems and by this means is able to deliver real-time information on mobile phones and via the Internet for any bus service in Yorkshire. The main elements of BLISS are;

- **Automatic Vehicle Location (AVL)** - the system that uses radio and satellite positioning to track the locations of buses;
- **Public Information Panels (PIPs)** – provide basic bus time predictions at bus stops around the City;
- **Traffic Light Priority (TLP)** – equipment located at traffic signal junctions that gives buses priority;
- **Information Kiosks** (also called the Cityspace Smart Columns) - located around the City giving real-time bus and web-based travel information and news on street;
- **Smart Screens** - located at the Park and Ride sites, providing high quality real time bus information.
- **BusNet** – The ‘back office’ system that allows Council officers and the bus operators to monitor bus location and performance.

### **Current System Use**

11 The uses of the ITS centre around providing real-time information to travellers, providing buses with priority at traffic signal junctions and allowing officers to better manage the network. In brief, the follow uses are made of the system on a daily basis;

- *Car Park Guidance Signs* – Allows driver to make informed choices when parking in the City, and so reduces needless journeys and avoids additional congestion. The system uses a network of 26 variable message signs (VMS) around the city centre (see Annex B for their locations), which are linked to counters in 12 car parks. The system, which updates every 10 minutes, gives information on car park occupancy to drivers between the hours of 1am and midnight, 7 days a week. Shortly after the launch of the system in March 2004 public perception surveys indicated a high level of appreciation and use of the system both by locals and visitors, with 70% of those questioned considering the Car Park Guidance System as either ‘important’ or ‘very important’ when parking in the City . (See Annex A). In May 2006 the system was expanded to use existing Outer Ring Road VMS (see below) to provide car park information to users of the Askham Bar and Grimston Bar Park and Ride sites).
- *Car Park Counting* – Loop based traffic counting equipment located in 13 City Centre Car Parks, (Marygate, Bootham Row, Union Terrace car and coach parks, Monkgate, Jewbury, Haymarket, Shambles, Castle, St Georges Field, Piccadilly, Nunnery Lanes and Esplanade), and 3 Park and Ride sites (Askham Bar, Grimston Bar and Rawcliffe Bar). This equipment counts vehicles entering and leaving the car parks and provides the data displayed on the Car Park Guidance VMS and website.
- *Driver Information Signs* – 19 “Freetext” matrix VMS are located at strategic points around the A1237 Outer Ring Road and main approach routes into the City (see Annex C for their locations). These, as well as being used for car park information at the Park and Ride sites, are used to inform drivers of significant incidents and events affecting the road network. Between January and October 2007, the signs were used for advanced warning of all race meetings, and major events such as the Northern Motor-home Show and the York Festival of Food and Drink. They were also used on over 20 occasions to provide advanced warning of major roadworks and incidents. At other times the VMS are also used to support current road safety themes through the use of Think! Messages covering such issues as drink driving, mobile phone use and the wearing of seat belts. When not in use for any of the above, the signs are left blank.
- *Yorktraffic Website* – Information from the ITS is presented to the public via the Yorktraffic.info website. This site gives live, up to the minute information on car park occupancy, roadworks and incidents current network problems and messages on the VMS. Work is currently underway to redevelop this website using a more user-friendly and interactive mapping style. Initially this redeveloped site will also give information on car park occupancy, roadworks and incidents current network problems and messages on the VMS but

this will be expanded to include live congestion information for the Outer Ring Road and approaches to the City and images from the CCTV system.

- *Automatic Vehicle Location (AVL)* – This is the core of the BLISS public transport real-time information system. AVL operates by each of the buses being fitted with a GPS satellite tracking system and a digital radio. This allows them to broadcast their exact location every 30 seconds to a computer (known as the ‘in-station’) at St Leonard’s Place, and from this the BLISS system is able to carry out its other functions described below. The fitting of AVL equipment to vehicles is central to the operation of BLISS. Only fitted vehicles, or vehicles whose AVL is working correctly can be tracked by the system. Currently in York the following vehicles are fitted with AVL;
  - 70% of First York’s fleet (including all the FTR and Park and Ride vehicles) –This allows BLISS to operate on routes 2,3,4,7,8,9 and 10;
  - All the vehicles used by East Yorkshire Motor Services (EYMS) for the X46 / X47 services;
  - All the Arriva vehicles used between Selby, York and Wetherby (fitted as part of the South and West Yorkshire real-time information scheme);
  - All Coastliner vehicles (fitted as part of the South and West Yorkshire real-time information scheme).

During 2008 it is planned to complete the fitting of the remainder of the First York fleet, which will be assisted by the cascading of AVL equipment from the existing Park and Ride vehicles. Negotiations are also underway with EYMS to ensure the buses they use on their other services into the City are fitted. Technical differences between the York and neighbouring South and West Yorkshire systems mean that we are not yet able to display predictions for Arriva and Coastliner services operating through the City on the PIPs. It is expected a solution to this issue will be developed during 2008/09. On average in November 2007 90% of all First and EYMS journeys on routes operated by AVL fitted vehicles were being tracked by the system. This is up from 63% in January 2007– See Annex D for more details. When fitting of AVL to vehicles is completed it is intended to have all routes operated by First and EYMS tracked and at least 95% of all bus journeys monitored at any time.

- *Public Information Panels (PIPs)* – Located in bus shelters and part of the BLISS system, these displays give real-time information for bus arrival times at 30 bus stops around the City. In most cases, they give ‘countdown’ predictions of the actual arrival times for buses in minutes, or scheduled times where no real-time predictions can be made. In order for the system to work, buses must be fitted with the necessary equipment as described above.

Common reasons why the PIPs fail to make predictions about approaching buses include BLISS on-bus equipment not fitted or faulty; Incorrect data set up or driver log on; and incorrect timetable data available to the system.

- *Traffic Light Priority (TLP)* – TLP uses the same bus mounted technology as the PIPs, to give late running buses priority at traffic signals. Currently 27 traffic signal junctions throughout the City (out of a total of 61) have necessary equipment installed to allow them to receive broadcasts from buses and if appropriate, ensure the bus gets priority. As with the PIPs, this system relies on the buses having the correct equipment fitted and as more are, (as outlined above) so the benefits of TLP in keeping buses to schedule will be more widely seen. It is now the case that where appropriate, new traffic signal junctions are provided with TLP at the time of installation, and existing traffic signal junctions are fitted with it when they are refurbished. Funding is made available each year through the LTP to ensure a rolling programme of fitting major junctions on bus routes with TLP can continue. It is anticipated that all appropriate junctions in the City will be TLP fitted by 2012. It is also planned to start fitting TLP to the City's 48 Pelican and Toucan Crossings during 2008, starting with sites where a real improvement to public transport operation can be achieved.
- *Information Kiosks (Cityspace Columns)* – York now has 6 interactive smart kiosks, (3 in the City centre and 1 each at Acomb, the University and Rawcliffe Bar). These columns provide a range of interactive services including mapping, journey planning and access to news, events and weather as well as real-time bus arrival information. We receive monthly usage reports for the Cityspace Columns that show consistently high levels of usage and appreciation of this equipment. (Details of usage can be found in Annex E).
- *Smart Screens* – 3 new 'Smart Screens' have recently been installed at Park and Ride sites. Final software development work to allow them to draw live data from the BLISS system is currently underway. On completion during January 2008 they will display enhanced real-time information for park and ride users including next departure from the site, next arrival at the site and current journey time to the City Centre. Based on the performance of the first three installations, it is envisaged that Smart Screens will be installed at the remaining two Park and Ride Sites.
- *Bus Net* – Bus Net refers to the 'back office' systems that are part of BLISS. These systems allow officers in the Council, at the bus companies and at the Park and Ride sites to monitor bus location and adherence to schedule. Additionally, it allows bus company staff to produce reports detailing levels of performance of their fleets and services. For Council officers Bus Net is a extremely

useful tool both in identifying problems with bus service operation in real time and undertaking general highway network monitoring. This can assist officers in such activities as controlling traffic signal operation and dealing with periods of particularly heavy traffic in the City. Bus Net includes computer consoles that allows operators to see graphically current conditions of the bus service network and act appropriately.

## **General Operational Issues**

- 12 Some elements of the ITS such as Car Park Guidance and BLISS have now been running for around 5 years and continue to give good service. However as would be expected with such wide ranging and technically complex systems, maintenance issues do occur. In most cases these are resolved in house by CYC staff but for more serious problems maintenance agreements covering systems including Variable Message Signs, the Common Database, communications network and BLISS equipment are in place. This ensures that faults are dealt with quickly. In order to further improve our ability to quickly identify and resolve faults the Network Management Team is currently reorganising resources and this will increase interoperation between the Traffic Team and Traffic Signals and ITS functions and ensure that systems are watched more regularly and faults logged in an increasingly timely manner.

## **Bus Operation Issues**

- 13 The BLISS system continues to demonstrate increasing levels of reliability and is now consistently making accurate predictions to the on-street displays. At present around 90% of bus journeys on routes BLISS operates on are tracked (See Annex D). ACIS, the supplier of the BLISS system hardware undertakes monitoring of all the real time systems they operate in the UK. This monitoring shows York to be in the top 25% of UK real time systems in terms of percentage of possible journeys tracked. On-going monitoring of the system with both on-site and office validation is undertaken to ensure this continues to be the case. This monitoring highlights accurately where the outstanding issues are, and provides a clear means of resolving them. On this basis the core system as supplied by ACIS, which consists of the AVL and prediction system is viewed as working well and reliably. Other than the issue of ensuring all relevant buses are AVL fitted (as discussed above), the main outstanding issues lie with inaccuracies in timetable data supplied by the Operators, and maintenance issues with the on-bus equipment. Work is ongoing with the bus operators and WYPTE, as regional data processor to ensure systems are in place to deal with these issues. It is envisaged that by April 2008 improved procedures will ensure data is correctly compiled and validated (for all operators) and formal maintenance agreements

between CYC, ACIS (the system supplier) and the operators will be operating

### **VMS Messaging Protocol**

- 14 An important element in increasing usage of the system is the need to use the Driver Information VMS more regularly, and in a more consistent manner. To achieve this the Traffic Team are re-organising resources to increase the number of officers able to access the system and set messages on the signs. To allow this development to take place it is necessary to adopt a formal protocol describing the type of messages it is permitted to show on the VMS.
- 15 The VMS Messaging Protocol will also help to alleviate pressure to display messages that are not appropriate. As the VMS are very prominent, regular requests are made to officers for their use, and at the moment these are dealt with on an ad-hoc basis. Having an adopted Messaging Protocol will remove any ambiguity about what messages are permitted to be displayed on the signs.
- 16 Messages suitable for display on the VMS fall into four categories;
  - *Incident Notification* – Messages used to notify drivers of current, serious incidents on the highway network. This can include emergency road and lane closures, diversions and other events that have a material impact on the operation of the network, either in York or on the surrounding road network. Incident notification messages should only be displayed for the duration of the incident and cleared down once the situation has returned to normal. Care must be taken when writing messages that only place names that are recognisable to a wide audience are used and drivers from outside the York area are able to understand locations given. (“A19 SOUTH OF A64” is preferable to “A19 AT DEIGHTON” for instance).
  - *Events Affecting the Transport Network* – Pre-planned messages describing planned events such as roadworks, planned road closures and major events in the City. these messages can tell travellers about events that will be happening over the coming weeks and will require drivers to amend their routes or planned travel times. Only events that are likely to have a major affect on the transport network should be considered but not only highway events – major events affecting bus and train travel can also be suitable for display. For most events only VMS in the vicinity of the event should be used but for major events City wide coverage can be considered. Again, care must be taken when writing messages that only place names that are recognisable to a wide audience are used and drivers from outside the York area are able to understand locations given



- *Road Safety* – Road safety campaign messages can be displayed on the VMS. Generally these should link to and reinforce an ongoing local, regional or national campaign. Examples of campaign messages should use the ‘THINK’ branding (such as “THINK DON’T DRINK AND DRIVE”).
- *Car Park Guidance* – Standard messages used as part of the Car Park Guidance System. These are generally produced automatically by the UTM system and give drivers guidance to car park spaces on the approach to the City centre and Park and Ride sites. Where data is available these messages will include live car park space information, or else will be static, in form (“DESIGNER OUTLET PARK AND RIDE OPEN” for example). Car Park Guidance messages should not be written manually, and VMS displaying car parking messages should not be used for other purposes, other than in exceptional circumstances.

Beyond these categories all other types of message should not, under normal circumstances be displayed. The VMS are principally restricted to exception reporting of significant incidents and events that have a material effect on the City’s transport network. Increasingly requests are made to use the signs for other purposes that are not directly traffic related and which if accepted would result in increased use of the signs. This would be likely to reduce their impact when used for genuine incidents and events.

- 17 The VMS Messaging Protocol is currently being developed, and will build on the principles laid out above, adding the technical detail required for officers to use it as working guidance. This report seeks member adoption of the principles above as Council policy relating to the use of the Variable Message Signs.

## Options

### Development of ITS Over the Coming Years – The ITS Vision

- 18 A major element of the development of ITS over the coming years will be consolidation. As outlined in this report the City now has a number of systems capable of giving the traveling public accurate real time information and we will continue to expand and develop these, both to increase their scope and further improve reliability. However, as stated in para 8 above there will also be three core areas of major new development or expansion of the UTM and BLISS elements of ITS over the 5 years;
- *Increased use of high quality interactive displays on street and in public spaces;* This will involve the provision of additional ‘Cityspace’ kiosks. The intention is that each bus interchange point in the City centre, and the busiest stops outside the City centre has at least one Kiosk. Kiosks (or similar) could in the future also

be installed at prominent locations in the foot-streets, district shopping centres and villages. We will also begin to roll-out high quality colour screens at other bus stops around the City, as a replacement for the single colour LED equipment currently used.

- *Delivery of accurate real time information onto mobile devices and into people's cars and homes;* Development work is currently underway to allow real time information about travel in the City to be presented to mobile phones and other personal mobiles devices. This will build towards the aim of providing travellers with accurate information where and when they need it. It is anticipated that a preliminary roll-out of this technology will be made during early 2008. Further expansion of this technology will allow information to be provided in people's homes, using affordable, dedicated hardware and ultimately (as the technology develops) into vehicles. The UTMC and BLISS systems that have been developed to date will form the basis of this expansion in information delivery methods.
- *Provision of 'near future' predictions, using advanced data analysis techniques to offer improved predictions of public transport and highway operation and conditions;* Also building on the current development of the UTMC and BLISS systems, we are now looking at ways of offering an improved level of real time information to the public. This will involve developing UTMC's ability to analyse data from a number of sources and offer transport users detailed information and guidance based on current events. The development of such services, building on the systems currently in place is being driven by York's involvement in 'FREEFLOW' a national research project lead by a consortium of universities and industrial partners that will develop new techniques of managing and analysing large amounts of real time data. York will benefit from this in gaining access to the new technologies it delivers to use as part of the new developments outlined above.

## **Analysis**

- 19 As highlighted above, the further development of York's Intelligent Transport Systems is embedded within the LTP and Members have approved a package of measures under the capital programme for 07/08. These systems demonstrate York's continuing commitment to providing it's customers with high quality travel information and raising public awareness The development of the ITS over the coming years in line with the Strategy outlined above is considered crucial to this.

## Corporate Priorities

- 20 The further development of the real time systems is in accordance with the Council's Corporate Strategy, Objective: "To increase the use of public and other environmentally modes of transport". In addition corporate Aim 1.3: "Make getting around York easier, more reliable and less damaging to the environment" is also relevant.

## Implications

- 21 **Financial** - The development of the UTMC and BLISS systems is included as an aim of the LTP, and funded from the LTP Capital Programme. An indicative budget of approximately £1m was allocated to these systems over the 5 year period from 2006/07. £411k was spent in 2006/07 and £180k is allocated in 2007/08. Owing to reducing LTP budgets the allocations available for UTMC and BLISS will need to be prioritised against other integrated transport schemes. The details of the funding provision for ITS is dealt with as part of the yearly LTP Capital report considered by the City Strategy EMAP.
- 22 **Human Resources (HR)** - Actions will be resourced from within the existing structure.
- 23 **Equalities** – There are no equality implications.
- 24 **Legal** – There are no legal implications.
- 25 **Crime and Disorder** – There are no crime and disorder implications.
- 26 **Information Technology (IT)** - where necessary, the development of the UTMC and BLISS systems has been undertaken in co-operation with officers from the Resources Group, ITT Section. This will continue in the future. Currently where possible, hardware and communications elements of the ITS is integrated with the appropriate corporate Council systems, to maximise systems efficiencies and such synergies will continue to be sought and exploited in the future.
- 27 **Property** – There are no property implications.

## Risk Management

- 28 Measured in terms of impact and likelihood, the risk score has been assessed at less than 16. This means that at this point the risks need only to be monitored, as they do not provide a real threat to the achievement of the objectives of this report.

## Recommendations

It is recommended that:

1. Members note the developments being made to expand the ITS systems in the City and continue to improve reliability.
2. Members approve the adoption of the VMS messaging principles as outlined in para 17 above, which will be incorporated into the forthcoming VMS Messaging Protocol, to ensure consistent use of the Variable Message Signs.
3. Members approve the three elements of the ITS Vision as the basis for the development of York's Intelligent Transport Systems.
4. A further review report is presented in 12 months.

Reason:

To ensure the continued development of the ITS and continue to increase it's contribution to the delivery of the Council's LTP objectives.

### Contact Details

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**Report Approved**

**Date** *Insert Date*

### Specialist Implications Officer(s)

*None.*

**Wards Affected:** *List wards or tick box to indicate all*

**All**

**For further information please contact the author of the report**

### Background Papers:

*City of York Council - Local Transport Plan 2*

### Annexes

**Annex A – Awareness and Reaction to the VMS Signs**

**Annex B – Inner Ring Road Car Park Guidance Signs – Locations**

**Annex C - Outer Ring Road Driver Information Signs – Locations**

**Annex D – BLISS – Percentage of Bus Journeys Tracked**

## **Annex E – Cityspace Smart Column Public Usage Data**