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EXECUTIVE SUMMARY

This feasibility study has been commissioned by Southampton City Council (SCC) to explore the opportunities to improve the toll collection system for the Itchen Bridge with the aims of making cost savings whilst maintaining or improving the current throughput of vehicles at the toll plaza.

The current method of collection is a token and cash based system, the tokens being used to provide a concession to local residents and business. The ability to continue to offer these concessions is seen as vital by SCC in any system that is introduced.

As staff form the most significant cost to the operation, any tolling method or strategy that reduces the current level of staffing will help deliver the aim of SCC. The principal ongoing cost driver for the operation of the tolls is the salaries and wages of the staff.

Due to the perceived sensitivity of potential staff reductions, when commissioned, Capita Symonds were asked to treat the subject matter with great care and this has hampered some of the investigative work.

It is accepted by SCC that any changes to the toll collection system will incur one off costs and they wish to ensure that any cost saving benefits derived from the changes recoup this investment within 3 to 5 years.

The recommended system, Option 6, delivers the greatest cost saving and would see all staff removed from physical toll collection at Itchen Bridge and an electronic toll collection system introduced. The system would comprise two basic elements, an electronic Tag system for concessionaires and regular users, augmented by a remote payment system similar in operation to the London Congestion Charging Zone.

It is accepted that the recommended option may prove unpalatable and present such a significant "seed" change as to cause concerns within SCC. For this reason a second recommendation, Option 5, which would retain some staff at the tolls has also been presented. This option retains a cash payment method and would see recovery of the cost of implementation being made in just over 4 years.

Both of the recommendations have the potential to utilise Smart Cards which it is understood SCC are considering introducing.

1 INTRODUCTION

1.1 General

This document has been prepared for SCC following a request for Capita Symonds to undertake a feasibility study into options to update the tolling system on the Itchen Bridge with the aim of reducing the operating costs and improving vehicle throughput at peak times.

1.2 Background

The construction of Itchen Bridge was funded by SCC with the cost being recovered by toll collection from the opening in 1977. Comprising a single carriageway with cycle lanes and pedestrian walkways it has a span of 800 metres and rises 28 metres above water level. The total cost of construction was £12.174 million.

The Itchen Toll Bridge was a flagship project for SCC and was built to allow local residents easy access to and from Southampton City Centre.



Figure 1: The River Itchen Toll Bridge

1.3 Constraints

The brief from SCC stated that there was no scope to modify the roundabouts, approaches to the tolls and road widths as they would be restricted by the lack of further land available and therefore any civil engineering costs would be significant. The recommendations at the end of the report takes account of these constraints particularly as a pay back period of 3 to 5 years is required as mentioned at the initiation meeting on 11th January.

SCC had initially requested a level of confidentiality which has made it difficult to brief prospective suppliers fully. The response of suppliers has been limited by this constraint and some have not responded at all. At the progress meeting on 11th May, the restriction was lifted, however it has left little time to obtain detailed costs from as wide a range of suppliers as initially planned. We have therefore allowed some contingency in the budget costs.

1.4 Local infrastructure

Both approaches to the bridge are via small roundabouts which restrict traffic flow especially at peak times when queues form quickly. The approach zone on the east side, where the toll booths for both directions are located, is particularly short and traffic quickly backs up to the roundabout causing delays and tailbacks on all approaches.

On the eastern side of the bridge there is a route allowing buses and other approved vehicles to bypass the toll booths. This route is frequently used by some as a means of avoiding the tolls.

The curvature of the bridge is such that the high summit can obscure approaching traffic's view of any queue forming back from the booths during peak times.

The current layout does not provide a 'quarantine' area where users from the west or east, who have arrived at the booth unable to pay, can be directed so that disruption in the approach lanes is minimised.

However, a questionnaire survey carried out to assess customer satisfaction with the Itchen Bridge reveals that 33% of the respondents queue up at the access straight away while approaching the bridge in both the directions and 25% line up behind two to three cars. The analysis supports the view that the local roads and the toll approach roads have insufficient capacity at peak times and that a better throughput could be realised by installing a more efficient tolling system.

1.5 Toll Structure

The tolls are structured over 6 vehicle classes ranging from bicycles to heavy good vehicles, with peak periods of Monday to Friday 07.00 to 09.30 and 16.00 to 18.30. Details can be found in Table 1 on page 5.

Concessions, for cars and light vans in Class 3, are available to Southampton residents who pay council tax. These take the form of discounted prepaid tokens which can be purchased from numerous vendors across Southampton. There are two different Class 3 tokens to cover peak and off peak travel.

Businesses that operate from within a defined area are also entitled to concessions that are available to those that operate commercial vehicles in classes 4, 5 and 6.

In addition there is a concession awarded to those registered as disabled which allowed over 145,000 free crossings during FY 2009/2010. This concession is awarded to the individual, not the vehicle.

From February 2010 Class 2 (motorcycles) vehicle owners who live within the SCC boundary can purchase an annual permit allowing free passage when presented at the booth.

Considering only 20% (£0.66M in 2009/10) of the annual revenue comes from token sales the cost of administering the concession system is disproportionately high (approx. £68K per annum 2009/10)

1.6 Development Plans

The SCC is working towards giving the city a worldwide profile with ambitious plans to set out a clear vision for its sustained growth. Of the planned developments The Royal Pier Waterfront and the Woolston residential development are closest to the Itchen Bridge. It is anticipated that both of these developments have the potential to increase the traffic using the bridge, though no data is currently available.



Figure 2: Developments in respect to Itchen Bridge

2 EXISTING TOLL COLLECTION AND CHARACTERISTICS

2.1 Overview

Tolls are collected 24 hours a day, 7 days a week with the exception of Christmas and Boxing Day. The collection of tolls, either by cash or prepaid tokens, is by five manned toll booths located at the eastern side of the bridge. During normal operations a total of four booths, two in each direction are open. At peak times or during maintenance periods the fifth, central booth, is opened when temporary cones are laid out to mark the additional lane.

This system requires all drivers to stop at the booth to make their payment before being allowed to proceed under the control of a red /green traffic light system. The approach towards the toll booth is regulated with the help of loops just beyond the payment window. At peak times significant queues develop, which during the morning and evening peak cause disruption to the local road network.

2.2 Traffic Implications

2.2.1 Daily Traffic – Working Day

The available data, Appendix B, shows that on a normal working day, the traffic distribution has 2 distinct peak slots for the bridge. The morning peak hours see the majority of the traffic towards Southampton city (west-bound), where as in the evenings this is reversed. Also evident from the data is a sudden increase in the traffic, during the morning peak times, and a gradual decrease thereafter. On the other hand, there is a gradual increase towards and decrease from the evening peaks. The weekday vehicles per hour (vph) easterly flow is 17vph between 03:00 and 04:00. At weekends the peak flow rates vary from a westerly flow peak of around 1400vph between 08:00 and 09:00 and reduces to 760vph between 10:00 and 11:00 with a low of 38vph between 05:00 and 06:00.

Further analysis of the given data reveals that the peak hours contribute to 49% of the daily traffic on the bridge. This information will be vital when designing options and deciding upon a new tolling system. Also, assuming that this travel pattern is even through most of the days in the week, new strategies would have to take account of these patterns.

2.2.2 Daily Traffic – Non Working Day

The data also shows that whilst the overall daily traffic on a Saturday is reduced by 5% the pattern does not show such distinctive peaks as during the weekday. The pattern on a Sunday is similar to Saturday but with a lower throughput.

2.2.3 Vehicle Class Distribution

Table 1 below illustrates the present toll charges and concessions. The subsequent charts show the composition of the Annual Traffic and Annual Revenue from cash and tokens by each class of vehicle as a percentage.

CLASSES OF TRAFFIC ON THE ITCHEN BRIDGE			
Class	Description	Toll Charge Peak/Off Peak	Token Peak/Off Peak
1	Bicycles, Animals and Disabled persons in receipt of the Higher Rate Mobility Component of the Disability Living Allowance.	Free/Free	Free
2	Motor-cycles, Motor-cycle combinations, 3-wheel cars.	£0.20 /£0.20	Free with permit
3	Cars and Light Vans, including taxis and vehicles with a gross weight less than 2 tonnes.	£0.60/£0.50	£0.40/£0.30
4	Light Commercial Vehicles with a gross weight not less than 2 tonnes and not exceeding 7.5 tonnes.	£1.20/£1.20	£0.60
5	Heavy Commercial Vehicles not included in any of the forgoing classes with a gross weight exceeding 7.5 tonnes and not more than two axles in contact with the road at the time of crossing.	£5.00/£5.00	£2.00
6	Other Heavy Commercial Vehicles not included in any of the forgoing classes with a gross weight exceeding 17 tonnes or with three or more axles.	£25.00/£25.00	£2.00

Table 1: Existing Vehicle Classification and Toll Charges

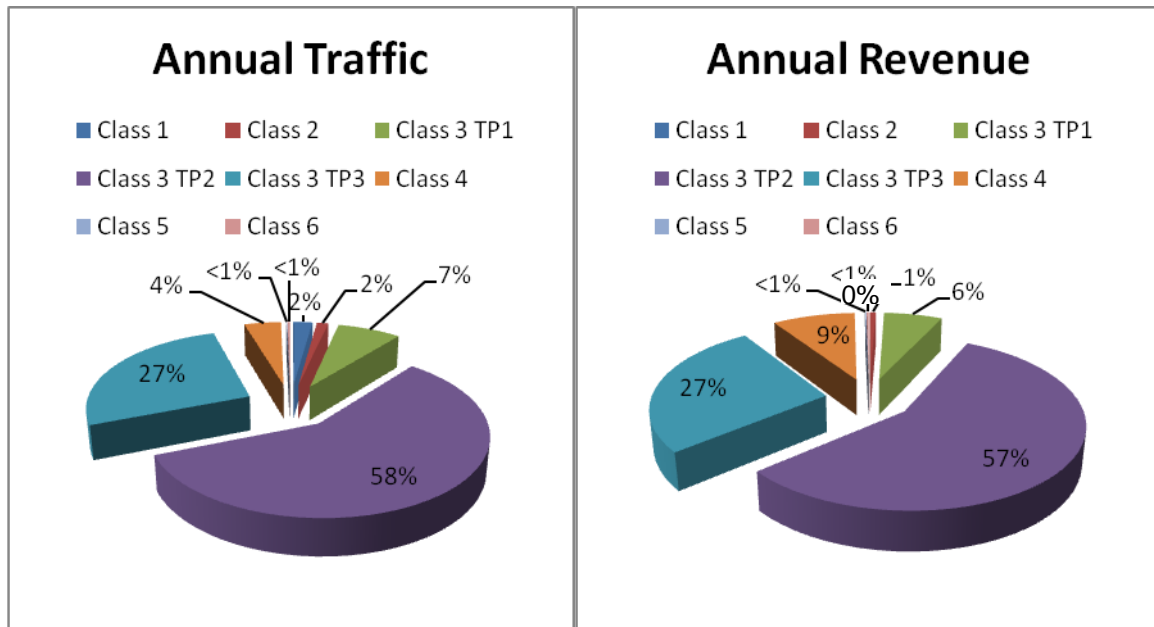


Figure 3: Annual Traffic & Annual Revenue Composition

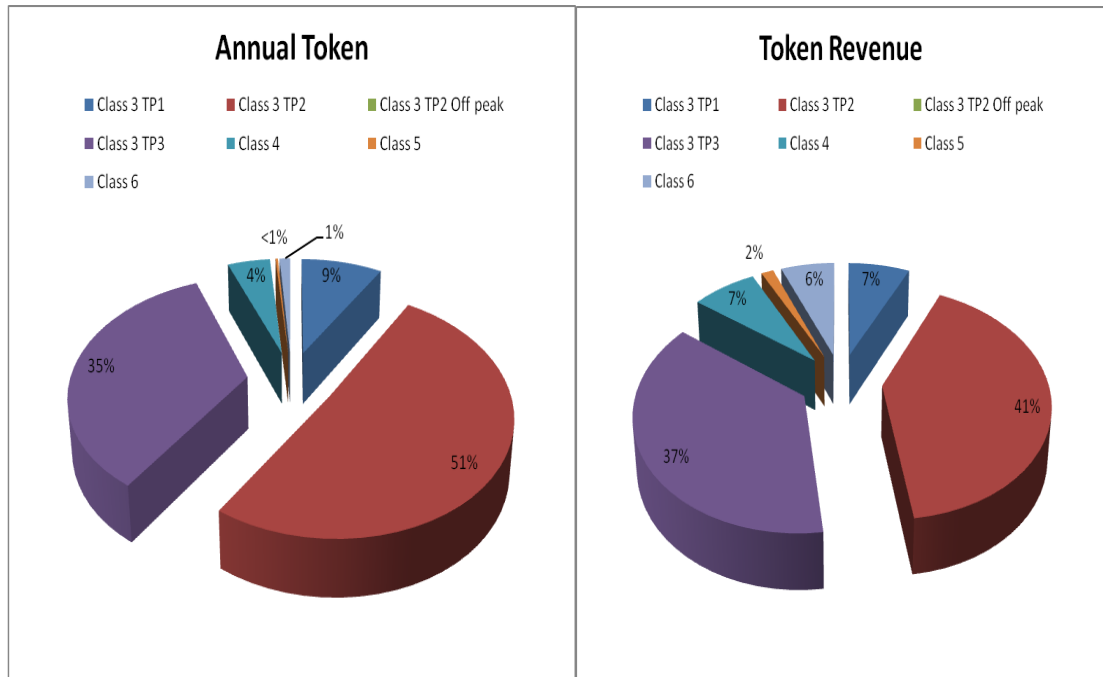


Figure 4: Annual Token & Token Revenue Composition

From the available information, it is evident that on any day of the week, working or non-working, the Class 3 type contributes to 90-95% of the total traffic on the bridge. Analysing the annual revenue figures for all classes reveals a similar relation with Class 3 adding 90% of the total daily and annual revenue generation.

The total revenue collected through tolls in the year 2009/2010 was £3.31M of which £0.66M was from tokens.

2.2.4 Control Room

The control room is situated adjacent to the toll plaza and is permanently manned. The current system was installed in the 1999 by Applied Industrial Systems (AIS)

AIS developed and supplied the toll system which replaced the old (non millennium compliant) system. The AIS system uses a PC in each toll booth, linked back to a dual server database located in the control room with a full back office application for reporting, shift reconciliation and system configuration. The toll booth PCs interface to traffic lights, toll displays and an induction loop which detects vehicles driving off.

2.2.5 Toll Booths

The toll booths are stand alone and require the operators to access them by crossing live traffic lanes. There are barriers in each lane but they are manually operated and are only closed during maintenance or when the toll lane is not in use. Currently the only surveillance equipment installed is a Closed Circuit Television (CCTV) system that is used by the toll office to monitor the toll plaza area for security purposes.



Figure 5: The River Itchen Bridge Toll Booths

2.3 Other Technology on Bridge and Tolling Area

2.3.1 CCTV

As part of the SCC traffic control system there are two cameras which are used to monitor traffic, one on each side of the bridge, at the Portsmouth Road roundabout and the Central Bridge roundabout.

There are also a number of security CCTV cameras covering the staff car park, control building entrances and the area around the toll booths all transmitting images to the toll office.

3 OPERATIONAL REQUIREMENTS

3.1 Overview

The Itchen Bridge provides a major route in and out of Southampton city centre for the conurbations to the east of the River Itchen. SCC has expressed a wish to reduce operating costs and improve vehicle throughput whilst maintaining access to the bridge for local residents.

In order that these aims are met the following points have been considered:

- Minimising delays to drivers both on the approach to and at the toll booths.
- Avoid creating additional bottlenecks.
- Collect tolls in quick, efficient and secure manner.
- Minimise handling of cash/tokens and thereby reduce the need to handle cash.
- Retain local concessions.

3.2 Southampton City Council Network Strategy

Southampton City Council's network strategy is based on their published "Local Transport Plan 2006 – 2011" and commits to delivering four major areas of improvements to the road user:

- Improve Accessibility.
- Reduce Congestion.
- Improve Road safety.
- Improve Air quality.

Any proposed technology improvements to the Itchen Bridge Toll collection system should aim to produce benefits to these areas. Reducing waiting times at the tolls will reduce congestion and help to improve air quality and reduce noise.

3.3 Additional Requirements

3.3.1 Enforcement

Whilst data supplied by SCC indicate that there were approximately 6,500 violations during the FY 2009/2010, this does not reflect the true picture either in terms of the scale of cost or lost revenue. Any changes to toll collection should include some form of compliance monitoring so that the level of non compliance can be ascertained and follow up action taken should it be felt appropriate.

3.3.2 Future Developments

The Woolston residential development and the Waterfront regeneration project will place an additional demand on the bridge toll system and will require it to be more efficient in handling the larger traffic volumes and therefore the ability to increase the throughput is considered a vital requirement.

3.3.3 Future Proofing

Any new toll collection system should be capable of being adapted to take account of changes in national or local strategies.

4 TOLL COLLECTION CONSIDERATIONS

4.1 General

With significant improvements in toll collection methods since 1999 there are a number of toll collections systems available now offering real opportunities to reduce both costs and improve vehicle throughput. The toll structure is complex with six vehicle classes together with concessions for business and private motorists. The recent introduction of a permit system allowing motorcyclists free passage has introduced another administrative layer.

When considering alternative toll collection methods for the Itchen Bridge, the following factors have been considered:-

4.2 Toll Throughput

This is the number of vehicles that can pass through the toll system and is generally given in vph. A slow transaction rate at the toll plaza with the restricted geometry of the bridge often causes queuing. Appendix B summarises the current throughput for Itchen Bridge during the peak and off-peak hours during working and non-working days of the week. The analysis of these figures and site survey indicate occurrence of queuing during the peak hours on a normal working day and subsequently a saturated bottle-neck at the roundabout at the junction of the Portsmouth Road.

Throughput is governed by the “wait time” of each vehicle when making payment at the toll and hence, is directly dependant on the tolling method. Any changes to the toll collection system should ensure that the current throughput is at least maintained if not improved. However if a "free flow" system is introduced it is likely that the throughput of vehicles may have to be artificially restricted in order to reduce the risk of accidents in the merge zone beyond the tolls. An additional benefit of such a system is that it could be used to "hold" traffic to assist buses and authorised vehicles entering and exiting the bypass lane.

4.3 Traffic Volumes

The traffic volume at the Itchen Bridge has been studied from the data made available by the SCC. An average of 19,000 vehicles cross the bridge during a working day with a small decrease of 7-8% on a Saturday. On a Sunday the number of vehicles using the bridge decreases to an average of 13,000.

On a week day approximately 50% of the movement over the bridge occurs during the morning peak hours (07:00 to 09:30) and evening peak hours (16:00 to 18:30)

Analysing data from the 900 responses to the most recent survey, carried out by SCC, shows that more than 75% of the commuters use the Itchen Bridge rather than any alternative route because it provides a direct link, is either more convenient or saves fuel.

4.4 Cash Payments

The present system provides only one method of toll payment which is known to cause tailbacks at peak times. In addition, handling of the cash payments, including transfer, security and processing can cost 5% of the revenue.

4.5 Local Concessions

Whilst reviewing the available technologies consideration has been given to maintaining the existing concession scheme. Any new toll collection system must therefore be able to identify the various distinct groups at the collection point and charge the appropriate toll. It has to be recognised that in order to maintain the current disabled free passage concession there may be a need to change the "entitlement" to that of a vehicle and not an individual and that this would probably lead to a loss of revenue of approximately £19,000. An alternative strategy would be to remove this "free" concession which would have the additional benefit of increasing revenue.

4.6 Number of vehicle categories

The current vehicle classification structure would have to be recognised by a new tolling system within its different degrees of automation. Rationalising the number of classes could be reviewed and would make vehicle identification and the toll charge simpler. Appendix A gives an overview of vehicle classification on similar bridges in the UK.

4.7 Vehicle identification

Any unmanned toll collection method will require a system to ascertain the class of vehicle transiting the tolls to ensure the correct toll is levied. In addition, if required, the system should also be able to ensure that any concessions are not being abused either by unregistered vehicles or ineligible drivers. There are two main methods of vehicle identification, measurement of the physical parameters using sensors at the toll plaza or to read the vehicle registration and to interrogate the DVLA database to obtain details.

5 POTENTIAL PAYMENT STRATEGY

5.1 Pre Payment

This type of payment is generally made through the use of Electronic Tolling Collection (ETC) systems and involves the holder of a "token" buying credit in advance of presenting themselves at the toll. The current SCC concession is based on this type of payment and is generally the most favoured as it is relatively easy to manage through the use of modern payment means and toll management systems. In addition the risk of defaulting on payment is significantly reduced.

5.2 Pay on Arrival

Generally this type of payment is made in cash, though the option of debit and/or credit card payment is available. Pay on Arrival caters for all road users, though the ability to offer concessions becomes difficult and potentially time consuming as evidence of entitlement may have to be presented at the toll. The current breakdown of toll payment on Itchen Bridge indicates over 80% of users pay with cash. Any new system would have to cater for these users either by continuing to accept cash or by obtaining payment by other means.

5.3 Post Payment

Whilst similar to Pre Payment in how this type of transaction is recorded, actual payment is not made until after the toll has been incurred and involves a request for payment of some time by the tolling authority. For this reason this type of payment can present issues for cash flow and the risk of non payment is increased.

6 POTENTIAL PAYMENT METHODS

6.1 Overview

Toll collection technology has improved significantly since 1977 when the existing system was installed. Various toll collection options are now available giving greater flexibility together with opportunities to reduce operating costs.

Examples of tolling technology collection systems available are:-

6.2 Manual Cash Collection at Booths

Not the most efficient method of toll collection but is the most versatile and may be considered a necessary feature of any toll plaza to deal with motorists who cannot pay by any other means including foreign drivers. Staff costs are high particularly if tolls are collected 24 hours a day 7 days a week. Throughput is slow as vehicles have to stop, pay the attendant and possibly wait for change.

Having staff in attendance for 24 hours does however provide onsite security and the ability to deal any problems that may occur.

6.3 Cash throw in bins

This means of payment offers an unattended alternative to manual collection. Drivers "throw" the toll charge into a large hopper which feeds the cash machine. Change is not normally offered, though this option does exist, however throughput is compromised if change is offered. In addition collection machines are available which also accept payment by credit or debit cards, including smart cards.

6.4 Token/Tickets

Tokens are purchased in advance and presented at the booth as a form of payment. This saves drivers carrying cash and allows concessions to be given to selected groups. However a token system can be expensive to administer and their use may only amount to a small proportion of the total revenue.

6.5 ETC

6.5.1 General

A range of electronic collection methods used to identify and automatically collect tolls from a user's account and generally allows for an operation which does not require the vehicle to stop. Data tag, transponder or bar codes are fitted in vehicles and are scanned at the booth. Concessions can be easily administered by being linked to a database of registered accounts and or vehicles.

6.5.2 Smart Cards

This is a form of ETC but as with cash collection, vehicles have to stop but only to swipe the card. The card is normally issued to an individual but can also be used to pay for other services such as parking, train and bus travel within the local area. The advent of contactless payment for smart and other cards will speed up the transaction time but the vehicle will still have to stop, momentarily.

6.5.3 Automatic Number Plate Recognition ANPR

Can form a part of pre or post pay system. A camera reads the vehicle registration number and debits the users account if pre registered or forwards a bill if no account is held. A data base of vehicle registration numbers and class is required together with any concessions available. For non registered vehicles, access to the DVLA data base is required to identify vehicle owners.

6.5.4 Satellite

This is a form of ETC which uses satellites to track movements via a transponder fitted to the vehicle. Not considered as a viable option for a standalone bridge toll system as the infrastructure is expensive and is therefore more suitable for an integrated toll system covering a large area.

6.6 Payment Methods and Throughput

Table 2, below, summarises payment methods and the expected throughput.

Method	Description	Throughput Vehicles per hour (vph)
ETC	Transponders, Tags, bar code reader. Vehicles reduce speed to allow the system to collect toll.	450- 900
Card payment	Debit, credit or charge card. Vehicles have to stop in order to carry out transaction and wait until it has been verified.	200-350
Coin bin	Vehicle stops and cash is thrown into bin. Change and receipts can be given.	300-500
Manual payment	Vehicle stops at pay booth and offers cash or token. Change and receipts can be given.	250-550
Note: 900 vph equates to a transaction every 4 secs. 450 vph equates to a transaction every 8 secs 300 vph equates to a transaction every 12 secs 200 vph equates to a transaction every 18 secs		
Source: Design Manual for Roads & Bridges, Vol. 6, Sec. 3 Part 6 TA98/08		

Table 2: Expected through put for each collection method

6.7 Enforcement

Whichever method of toll collection is used some form of enforcement should always be put in place to discourage toll violation. Whilst initially this may not present a significant loss of revenue, should the fact that the toll is not enforced become widely known, the percentage of violations can be expected to increase.

Toll violations at the Itchen Bridge consist of non payment of tolls both by driving through the red light and illegal use of the bus lane, abuse of concessions, disagreements regarding vehicle classification and heavy goods vehicles, especially foreign, not willing or having the means to pay.

It is important that enforcement should not be seen as a revenue stream, but as a strategy to ensure compliance with the tolls. The cost of recovery also needs to be considered and any violations should incur a penalty charge, this not only helps to fund the cost of recovery but helps to discourage further violations.

6.8 Tolling Back Office

The back office is where all the administration of the toll system is carried out. It does not need to be located adjacent to the toll plaza and for economic reasons could be combined with other administrative centres under the control of SCC.

All the toll collection systems outlined above require a central data base of information including currently “in credit” users, vehicle class and registration numbers so that the correct payment can be levied or the payment made checked.

The back office also has to deal with violations, incorrect toll and toll infractions including an administration system capable of reclaiming the appropriate cost.

6.9 Operating Costs

The main requirement of SCC is to try and achieve savings on the operation of the Itchen Bridge tolls. Any changes to the system will incur cost, not only for the procurement of equipment, resource and project management but the potential cost of redundancy should the level of manning be reduced. However the ongoing costs of maintaining and operating the equipment and back office also need to be considered.

7 TOLLING OPTIONS

When reviewing the options the principle has been followed of reducing the level of human intervention and increasing the level of automation at all stages of the process from making the toll charge to SCCs bank account being credited.

7.1 Option 1 - Do Nothing

As SCC wish to reduce the cost of collecting tolls, this option has not been considered in this study.

7.2 Option 2 - Remove the toll

Allowing free passage is also not considered an option as the revenue from the toll pays for the maintenance of the bridge, with any surplus going to other departments within the council. Another consequence of removing the toll is the expected increase in traffic resulting in higher levels of noise and pollution in the local area.

7.3 Option 3 - Allow free passage when traffic volumes are low

Savings could be made by allowing free passage during the 'quiet' periods when the amount collected is less than the staff cost. This option is only pertinent if the toll continue to be manned.

7.4 Option 4 - Unattended roadside toll collection

Unattended payment machines that accept debit/credit cards, smart cards and cash would create savings by reducing staff costs at the booths and in the control room. The toll plaza however would not be totally unmanned as there will need to be a site presence to deal with payment issues. In addition existing plaza layout would need some minor adaption to cater for the new collection machines. There will also be additional costs associated with introducing the smart card payment system which would incur a transaction charge from the smart card operator. Cash machines will have to be emptied and the money processed, though keeping the number of machines accepting cash to a minimum would help to reduce costs. Debit and credit card payments will attract a transaction charge though this could be offset by higher toll charge.

7.5 Option 5 - Unattended roadside collection with Tag

Adding a 'Tag' system, similar to Dartford and Tamar Tag, to Option 4 would then offer a complete range of payment methods catering for the needs of the frequent and infrequent user. The Tag system is the fastest way of taking payment as vehicles do not have to stop. It has the added benefit of reducing congestion at peak times.

A Tag system would also allow the existing toll structure, concessions and free passage arrangements to continue whilst also making any future changes easy to implement. One Tag account could also be used to pay for toll and municipal parking by means of affiliating a smart card to the account.

7.6 Option 6 - ANPR with Tag

A total free flow system using ANPR with Tags for frequent users, would increase throughput, eliminate the need for a presence at the toll plaza and represents the greatest potential for savings. There would however be a need for a back office to deal with violations, queries from the public and validation of data. This effort would be primarily focussed on non Tag holders and a review of the toll structure would help to incentivise take up of the Tag system and thereby help to reduce this overload. These costs are difficult to quantify as the potential level of violation is unknown but can be significant as revealed following the introduction of the London congestion charge, which does not benefit from a Tag system.

There would be a need for staffing of a call centre and points of sale but these functions could be combined in the back office, or with other similar operations within the council or even outsourced.

An additional benefit of using an ANPR based system is that the data derived could not only be provided to ROMANSE to support the monitoring of the network, but to local signage which could advise of transit times via the bridge from key "decision" points on the approaches.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 General

The main aim of SCC in commissioning this study was to identify the potential opportunities to make savings in the operating costs of Itchen Bridge tolls. The main ongoing cost driver is the salaries of the staff required to manage the toll system and in order to reduce manning some form of automation of the toll collection system would be required. In addition if additional revenue can be generated or loss of revenue stemmed this will also represent a net saving to SCC.

The Itchen Bridge was built to serve the communities local to it, and this is emphasised by the provision of a concession that entitles holders to a reduced toll. It is a requirement of SCC that this concession system be maintained.

It is understood that SCC are considering the introduction of a Smart Card system. In order that the take up of cards can be encouraged it is felt every opportunity to utilise this technology should be pursued.

8.2 Toll Automation

Option 6 is recommended as it has the potential to generate the greatest savings as the need to man the toll booths and the control room would be removed. In addition it provides the necessary mechanisms to support the ongoing granting of concessions and would help to reduce the loss of revenue from toll avoidance.

However it has been noted from meetings with SCC that the complete automation of the tolls may present issues internally.

Should the option of implementing a totally unmanned toll collection system prove unfeasible, then the alternative for delivering the SCC requirements would be **Option 5**.

8.3 Bus bypass enforcement.

It is accepted that illegal use of the bus bypass occurs and that not only does this represent a loss of revenue but can present an increased risk to pedestrians. It is therefore recommended that ANPR cameras be located in the bus lane to provide a means of identifying and penalising unauthorised vehicles.

8.4 Automatic Incident Detection

It can be anticipated that automation of the tolls will increase throughput and therefore queues are more likely to develop and back up onto the bridge. This has the potential to increase the risk of collisions as vehicles transit the brow of the bridge. It is therefore recommended that a video based incident detection system be installed, which should be linked to message signs to warn of queues ahead. A further benefit of this type of system would be that it could help monitor the Samaritan Help Points during off peak periods.

8.5 Next Steps

Should SCC wish to take forward this recommendation it is suggested that a full consultation with stakeholders and further survey of bridge users' opinions be undertaken prior to set of detailed requirements being drawn up.

9 OUTLINE BUSINESS CASE

9.1 Overview

The Council's main aim is to reduce the cost of collecting tolls at the bridge. Various options have been considered all of which will produce cost savings apart from the 'do nothing' option. The greatest benefits both in terms of reduced manning and other operational economies will come from using the various forms of ETC that enable tolls to be collected automatically.

9.2 Option 6

9.2.1 Option 6 Summary

Option 6, ANPR and Tag, is recommended because it will deliver the requirements set out by SCC.

Even though this option does not require any staff at the bridge, the back office function will need staff to administer both systems of toll collection. The costs involved in this operation will depend on the take up of each payment method. The ANPR system is post payment where the bill is sent out to the registered owner as listed on the DVLA database. The Tag system is linked to a registered account which is debited each time the vehicle passes the collection point and can be linked to a smart card. In developing the business case for this option it has been assumed that the take up would be split equally between ANPR and Tag.

The true cost of violations, to the tolling operation on Itchen Bridge, is not known. However it is accepted that a significant number of motorists make illegal use of the Bus Bypass lane, their actions also represent an increased risk to bus passengers. The cost of installing an enforcement system may not recover the cost of its implementation immediately, however the impact on general compliance can be expected to provide benefits to the whole tolling operation.

The increased throughput at the tolls will inevitably lead to long queues at the exit points which in turn have the potential to cause accidents as motorists approach the end of the queue over the blind summit of the bridge. Once again recovery of the cost of implementation may be difficult to quantify in hard cash, however prevention of one serious accident will represent savings in real terms. Should such a system be installed it could also be used to monitor the Samaritan help points during off peak times, thereby providing a back up to the help points when they are out of order.

9.2.2 Option 6 Benefits.

- Reduced staff costs.
- Improved throughput.
- Improvement to bus access to/from the bridge.
- Reduced levels of violation.
- Air quality benefits due to reduced congestion and queuing.
- ANPR data could be used by ROMANSE to measure journey times and give real time information about traffic conditions on the bridge and approach roads.
- Tag account can be linked to smart card.

9.2.3 Option 6 Disadvantages

- Staff redundancies.
- Hampshire Act may require amending.
- SCC would need to adopt a more aggressive approach when issuing penalties.
- Billing foreign drivers may prove difficult and costly.
- Big change from the existing manual collection system, so publicity, incentives and encouragement will be required to ensure take up is good.

9.2.4 Option 6 - Potential Annual Savings

Item	Saving £	Comments
Staff reduction	370,000	Assuming management and some supervisory staff retained in back office.
Token system	50,000	SCC cost 22p per 10 plus 3% commission to vendors.
Handling cash	26,500	Assumed 1% charge by receiving bank
Reduced level of violation	10,000	Figure based on known violation through toll booths and assumed bus lane violation.
Maintenance and operation	-100,000	
Total saving per year	356,500	

Table 6: Option 6 - Potential Annual Savings

9.2.5 Option 6 - Implementation Costs

Equipment	Cost £	Comments
ANPR cameras, Tag detector, vehicle detector, overhead signs, displays, barrier.	220,000	5 lanes (one bidirectional)
Back office IT system	95,000	
Plaza alterations/adoptions	180,000	
Cost of tags	55,000	Assuming 50/50 split based on 10,000 vehicles per day. Could be mitigated by deposit scheme
Bus Bypass Enforcement	20,000	
Publicity & Surveys	65,000	
Requirements capture, design & Project Management	134,000	
Total	769,000	

Table 7: Option 6 - Implementation Costs

Assumptions:

1. Free passage to registered disabled removed and revenue balances loss of revenue from motorcyclists.

9.3 Option 5

9.3.1 Option 5 Summary

Option 5 is a 'softer' option which may be better suited to the council's political requirements as a small number of staff is retained at the toll plaza and office to attend any situation that may arise.

The introduction of a new toll collection system will inevitably be accompanied by some disruption and a period of learning and education as the public's normal routine is changed. Providing a presence on the bridge will help to smooth this transition.

9.3.2 Option 5 Benefits.

- Reduced staff costs
- Improved through put
- Improvement to bus access to/from the bridge
- Reduced levels of violation
- Tag account can be linked to smart card.
- Air quality benefits due to reduced congestion and queuing.

9.3.3 Option 5 Disadvantages

- Hampshire Act may require amending.
- Staff redundancies.

9.3.4 Option 5 - Potential Annual Savings

Item	Saving £	Comments
Staff reduction	186,000	Assuming 2 collectors and 1 manager/supervisor for 24 hours
Token system	67,000	SCC cost 27p per 10 plus 3% commission to vendors.
Handling cash	10,000	Assumed 1% charge by receiving bank and cash collected 30% of total revenue.
Reduced level of violation	5,000	Figure based on known violation through toll booths and assumed bus lane violation.
Maintenance and operation	-100,000	
Total saving per year	168,000	

Table 8: Option 5 - Potential Annual Savings

9.3.5 Option 5 - Implementation Costs

Equipment	Cost £	Comments
Cash/card machine, Tag detector, vehicle detector, overhead signs, displays, and barrier	200,000	5 lanes plus one bidirectional. Only one cash/credit/debit card machine in each direction.
Back office IT system	85,000	
Plaza alterations/adoptions	235,000	
Cost of tags	77,000	Assuming 70/30 tag/cash split based on 10,000 vehicles per day. Set up costs could be mitigated by deposit scheme.
Bus Bypass Enforcement & Monitoring	25,000	
Project management	70,000	
Total	692,000	

Table 9: Option 5 -Implementation Costs

Note: The costs of publicity, legislative changes and any improvements to signage have not been included.

APPENDIX A

OTHER BRIDGES: VEHICLE CLASSIFICATION

APPENDIX A: OTHER BRIDGES: VEHICLE CLASSIFICATION

Reviewing the toll collection system also offers an opportunity to rationalise the vehicle classification system. Below are listed vehicle classification details of a number of similar bridges in the UK.

Severn Crossing

- The Severn Crossing Standard Toll Prices

Category	Description	Cost (incl. of VAT)
Vehicle Category 1	Up to 9 seats	£ 5.50
Vehicle Category 2	Small bus up to 17 seats Goods vehicles up to 3500 kg	£ 10.90
Vehicle Category 3	Vehicles with 18 seats or more Goods vehicles from 3500kg	£ 16.40

- Severn Bridge TAG Prices

	Season TAG		Trip TAG
	Quarterly	Monthly	Cost per Crossing
Vehicle Category 1	£ 290.40	£ 96.80	£ 5.50
Vehicle Category 2	£ 575.52	£ 191.84	£ 10.90
Vehicle Category 3	£ 974.16	£ 324.72	£ 16.40

Dartford Crossing

- Charges to use the Dartford Bridge

	Day Charges (06:00 – 22:00)		Night Charges (22:00 – 06:00)	
	Cash	DART-Tag	Cash	DART-Tag
Motorcycles	Free	Free	Free	Free
Cars	£ 1.50	£ 1.00	Free	Free
2 Axle Goods carriers	£ 2.00	£ 1.75	Free	Free
Multi Axle Goods carriers	£ 3.70	£ 3.20	Free	Free

- Price schedule for Large vehicles and/or abnormal loads

	Day Charges (06:00 – 22:00)	Night Charges (22:00 – 06:00)
	Cash (plus the appropriate charge from Table 11.2.1)	Cash
Wider than 3.65m	£ 42	£ 21
Wider than 6.10m	£ 190	£ 190
Longer than 27.40m	£ 190	£ 190
Greater than 150,000 kg	£ 190	£ 190

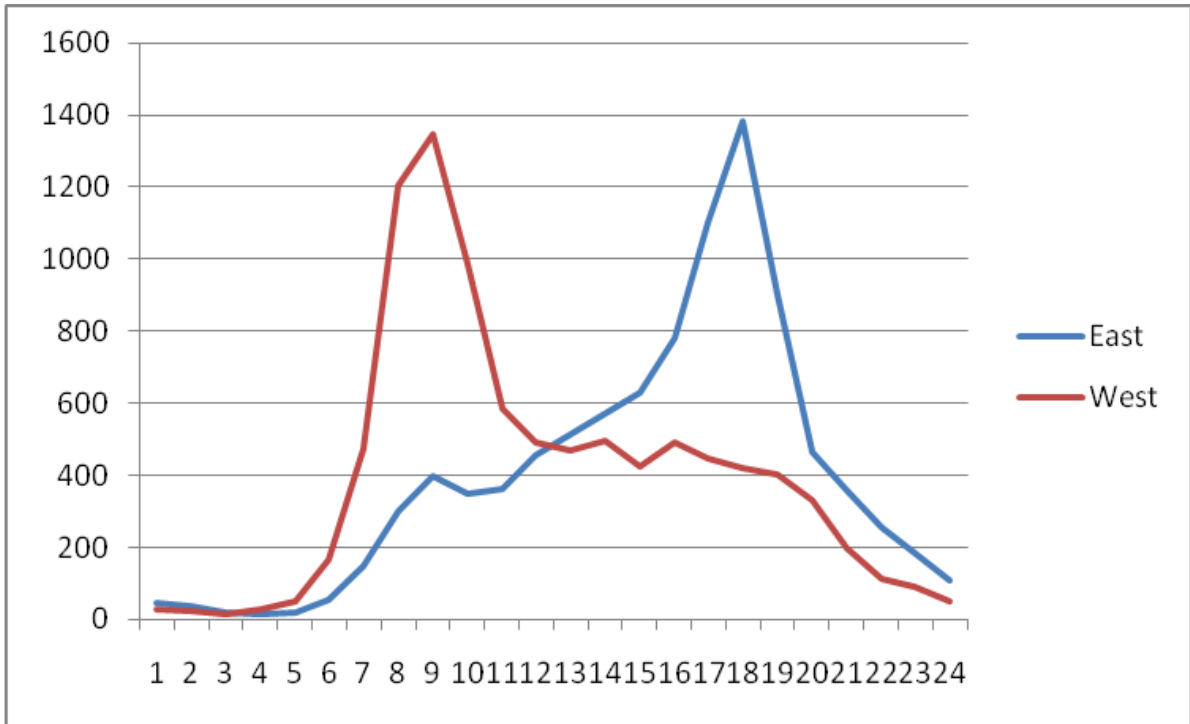
Tamar Crossing

- The Tamar crossing has 4 categories

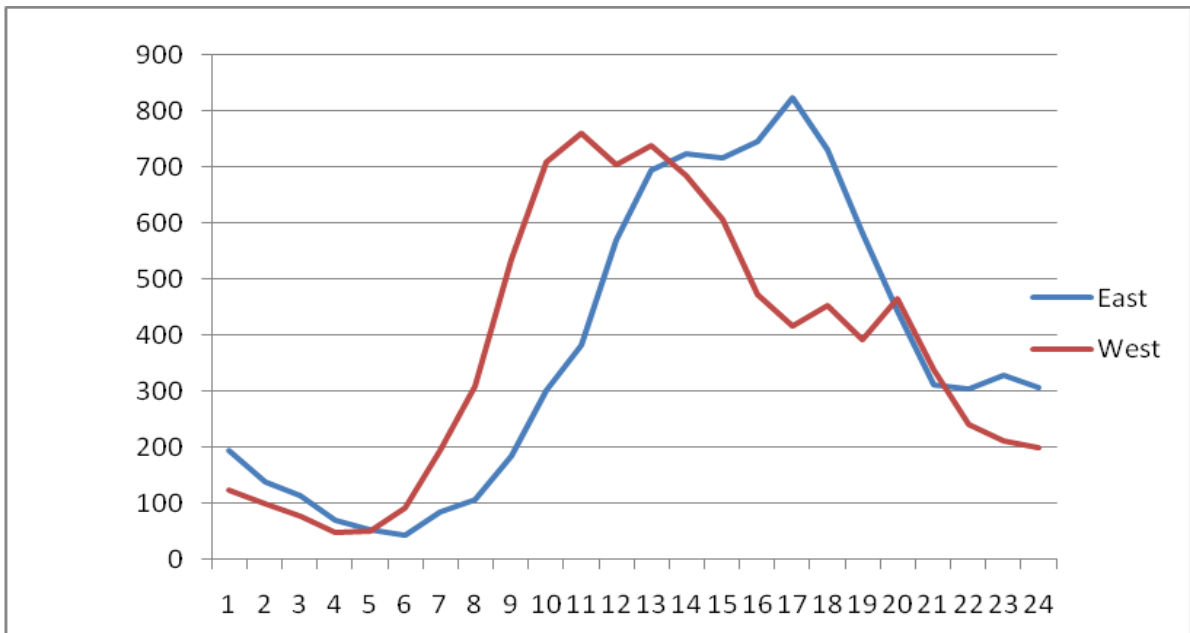
	Toll Payable			
	Single Vehicle		With Vehicle	
	Cash	TamarTag	Cash	TamarTag
Motorcycle	Free	Free	Free	Free
2 Axle Goods carrier under 3.5 tonnes	£1.00	£0.50	£2.00	£1.00
2 Axle Goods carrier over 3.5 tonnes	£2.50	£1.25	£5.00	£2.50
3 Axle HGV	£4.00	£2.00	£8.00	£4.00
4 or more Axles HGV	£5.50	£2.75	£11.00	£5.50

APPENDIX B: ITCHEN BRIDGE THROUGHPUT

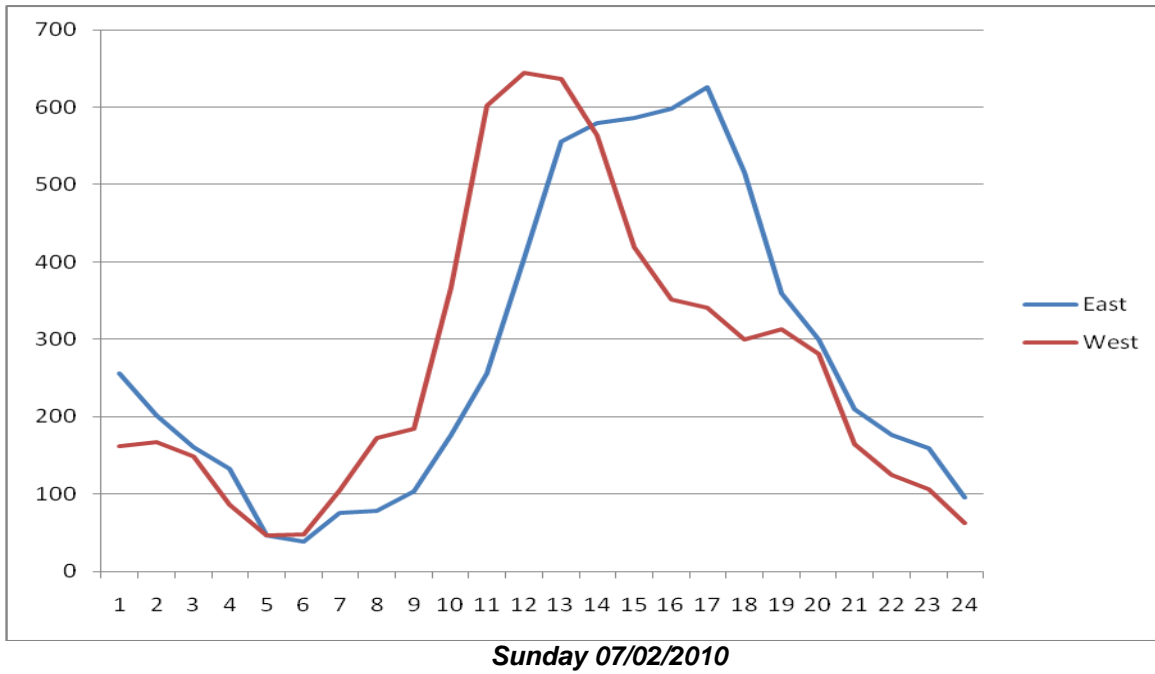
APPENDIX B: ITCHEN BRIDGE THROUGHPUT



Normal Working Day Monday 01/02/2010



Saturday 06/02/2010



Vehicle class	Class 1	Class2	Class 3			Total	Class 4	Class 5	Class 6	Violation	UAT Free	Total Vehicles
			TP1	TP2	TP3							
April -2009	12,690	7,673	41,638	330,817	146,114	518,569	23,039	537	1,384	485	0	564,337
May-2009	13,245	8,157	43,938	347,560	140,555	532,053	22,862	458	1,434	485	0	578,694
June-2009	13,275	9,306	41,043	328,098	163,642	532,783	25,747	464	1,895	548	0	584,018
July-2009	13,487	8,095	43,131	340,011	162,523	545,665	25,287	573	1,917	484	0	595,508
August -2009	12,335	8,362	42,381	333,442	128,375	504,198	21,983	464	1,650	575	0	549,587
September-2009	12,302	9,961	40,238	315,135	152,733	508,106	24,238	504	2,029	504	0	557,644
October-2009	12,724	8,304	41,822	338,487	155,845	536,154	24,998	415	1,892	627	0	585,114
November-2009	12,557	6,689	40,942	331,241	156,708	528,891	24,591	416	1,878	506	0	575,528
December-2009	12,563	4,967	39,009	350,558	147,603	537,170	22,756	464	1,447	586	22,772	602,725
January -2010	10,612	4,114	37,727	300,707	136,864	475,298	22,022	397	1,468	634	1,020	515,565
February- 2010	8,908	4,967	32,418	241,708	123,290	397,416	19,235	303	1,427	445	0	432,791
March-2010	10,395	64,707	34,997	269,063	140,315	444,375	22,171	350	1,554	541	0	485,793
Total	145,093	145,302	479,284	3,826,827	1,754,567	6,060,678	278,929	5,345	19,975	6,420	23,792	6,627,304

Vehicle class	Class 1	Class2	Class 3			Total	Class 4	Class 5	Class 6	Violation	UAT Free	Total Vehicles
			TP1	TP2	TP3							

<p>Class 1 Bicycles, animals and disabled</p> <p>Class 2 Motorbikes, Motorbikes with sidecars and 3 wheelers.</p> <p>Class 3 Cars, light vans, taxi all under 2 tonnes gross weight.</p> <p>TP1 = 24:00 – 06:00. TP2 = off-peak. TP3 = peak (07:00 – 09:30 & 16:00 – 18:30)</p>	<p>Class 4 Light commercial vehicles between 2 and 7.5 tonnes gross weight. Heavy Commercial Vehicles with a gross weight exceeding 7.5 tonnes and not more than two axles in contact with the road at the time of crossing.</p> <p>Class 5 Other Heavy Commercial Vehicles not included in any of the previous classes with a gross weight exceeding 17 tonnes or with three or more axles.</p>
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APPENDIX C

APPLICABLE TECHNOLOGY REVIEW SPREADSHEET

APPENDIX C: APPLICABLE TECHNOLOGY REVIEW SPREADSHEET

The following table gives a comparative study of some of the technology options being considered as potential method of toll collection at the River Itchen Toll Bridge. The data for the comparison table has been compiled after a literature review of past studies, existing technologies in other countries, manufacturer's specifications and suppliers information.

Option	Advantages	Disadvantages	Issues for consideration
<p>Electronic Toll Collection</p> <p>Tag, Transponder, Smart Card, ANPR.</p> <p>Vehicle throughput 450-900 per hour</p>	<p>To costumers: Speeds transaction time and reduces journey delay. Improved convenience and comfort. Receive monthly statements instead of waiting for receipts during every transaction. Improved safety (conventional toll collection can lead to typical rear-end collisions) Concessions are easily administered.</p> <p>To the Toll Authority: ETC lanes improve the speed and efficiency of traffic flow and save drivers time. Costs per transaction are usually lower in an ETC system. The number of transactions is far higher than in a manual system. The number of people required to operate an ETC system is far fewer than required for a manual toll collection system. Overall costs per transaction are therefore less. Minimum account balance required. Enhanced interoperability with other ITS systems with future considerations.</p> <p>The Environment: Improved air quality, particularly at toll plazas and in high emission departure zones. Reduced noise from vehicle acceleration in departure zones.</p>	<p>Set up cost is difficult to estimate as it is dependent on take up.</p> <p>Take up, particularly the infrequent user will depend on initial cost and the level of concession offered.</p> <p>With limited or no staff presence enforcement will be required to prevent toll infractions. Barriers or ANPR cameras will add to the installation cost but are necessary to control any violations. Administration costs for collecting penalties would need to be set at the correct level.</p>	<p>Costs to the User: Rent of the equipment or security deposit. Keep a minimum balance in the account</p> <p>Initial Costs: High initial costs of implementing ETC or converting a manual toll facility into an ETC.</p>

Option	Advantages	Disadvantages	Issues for consideration
<p>Automated Coin collection</p> <p>Vehicle throughput 300-500 vph</p>	<p>Various different coins can be accepted (GBP, Euros etc.) Reduces staff costs at the toll plaza Less expensive equipment compared to ETC equipments. Processing time for a coin takes 0.15-0.20 seconds, depending on the equipment. Machines are available which will accept cash and debit, credit and smart cards.</p>	<p>Enforcement using barriers or ANPR cameras would be required.</p>	<p>Jamming of the machine may cause congestion and delay. Motorist not carrying exact change could cause queuing during peak hours but they could be directed to a manned booth.</p>
<p>Manual Collection</p> <p>Vehicle throughput 250-550</p>	<p>Necessary feature of any toll plaza to deal with any motorist unable to pay by any other means.</p>	<p>Staff costs are high. Extended waiting time</p>	