THE GATEWAY PROGRAMME

Road Pricing Review

Confidential Draft Report

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British Columbia Ministry of Transportation

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EXECUTIVE SUMMARY

This report forms part of the Gateway capacity management options analysis. The report represents the professional opinion of Steer Davies Gleave for Gateway Programme information purposes only. This report does not imply Gateway Programme endorsement of road pricing.

The report summarises existing road pricing guidance in BC, potential road pricing regimes, the main issues raised by road pricing and the lessons learned to date from worldwide road pricing experience.

It is important to distinguish the different objectives of road pricing and tolling. Road pricing aims to reduce congestion, improve environmental conditions, generate revenues and provide a system of fairer taxation whilst tolling is generally regarded as a revenue generating tool to finance the construction and maintenance of new or enhanced infrastructure.

There are a number of potential road pricing regimes. This report covers corridor and area schemes. Corridor schemes are generally revenue generating schemes where the continued development of electronic tolling systems have allowed greater toll variability. The latest developments in the US are HOT lanes, combining HOV lanes and tolling.

Area schemes are based around city centres and are concerned with congestion management and road revenue generation. These schemes are effective but apply to a specific set of circumstances (i.e. congested city centres with extensive transit alternatives available).

The main concerns regarding road pricing include public response, equity, economic impact and traffic effects. Evidence from schemes shows the effect of these issues can often be overstated. However for corridor schemes the phenomenon of induced traffic demand (increase in capacity leads to additional traffic) is clear.

A number of lessons have been learnt from the implementation of road pricing. However, as long as the scheme is designed with a clear set of objectives in mind, the greatest challenge is political.

1. INTRODUCTION

The Study

1.1 Road pricing is one of the potential tools being assessed as part of the Gateway capacity management options analysis, in addition to lane allocation, land effects and staging. As such Steer Davies Gleave were commissioned to undertake a comprehensive review of the issues raised by road pricing[1].

1.2 This is a qualitative review of road pricing, where road pricing refers to any element of charging for the use of road space and can include point tolls, distance tolls, HOT lanes, cordon tolls or a congestion charge. The work outlined in this report will focus, where possible, on urban roads.

1.3 This work does not consider other 'alternative' forms of congestion charging such as gas taxes, pay-as-you-go insurance schemes, etc, which are outside of the scope of the Gateway Program mandate.

Content of this Report

1.4 The remainder of this report contains four further chapters:

- Review of existing guidelines.
- Present potential toll regimes that could be relevant to the Gateway Program.
- Review of important considerations/issues associated with road pricing.
- Lessons learned.

1.5 The report is supported by an extensive bibliography and relevant case studies.

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2. EXISTING GUIDELINES

British Columbia

Ministry of Transportation

2.1 As a result of the potential involvement of the private sector in financing new transportation infrastructure, the Ministry of Transportation (MoT) drafted a number of guidelines for the tolling of infrastructure[2] as the most appropriate means for recovering some or all of the costs of a significant investment in new highway infrastructure. These include:

1. Only major projects that result in significant **increases in capacity** will be subject to tolling.

2. Tolls will be implemented only if there are clear, demonstrable **net benefits** for the users of the new or improved facilities.

3. Tolls will be implemented only if a **reasonable untolled alternative** is available.

4. The **levels of tolls and limits** on the amount and frequency of increases will be established in advance.

5. **Public consultation** will occur in all cases where new tolls are considered.

6. The public have the **same rights to access** tolled highways as non-tolled highways.

7. Tolls will be used to **generate revenue** for transportation projects and provide a **return on the investment** of the private-sector partners.

8. The **same maintenance, safety and other standards**, and rules of the road, will apply to tolled highways as non-tolled highways.

9. The **privacy of personal information** used to levy and collect tolls will be protected.

10. A **fair and expeditious process** will be available for resolving tolling disputes.

11. The consequences of failing to pay tolls will be **fair and reasonable**.

2.2 Based on those guidelines, the Table 2.1 summarises how Highway 1 and Port Mann would adhere to these guidelines.

[2] BC Ministry of Transportation (2003), **Guidelines for Tolling**

TABLE 2.1 MOT TOLLING GUIDELINE APPLICATION

Guideline	Port Mann	Highway 1	Comment
1. Increase in capacity	✓	✓	
2. Net benefits	✓	✓	Analysis still to be completed
3. Untolled alternative	✓	✓	Definition of reasonable is subjective
4. Levels of tolls and limits	✓	✓	Assumed within procurement
5. Public consultation	✓	✓	Tentatively scheduled for Fall/Winter 2005
6. Same rights to access	✓	✓	
7. Revenue and return on investment	✓	✓	Assumed within procurement
8. Same maintenance, safety and other standards	✓	✓	
9. Privacy of personal information	✓	✓	
10. Fair and expeditious process	✓	✓	Assumed within procurement
11. Fair and reasonable	✓	✓	Assumed within procurement

TransLink

2.3 The Livable Region Strategic Plan (LRSP) by the GVRD identifies increasing transportation choice as one of its fundamental strategies. The objectives of this strategy are described in detail in Transport 2021 Medium and Long Range Transportation Plans developed by TransLink, which are linked in policy and specific objectives to the LRSP.

2.4 TransLink acknowledges that without additional funding, addressing the needs of the transportation system will be difficult. It also recognises that most of this funding will have to come from the region's residents, either in a direct form (taxes and other charges) or through user charges (tolls)[3].

2.5 Additionally it acknowledges that there are significant implementation challenges. For example, TransLink has identified regional tolls as a powerful tool but lacks the authority to introduce such tolls.

[3] TransLink (2003), **Long Range Transportation Plan: Context Paper**, March 2003, pp. 27

2.6 However, Golden Ears Bridge is under procurement and the TransLink Board of Directors has approved in principle a bylaw providing a framework governing key aspects of the tolling of the Golden Ears Bridge, including toll rate setting and collection. The actual collection and enforcement of tolls will be effected by TransLink, which will enter into an agreement with a billing organization. TransLink will set the tolls and will retain control of the toll rates throughout the life of the project.

2.7 In the short term this is likely to be the main form of road pricing being applied by TransLink. Any form of regional tolling is only likely in the medium to long term.

Rest of Canada

2.8 Canada has been the subject of a number of major federal transport studies. The 1992 Royal Commission on National Passenger Transportation made a number of recommendations[4]:

- Travellers pay full cost of their trips.
- Decision making to be assigned to the level of government closest to the people and most able to exercise authority efficiently.
- All modes to be taxed and regulated equally.
- Fuel tax revenue to be used for transportation.
- Weight-distance taxes for trucks.
- Conventional tolling systems to be considered for new or expanded limited access highways.
- *Gradual* development of a road pricing framework (author's italics)

2.9 The Canada Transportation Act Review of 2001 departed from the 1992 Commission position in recommending that congestion and other road charges should not necessarily be allocated to road investment if expenditures on other transport modes would yield a higher return.

2.10 Finally Canada has ratified the Kyoto Protocol and if Canada follows through with its commitment there will be strong impetus to reduce automobile travel by road pricing and/or other means.

[4] Lindsey R. (2003), **Road Pricing Issues and Experiences in the US and Canada**, IMPRINT-EUROPE Fourth Seminar "Implementing Pricing Policies in Transport: Phasing and Packaging", 13-14 May 2003, pp. 16

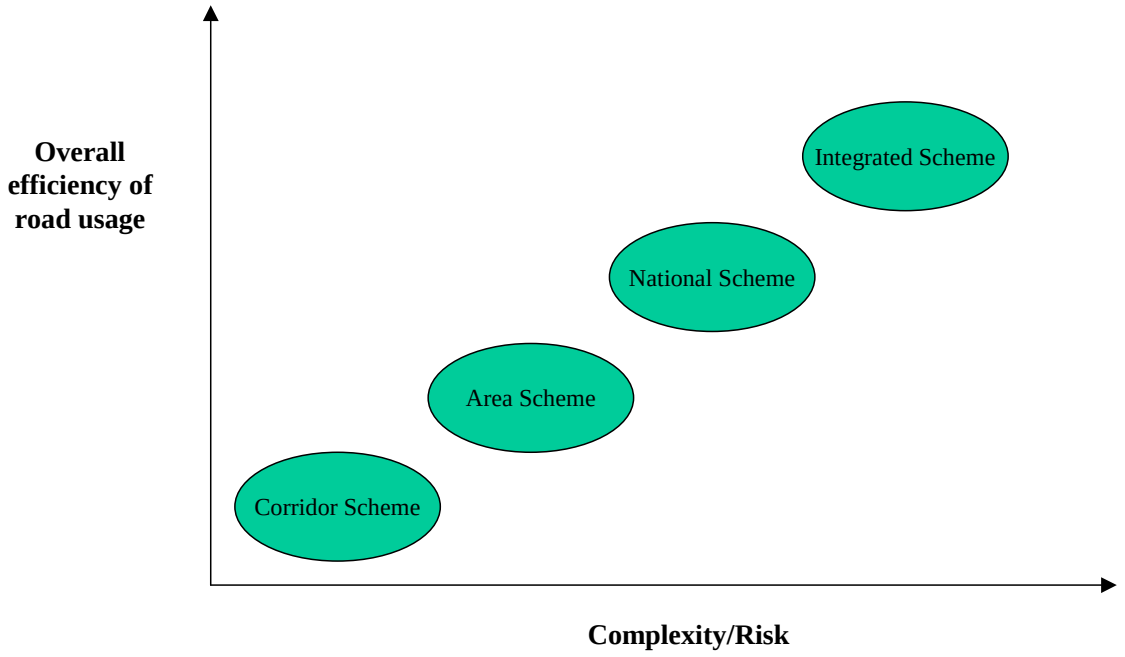
3. RANGE OF POTENTIAL ROAD PRICING REGIMES

3.1 Road user developments can be categorised in several distinct stages and according to a number of different principles, namely:

- The corridor approach; a charged stretch of road that provides a means of transport from one location to another, such as a traditional toll road. The main objective is revenue generating to pay for the road.
- The area scheme; charging for driving in an area with a closely integrated road system. This is applied to urban congestion charging systems. The objectives are to improve traffic conditions and to generate revenues.
- Regional/national/transnational systems; the charged area extends to a wider road network, rather than an individual zone. The objectives are to regulate the overall distance driven within the network and institute a more advanced charging structure than traditional vehicle and fuel costs.
- Integration; a future vision in which customers make informed choices at every step of the journey across transport modes. The charges would provide incentives for a traveller to make the most efficient transport choices.

3.2 Figure 4.1 summarises each stage based on its overall efficiency of road usage and the complexity and risks associated with each.

FIGURE 3.1 ROAD PRICING STAGES



Source: Deloitte Research, 2004

3.3 Additionally a number of these stages cover various road pricing regimes. The table below provides examples of each road pricing regime and shows the potential relevance to the Gateway Programme. Where 'Not relevant' they will not be discussed further. Also note that there are numerous toll bridge facilities where tolls have been in place for considerable length of time. However for the purposes of this report we have concentrated on BC tolled facilities or new facilities where road pricing has been applied or where innovative arrangements have been implemented (e.g. HOT lanes).

TABLE 3.1 ROAD PRICING REGIMES

Stage	Toll Regime	Example	Relevance to Gateway[5]
Corridor scheme	Fixed tolls*	Coquihalla Highway	Medium
	Variable tolls	E407 Toronto	High
		Citylink Melbourne	High
		SR91 Southern California	High
	HOT lanes	I-15 San Diego	High
	Truckways	-	Medium
Area scheme	-	London congestion charge	Low
		Singapore area scheme	Low
		Norway cordon scheme	Low
National scheme	Distance charging	Swiss and German truck charging schemes	Not relevant
	Pay-as-you-drive	-	Not relevant
Integrated scheme	-	-	Not relevant

NOTE: * By 'Fixed tolls' we refer to tolls which may differ by vehicle type but not do not change based on time/congestion levels.

3.4 The table shows which of these will be analysed further in the following sections.

Corridor Scheme

3.5 Tolls are a common way to fund highway and bridge improvements. Such tolls are a fee-for-service, with revenues dedicated to roadway project costs. They have traditionally been used on highways and bridges where access could easily be controlled.

[5] Relevance relates to potential of the different road pricing regimes within the scope of the Gateway Programme

Fixed Tolls

3.6 This is the first stage and simplest toll regime. It is the approach applied at the Coquihalla Highway (with one-way tolls ranging from $10 for Class 1 vehicles to $50 for Class 5) and the Confederation Bridge in Prince Edward Island (car toll of $39.50). This was the main method until the late 1980s when toll payment systems required vehicles to stop to pay the toll.

3.7 However development of technology now means free flow tolling is an option at most toll facilities around the world. Indeed in some existing operations, and new ones under construction, there are no cash collection facilities and they rely completely on free flow tolling (like the proposed Golden Ears Bridge). The main advantage of free flow toll collection systems is that no toll booths are required (with a consequent saving in land required) and they ensure the free flow of traffic with no delays. For this reason 100% free flow toll collection systems are particularly common in urban environments were space is limited and the potential impact of tail backs from toll plazas onto the rest of the highway network is most problematic.

3.8 Proposed tolls for the Golden Ears Bridge are shown in the table below. Again, please note that there is no planned time of day tolling.

TABLE 3.2 GOLDEN EARS BRIDGE PROPOSED TOLLS (2003 $)

	Toll Device*	Pre-paid user without a toll device	User without a toll device
Cars	$2.50	$3.00	$3.50
Light Trucks	$5.00	$5.50	$6.00
Heavy Trucks	$7.50	$8.00	$8.50
Motorcycles	$1.25	$1.75	$2.25

NOTE: * Toll device user required to pay a $10 security deposit and $1 monthly leasing charge

3.9 A similar approach is planned for the Tacoma Narrows Bridge where the fixed toll will be $3 for eastbound traffic (see Box 1).

Variable Tolls

3.10 Variable road pricing (higher prices under congested conditions and lower prices at less congested times and locations) is intended to reduce peak-period vehicle trips. Tolls can vary based on a fixed schedule, or they can be dynamic, meaning that rates change depending on the level of congestion that exists at a particular time. It can be implemented when road tolls are implemented to raise revenue, or on existing roadways as a demand management strategy to avoid the need to add capacity.

3.11 Potential complexity has often been a concern prior to implementation of differential pricing and generally attracts criticism in the early stages of implementation, whether warranted or not. However, given good publicity for the changes, and a clear logic to the price structure, these concerns have usually faded after launch[6].

3.12 Table 4.3 summarises the main characteristics of variable toll schemes throughout the world. It is interesting to note that most schemes shown are point toll based (i.e. a fixed charge according to time of day) that are applied to each vehicle type. The one exception is the E407 in Toronto which is distance based. It is also, by far, the longest scheme.

3.13 With reference to Highway 1 and the potential for distance based tolls, it is worth considering that people have difficulty estimating distance. Estimates of distance are often derived indirectly from estimates of journey duration – but these are subject to bias and error[7]. Additionally there is some evidence that users overestimate the time savings incurred when using a tolled, free flowing facility to a congested parallel route[8].

3.14 It is worth reinforcing that the main objective of the corridor schemes shown in Table 4.3 is to generate revenues. Thus tolls are set by the operator to raise a desired level of revenue and there is no wider congestion management objective. Even a scheme like SR91 (owned by the state of California but operated by a private company) has a specific remit to provide a certain level of service for the road and this is achieved by a constant adjustment of the tolls, although only with an attention on congestion on the parallel untolled facility.

HOT Lanes

3.15 High Occupancy Toll (HOT) lanes are High Occupancy Vehicle (HOV) lanes that also allow access by low occupancy vehicles if drivers pay a toll. Whilst a form of value pricing they are often proposed as a compromise between HOV lanes and Road Pricing. However HOT lanes raise a number of important issues.

3.16 Firstly, as feasibility studies are proliferating there is a wide range in the results presented to date. For example Virginia Department of Transportation recently announced a development agreement with the Fluor/Transurban consortium under which their planned addition of four HOT lanes to the Washington Beltway will go forward, supported 100% by the toll revenues generated by the new lanes. By contrast, the feasibility study of a network of HOT lanes for Atlanta (a metro area with similar congestion levels to the DC metro area), concluded that, at best, HOT lane revenues can cover operating and maintenance costs but only the incremental capital costs associated with constructing lanes as HOT rather than HOV (i.e. none of the actual lane construction costs).

[6] Leeds University (2004) **Road User Charging – Pricing Structures**, Final Report for the Department for Transport pp. iv

[7] Leeds University (2004) **Ibid** pp. v

[8] Sullivan, E. (2000) **Ibid** pp. xvii

TABLE 3.3 SUMMARY OF VARIABLE TOLL SCHEMES

Scheme	Description	Tolls	Issues	Gateway relevance
E407 Toronto http://www.407etr.com/	Population 4.3 million and city covers 100 sq km. Toll road originally 79 km long just north of Toronto with extensions opened in 2001 bringing scheme to 108 km. Parallel to E401, untolled alternative.	-Time of day (2 rates) -Vehicle type (2) -Distance based (cars 14.95cents/km peak and 14.10cents/km off peak)	Franchise deal criticized by provincial government as little power over tolls. However road carries over 270,000 vehs/day.	Relevant. 100% free flow toll collection system on a major urban route.
SR91 Southern California http://www.91expresslanes.com/	16 km East-West roadway links Riverside County (2.5m population) to Orange and Los Angeles counties. 4 tolled lanes provide alternative to 8 untolled lanes.	-Based on level of service, tolls vary by hour and day of the week (range from $1.05 to $7.75) -Point based	See Box 3. Since May 2003 HOV+3 travel free except at 'super peak' hours when 50% discount.	Relevant. Highly congested commuter route where additional tolled capacity has been introduced.
M6 Toll http://www.m6toll.co.uk/	Opened in December 2003 as Britain's first tolled motorway. Provides a 27 mile strategic route to the NE of Birmingham bypassing the untolled M6.	-Time of day (2 rates) -Vehicle type (5) -Point based with reduced rates for intermediate junctions		Limited. Strategic route with high proportion of long distance through traffic in semi-rural environment.
CityLink Melbourne http://www.transurban.com.au/	Population 3.2 million. Toll road is 22 km long, linking three of Melbourne's arterial freeways. Opened in 1999.	-Vehicle type (3) -Intersection based with toll caps and 24 hour and weekend passes		Relevant. Improved connectivity and travel times throughout Melbourne metro area.
Port Authority of New York and New Jersey http://www.panynj.gov/	Network of bridges and tunnels between New York City and New Jersey. Variable pricing introduced in 2001 to encourage switch to electronic tolling (EZ Pass).	-Time of day (2 rates) -Vehicle type (11) -Point based with discount for EZ Pass users	September 11th meant traffic patterns severely disrupted. Conflicting views on effectiveness.	Limited. Tunnels and bridges form cordon rather than corridor.

3.17 The other contrast is between Denver and Minneapolis/St. Paul. The feasibility study of a network of express toll lanes in Denver concluded that toll revenues could cover at least 50-60% of the capital costs of a $4.8 billion system. But the study of a $3.5 billion network of (mostly) express toll lanes in the Twin Cities found that toll revenues could cover an average of 22% of capital costs. Again, this for two areas with similar levels of congestion[9].

3.18 Finally, 'real' evidence from San Diego shows that extra revenue can also be generated for alternative measures (see Box 1).

3.19 Secondly, they offer more flexibility in how to manage demand on HOV lanes. An example is the HOV network in Houston (Texas) where requirements to use the HOV lanes are 2 occupants per vehicle. However for certain highways (US290 Northwest Freeway in the AM peak and Katy Freeway in the AM and PM peaks) the QuickRide program increases the HOV lane requirement to 3 occupants per vehicle whilst vehicles with 2 occupants can use the HOV lane for a flat payment of $2 each trip[10]. By allowing HOV-2 vehicles to buy-in to the HOV-3+ lane, QuickRide provided a way to utilize the excess capacity during peak periods without degrading the quality of the lanes.

BOX 1: I-15 SAN DIEGO

I-15 is a 13 km long six-lane freeway with 2 lane reversible HOT lanes.

The project was meant to address 2 concerns; motorists' complaints about 'empty' HOV lanes alongside congested lanes and the need for funding of long distance express bus service (without the need for further taxes).

The HOT lanes cater to 3,000 to 4,000 toll payers a day, each of whom pay a fee that ranges up to $4 based on real time traffic conditions (maximum toll of $8 if severe congestion) and to 10,000 or so car poolers who still travel free. Whilst the express bus route was established to carry commuters from the suburbs to the city, the take-up was very disappointing. The bus service however did prove a success in the opposite direction ("reverse commuting"), with many of the less well-off inhabitants in the city centre using the service to commute to jobs in the more affluent suburbs.

3.20 This achieves a number of goals. It increases the overall person throughput in the corridor while increasing travel speeds on mixed flow lanes by diverting traffic to the HOT lane, thus managing demand without adverse operating impacts on either HOT or mixed purpose flow lanes.

3.21 Thirdly, is the concern regarding the declining usage of HOV lanes ('empty lane syndrome'). Evidence for the Lower Mainland shows the vehicle occupancy rate in the HOV lanes on Highway 1 has decreased between 1999 and 2004 in every direction, time period and location surveyed.

[9] Poole, R. (2005) **How Much Can Tolls Pay For?** Surface Transportation Innovations, Reason Foundation, Issue No. 23

[10] www.quickride.org

3.22 Whilst this decline could be explained by increases in non-compliance rates on the HOV lanes (up to 21% of HOV lane users AM Eastbound between King Edward and Cape Horn are SOV)[11] the declining use of HOV lanes is reinforced by latest results from the Greater Vancouver trip diary surveys showing auto driver mode share increasing from 54.9% in 1994 to 59.4% in 2004 while auto passenger mode share decreased from 21.7% in 1994 to 17.4% in 2004. This was despite the introduction of HOV lanes on Highway 1 in 1996[12].

3.23 In the US 2003 data from the Census Bureau's American Community Survey shows that car-pooling has continued to decline, reaching a new low of 10.4% in 2003, down from 11.2% in 2000. Additionally there are concerns on who is actually doing the car-pooling, with Alan Pisarski raising the issue of "fam-pooling"—i.e. family members who would be travelling together anyway taking advantage of the HOV lanes, with some studies suggesting up to 83% of carpools could be classified as fam-pools[13]. Whilst there are exceptions e.g. HOV corridors in Houston, the Washington DC suburbs and Los Angeles which are heavily used by buses, thus fulfilling the original intent of getting more people to use fewer vehicles to get to work, it now appears that most of America 's HOV-2 lanes serve mostly fam-pools[14].

3.24 There is no doubt that HOT lanes are gaining in acceptance in the US and that this appears the way forward for numerous transportation agencies in the US. Further to the schemes described above Interstate 394 HOT lanes in Minneapolis have recently started operation (May 2005) and 6.6 miles of HOT lanes in I-25 in Denver are expected to open in late 2005. Schemes are increasing in sophistication as schemes to date have only one entry and one exit whilst, for example, Minneapolis has mid point access points.

Truckways

3.25 These have been proposed in the US as long distance, inter-city toll truck lanes that would be added to existing interstate highways. The truckways would be separated from regular traffic by continuous concrete barriers. The truck lanes would have their own entrance and exit ramps - to avoid mixing heavy truck traffic with car traffic in the regular lanes. They are seen as a way to separate car traffic from trucks, thus reducing the number of car-truck accidents and improving productivity of the road freight industry.

3.26 Virginia is considering a Public Private Transportation Act proposal by a private consortium to build a 4-lane truck tollway in the median of I-81. The Interstate would be a minimum of 8 lanes throughout Virginia, and up to 12 lanes wide in some metropolitan areas.

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[11] CTS (2004) **Highway 1 Vehicle Occupancy Surveys** pp. 11

[12] BC Ministry of Transportation and TransLink (2005) **2004 Trip Diary Survey**

[13] McGuckin, N. and Srinivasan, N. (2005) **The Journey-to-Work in the Context of Daily Travel**, TRB Conference on Census Data for Transportation Planning, Table 12

[14] Poole R. (2005) **The Continued Decline of Car-Pooling** Surface Transportation Innovations, Reason Foundation, Issue No. 23

3.27 However caution is advised with regards to truck's reaction to road tolls. The Camino-Colombia Toll Road near Laredo, Texas is a 22 miles long link between I35 and the Mexican border. Whilst not a truckway, it opened in 2000 hoping to attract significant truck traffic at $16 toll for 18 wheelers (and $3 for cars). The project proved a dismal financial failure[15].

3.28 Another example is the Port Authority of New York and New Jersey trying to incentivise truck drivers to cross onto Manhattan during the night by halving the toll rate for trucks to US$20, but this has had little effect[16].

3.29 The proposed approach for the Dublin Port Tunnel in Ireland has been different. Dublin is virtually unique in Europe in having the country's premier port located in the heart of the city and all trucks must travel through the city. The proposed Dublin Port Tunnel will provide a 5.6 km link (4.5 km in a tunnel) from the port to the main highways when it opens in late 2005. However to encourage its use by trucks it will be untolled, whilst cars will be tolled 5 Euros (just over $7 in 2001 prices) to ensure they are discouraged from using the tunnel to ensure the new link does not become a new car commuter route into the city centre[17].

Area Scheme

3.30 Cordon tolls are fees paid by motorists to drive in a particular area, usually a city center. Some cordon tolls only apply during peak periods, such as weekdays. This can be done by simply requiring vehicles driven within the area to display a pass, or by tolling at each entrance to the area.

3.31 Their main purpose is to reduce congestion, improve mobility and address the external costs, such as the perceived cost of congestion, pollution and noise that the road user imposes on others. It is generally accepted that establishing trust is the prerequisite for these schemes to succeed, as the value of the benefits are realized long term. The scheme therefore needs to create the wide held belief that the overall benefits in the future outweigh the costs that have to be paid in the present.

3.32 Interestingly the Norwegian cordon schemes introduced in the 1980s/early 1990s resulted in significant reductions in traffic levels in each case, but congestion management was not the aim. The toll rings were introduced in the teeth of fierce opposition with the specific aim of raising revenue for transport infrastructure investment and congestion reduction was merely a welcome side effect.

3.33 The main examples of the schemes are summarized in the table below.

[15] Samuel, P. (2005) **Ibid** pp. 5

[16] Local Transport Today (2005) **Ibid** pp. 17

[17] www.nra.ie/News/PressReleases/2004/htmltext,764,en.html

TABLE 3.4 AREA SCHEMES

Scheme	Effect on average speed	Effect on traffic demand	Effect on transit
Singapore Area Scheme	Charging adjusted to target speed of 35-65kph for expressways and 20-30kph for arterial roads.	Transfer from manual to electronic system resulted in 15% traffic reduction. Only slight increase since then.	65% of commuters use transit, up from 46%.
Oslo Cordon Scheme	Information not available	Immediate reduction in traffic of 5%. Reduction in the centre of Oslo 20%.	20% of revenue earmarked to public transport. This has been used to finance metro and expanded bus network.
London Congestion Charge	Traffic speeds increased by 37% and journey time on round trip to and from the zone has dropped 13%.	Number of vehicles driving within the zone has fallen 16%.	Increased bus reliability and shorter journey times helping commuters and improving bus efficiency.

3.34 It is worth remembering that these schemes cover relatively small areas of city centers with high traffic densities and a good provision of transit alternatives. That is the reason why pursued by a number of European cities following the success of the London scheme whilst in the US only Boston and San Francisco are considering.

3.35 The Fraser River provides natural barriers and bridges to make clear charging cordons. However considering the above, it is difficult to view its appropriateness to Port Mann and/or Highway 1. Indeed the Burrard peninsula is probably the only potential candidate for cordon tolling in BC.

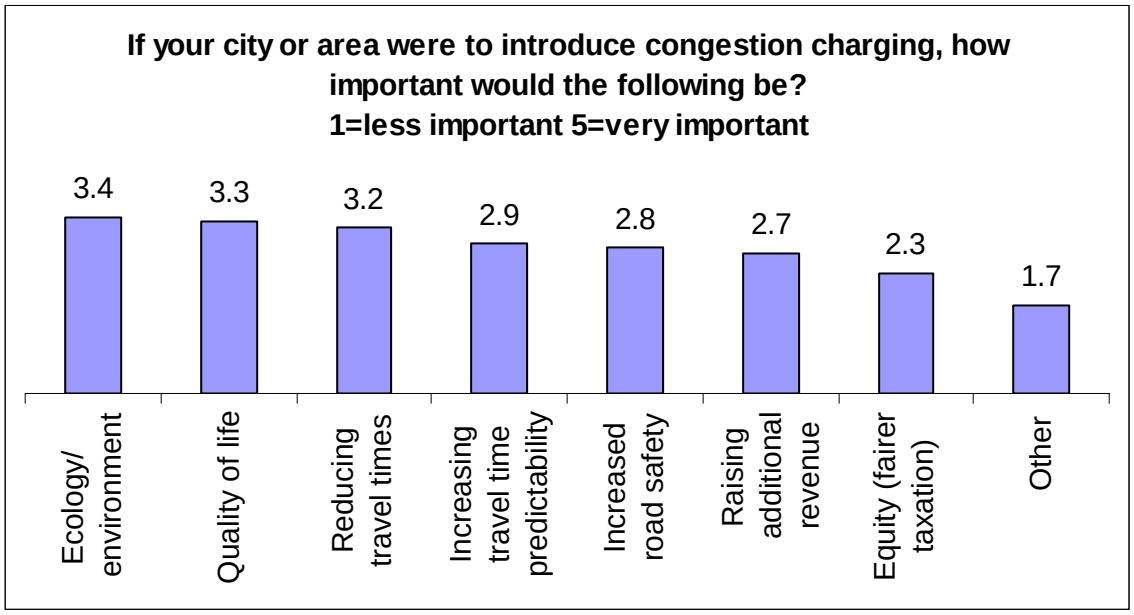
4. ROAD PRICING ISSUES

Objectives

4.1 Traffic congestion leads to lost productivity caused by delays and uncertain travel times. Whilst there is no "standard" method to measure congestion and its costs, it is increasing throughout BC and, in particular, the Lower Mainland. Transport 2021 estimated the cost of truck congestion in the Lower Mainland to be $110 million annually as of 1993 whilst in 1999 the BC Trucking Association estimated the costs to the trucking industry alone at $500 million annually. More recent work using the regional transportation model puts the estimate between $750 million and $1.5 billion[18].

4.2 While economic costs are considerable, the environmental benefits should not be understated, particularly in the view of policy makers. The results of a major survey of 47 municipalities in 15 European countries on congested road user charging are summarised in figure below[19].

FIGURE 4.1 REASONS FOR INTEREST IN ROAD PRICING



SOURCE: Deloitte Research (2004)

[18] TransLink (2003), **Ibid,** pp 22

[19] Deloitte Research (2004), **Combating Gridlock**, Fig. 5

4.3 It is generally acknowledged that road pricing has two objectives, revenue generation and congestion management[20] where the congestion management objective is generally part of a transport demand management (TDM) strategy. In fact this is a specific policy area of TransLink's Transport 2021 strategy which says:

- "The Province should apply road pricing/tolls with the long run purpose of shaping travel demand in addition to obtaining revenues. The Province should not remove tolls unless it is clear that the external costs the automobile have otherwise been accounted for and are recognised by the user."

4.4 This contradicts the Ministry of Transportation's tolling guidelines where revenue generation is the only objective explicitly mentioned (see paragraph 2.1.7). This is particularly important as the public perception of road pricing improves considerably when viewed as part of an overall transport strategy rather than a revenue generating project alone. This is expanded in the following sections where the concerns of road pricing are covered.

Concerns

4.5 Whilst there will be differences between the concerns caused by a tolled stretch of road (where there are alternatives) and a cordon (where all traffic crossing cordon is liable to a charge), we have grouped these concerns as common to most road pricing schemes even though some of these effects will be greater in some cases.

Public Response

Concern: The public see road pricing as another tax collecting measure and it is inherently unpopular.

4.6 Even when the funds are reserved to transport measures e.g. to improve transit, people fear that they will become part of overall tax burden. This is also articulated as the view that road pricing revenues are seen as a blank cheque to the transport authority or as a case of double taxation, since motorists pay road user fees such as fuel taxes and vehicle registration fees.

4.7 However, existing road user charges in North America are insufficient to cover total roadway costs[21]. Direct user fees are generally the most equitable way to fund improvements because they can represent the actual cost of providing capacity on a particular stretch of roadway, and so avoid cross-subsidies from motorists who do not drive under such conditions.

[20] vtpi (2005), **Congestion Pricing, Value Pricing, Toll Roads and HOT Lanes**, TDM Encyclopaedia, Victoria Transport Policy Institute (www.vtpi.org)

[21] Federal Highway Administration (1997), **Federal Highway Cost Allocation Study,** US Department of Transportation

4.8 Moreover the most persistent finding across a range of national cultures is that the acceptability of road pricing improves significantly when the revenues are hypothecated (or 'reserved') to the development of transport generally[22].

4.9 This is confirmed by work done by Jones arguing that the road pricing can attain objectives required (congestion management and revenue generation) but it must be part of a package of complementary transport and land use measures[23].

4.10 Nonetheless there usually is scepticism before any road pricing scheme is implemented. In Stockholm public is split roughly 50:50 on the subject of congestion charging (with referendum due in 2006 following trial period)[24].

4.11 Whilst in Edinburgh the public rejected road pricing comprehensively in February 2005.

BOX 2: TACOMA NARROWS BRIDGE

Congestion is a problem on the State Route 16 corridor. Daily traffic flows of 90,000 vehicles use the bridge today and use is estimated to increase to 120,000 by 2020.

To remedy this a new suspension bridge is being built parallel to the existing bridge, providing two general purpose and a HOV lane for eastbound traffic. The existing bridge will be reconfigured to provide two general purpose and a HOV lane for westbound traffic only. When the expanded bridge opens in 2007 there will be a $3 toll for eastbound traffic (one way toll possible as there are no feasible alternatives).

However the introduction of the toll required a referendum as the present bridge is untolled. This was passed in 1998 where residents faced the question:

Should the Tacoma Narrows Bridge be modified and a new parallel bridge constructed, financed by tolls on bridge traffic and operated as a public-private partnership?

Source: www.wsdot.wa.gov/projects/sr16narrowsbridge/

4.12 However these are cordon congestion pricing schemes and there are examples of referendums won, such as the Tacoma Narrows Bridge (see Box 2) and in the Confederation Bridge's referendum in 1993 almost 60% voted in favour of a tolled fixed link.

4.13 Moreover experience from schemes on the ground show shift in perceptions once the scheme is implemented, as detailed below.

- In Trondheim (Norway) 72% of people opposed road pricing in 1991. By 1996 this had reduced to 36%.
- In London 50% support/tend to support congestion charging versus 30% who oppose/tend to oppose it.
- As part of SR91 (California) surveys, 50-75% of respondents approved on toll facilities across most commute groups.

[22] Lyons, G., Dudley G., Slater E. and Parkhurst G. (2004) **Evidence-Based Review - Attitudes to Road Pricing**, Centre for Transport & Society, UWE

[23] Jones, P.M. (1998) **Urban road pricing: public acceptability and barriers to implementation**. In K.J. Button y E.T. Verhoef (eds), *Road Pricing, Traffic Congestion and the Environment*, Edward Elgar, Cheltenham, pp. 263-284

[24] Local Transport Today (2005) **Road User Charging** Spring 2005, pp 6

4.14 Within the Lower Mainland, consultation carried out by TransLink regarding the Golden Ears Bridge (in focus groups and open houses) shows that people support tolls as a fair way to fund new transportation infrastructure. An independent poll by BCAA of its members indicates that 73% of BCAA members support or somewhat support the implementation of tolls to recover construction costs on new highways and bridges[25].

Equity

Concern: It is unfair to certain segments in society like low-income users or people living in charge zone who are effectively 'forced' to pay a charge because of where they live.

4.15 Road pricing can impose a financial burden on motorists dependent on that roadway. It is argued that this impact generally declines over time as consumers adjust to new prices, and can be minimized if road pricing implementation is predictable and gradual. For example, if it became public policy that all new suburban highway capacity expansion projects will be paid through user tolls, people could take that into account when considering whether to purchase a home that would require frequent highway trips[26].

4.16 Road tolls represent a greater financial burden on lower-income motorists than on higher-income motorists, but they are not necessarily more regressive than other road funding options, such as fuel taxes or general taxes. Whether a toll is regressive overall depends on how much lower-income consumers drive on such highways, the quality of travel alternatives, and how revenues are used[27].

4.17 Indeed some evidence suggests lower-income motorists are sometimes willing to pay for time savings, indicating that pricing strategies that prioritize trips can provide a transportation choice that is valued by motorists of all income levels. For example, user surveys of the SR91 Value Priced lanes, in which motorist can pay a premium to drive on a less congested lane, show that almost 20% of the lowest-income class of motorist (less than $40,000 annual income) uses the lanes on a frequent basis[28]. Indeed it has been argued that HOT lanes in particular can provide equity benefits by improving mobility options for transit and rideshare users.

4.18 There are also practical methods to counteract the equity charge by providing discounts to certain categories of users (such as residents within the charge zone in London) or by using revenues to improve transit public transport (such as the Norwegian Cordon Schemes and in San Diego).

[25] www.translink.ca/goldenearsbridge/project_information/funding.asp

[26] vtpi (2005) **Ibid**

[27] Litman, T. (1996) **Using Road Pricing Revenue: Economic Efficiency and Equity Considerations**, Transportation Research Record 1558, Transportation Research Board, pp. 24-28

[28] Sullivan, E. (2000) **Continuation Study to Evaluate the Impacts of the SR91 Variable-Toll Express Lane Facility**, Civil and Environmental Engineering, Cal Poly State University

Economic Impact

Concern: Road pricing applies distorting effects on economic activity.

4.19 This claim is generally more relevant to cordon schemes where access to an area is tolled and therefore traffic will avoid it, thus impacting the local economy. However data on the economic impact of road pricing is limited.

4.20 Latest data from the London congestion charge reports "net impact of the scheme on the central London economy has been very marginal"[29]. Quantitative information for Singapore is not available but the Land Transport Authority (LTA) reports of no signs of adverse effects on local business.

4.21 In Trondheim (Norway) travel surveys gave no indications of significant changes in shopping trip destinations with charge zone shopping trips increasing in toll-free periods (evenings and weekends) and decreasing in tolled periods[30].

4.22 On a more hypothetical scenario, businesses in three historical towns in the UK were surveyed on their perception of transport problems and the impact of road pricing and workplace parking levies. The businesses considered road congestion and inadequate transit provision as serious problems, and that road pricing would produce environmental improvements. However they were concerned this would have negative effects on their business and in their capacity to recruit and retain staff. It concluded that this reticence can be drastically reduced if the clear benefits to the town and to the businesses of these policies are communicated effectively[31].

Traffic Effects

Concern: Traffic will avoid user changes and re-route to an alternative free route (redistribution).

4.23 Road pricing can cause problems on the boundaries of cordon tolls. It is feared that drivers will park just outside the tolled area (to continue their trip on foot or transit) or that they will reroute and avoid the toll area thus increasing congestion in previously uncongested areas. For tolled links it is argued that free alternatives will see substantial increases in congestion. Regarding the first issue, experience in London shows an absence of boundary-related problems[32] whilst for tolled links there have been cases of extensive diversion occurring in the US, although only as a result of "earthquake pricing".

[29] Transport for London (2005) **Central London Congestion Charging Impacts Monitoring – Third Annual Report**, pp. 2

[30] www.progress-project.org/Progress/Tron.html

[31] Gerrard, B., Still, B. and Jopson, A. (2001) **The impact of road pricing and workplace parking levies on the urban economy: results from a survey of business attitudes**. Environment and Planning 33A, pp. 1985-2002

[32] Transport for London (2005) **Ibid,** pp. 3

4.24 This is where toll authorities have toll rates frozen for many years and then applied a large increase. This leads to traffic, particularly trucks, to divert onto local roads after the toll increase[33]. In Illinois, for example, the state toll authority imposed a hefty toll increase on truckers in January 2005 and soon after the toll increase, media reports indicated a 100% increase in truck traffic on a northern stretch of an alternate route, U.S. Highway 41.

Concern: Increase in capacity will result in more traffic on the highway network (induced demand).

4.25 New highway links (even when tolled) attract traffic from surrounding road network, improving conditions on the routes being relieved and often in turn leading to more traffic on these routes, so called induced traffic demand. This is illustrated in Box 3.

4.26 Another example is the M6 Toll, Britain's first tolled motorway, providing a strategic alternative route to the congested M6 near Birmingham. The M6Toll has improved travel times considerably but has also resulted in extra traffic in the corridor. Initial estimates show the number of vehicles on the M6 corridor have increased from 144,000 in November 2003 (before scheme opened) to 160,000 in November 2004[34].

BOX 3: STATE ROUTE 91 SOUTHERN CALIFORNIA

Four-lane tolled section of SR91 opened in 1995 to relieve pressure on the free 8-lane highway.

Very dramatic improvement in amount of congestion on untolled section but phenomenon did not last long. Trips cut to 25-30 minutes on the free section and 15 minutes on the tolled section when scheme opened. However by 2000 traffic levels on the untolled section were back to their old levels.

Scheme since then encountered problems as California's DOT suggested building additional untolled lanes and was threatened by legal action by the toll operator because a 'non-competition' clause in their agreement with the state of California (the more congestion on untolled section the more motorists prepared to pay to travel without congestion).

The state of California bought out the operator and then hired the same company to carry out the day-to-day running of the tolled section. The additional lanes of untolled highway are yet to be built.

4.27 This raises the issue of 'locking in' the benefits of any highway improvements (i.e. to contain traffic levels within the capacity provided by discouraging induced traffic).

4.28 For example, several major highway studies in the UK have recommended that additional capacity in the absence of such control would be shortsighted, and would result in requests for further widening in a few years. As a result, decisions to increase capacity on the strategic network are now taken with a parallel commitment to consider what is necessary to ensure the effective measures are in place to lock in the benefits[35].

[33] Samuel, P. (2005) **Should States Sell Their Toll Roads?** Reason Foundation Policy Study 334, pp. 20

[34] House of Commons Transport Committee (2005) **Road Pricing: The Next Steps**, Volume 1, pp. 33

[35] House of Commons Transport Committee (2005) **Ibid** pp. 26

5. LESSONS LEARNED

5.1 Deloitte identify ten strategies for successfully making the transition to road user charging. However as the report highlights "politics is by far the greatest challenge: almost everyone who has been through a project of this kind will say that in retrospect the political and policy problems loomed largest"[36].

5.2 Additionally the need to ensure that road pricing decisions are transparent and built on public participation and trust is a constant theme throughout road pricing reviews.

5.3 The ten strategies identified by Deloitte to make the successful implementation of road pricing are:

PLANNING

- 1. Recruit an influential champion[37].
- 2. Keep the public stakeholders informed and on your side.
- 3. Secure cooperation from third parties.
- 4. Make it part of an integrated strategy.
- 5. Counter the "just another tax" charge.
- 6. Pick the right scale and pace.

IMPLEMENTATION

- 7. Use proven technology.
- 8. Focus on customer relationship management.
- 9. Ensure a successful debut – plan appropriate contingencies.
- 10. Don't lock yourself in.

5.4 With reference to the Gateway Programme the public consultation process is a very important process as this can potentially deal with points 2 and 5 whilst cooperation with TransLink would aid the definition of points 3 and 4.

[36] Deloitte (2004) **Ibid** pp. 24

[37] Person who will take up the cause and speak up for it effectively and persistently. Most pricing projects that have made it all the way to implementation have had strong champions

5.5 With regards to the public consultation, numerous studies into road pricing have focused on economic benefits and the ability of technology to deliver them. However they have tended to gloss over a key point, namely public acceptability. "To put it bluntly, if the benefits are so good, and the technology can deliver, why aren't more public authorities around the world implementing road pricing to improve their competitiveness, protect their environment and promote social inclusion?"[38]

5.6 Thus to accept road pricing, people need to agree that it would deliver a solution to an issue that they can see needs addressing, with trust in the implementing authority a crucial component of that process. Identifying potential opponents and developing measures to gain their support (or alternatively reduce their opposition) is critical for success.

[38] UK Department for Transport (2004) **Feasibility Study of Road Pricing in the UK - Summary** Paragraph 2.3

APPENDIX A

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