DEVELOPMENT OF TOLL ROADS

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Abstract

Toll roads have re-emerged over the last few decades as a result of growing transportation problems outpacing government funding sources. This thesis provides a general background on tolling and public-private-partnership issues that arise when developing public and private toll roads. The following are some of the major findings: (1) Build-operate-transfer arrangements are extremely complex financially and legally. (2) The major obstacle in developing toll roads is overcoming public opposition. Where public opposition has been fierce, the issues have become political agendas, which have delayed or stopped the project. (3) Most toll roads have failed to meet their toll revenues. Based on a report by Muller and Morgan (1996), 10 of 14 toll roads missed their projections by 20% to 75% in the initial years after opening. The cost and time to develop the agreements are grossly underestimated. (4) Private toll projects are costly and delayed because of lengthy land negotiations, lack of definition in the preliminary design, and stringent environmental reviews and approvals.

The findings from this study show that the use of private toll roads will be limited unless government is willing to support the private sector by providing financial contributions and clearing the project of land and environmental approvals, where possible. If government does not provide substantial support for development of private toll roads, the future trend will lean towards public toll road development, assumed by an authority that would be responsible for a number of toll projects for the following reasons: (1) Lack of available private toll road projects that would be profitable and capable of being supported by tolls alone. To increase revenues and reduce diversion, a system of toll roads will be required. (2) Based on past toll road revenues, the private sector will be more cautious in entering build-operate-transfer (BOT) agreements and lenders will be more cautious with their funds. Non-recourse financing will be more difficult to obtain. (3) Reduced project cost by reducing the time required to develop private agreements and to obtain right-of-way and environmental approvals.
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Preface

This thesis was completed while I was employed by the Ministry of Transportation and Highways. However, my Master of Applied Science degree was completed independent of my employer and does not reflect the opinions or the views of the B.C. Provincial Government. When developing this paper, no special consideration was made in the interest of the Ministry of Transportation and Highways. This thesis provides a general analysis of the issues related to the development of toll roads in North America.
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1 Introduction

Toll roads have re-emerged over the last few decades as a result of growing transportation problems outpacing government funding sources. The public is not receptive to further tax increases and it is difficult for governments to reallocate existing revenues to transportation given other public sector needs.

Tolls are one means of addressing financial limitations by internalizing the transportation cost directly to users. "In most cities, passenger transportation is provided to users at less than cost: for instance the private automobile and public transit are both subsidized – directly through the public purse and also indirectly through the hidden costs they impose on the environment and non-users. One estimate is that travelers on all transport modes combined pay only 2 / 3 to 3 / 4 of the full economic costs." (GVRD and Province of British Columbia, 1993)

Tolls can be a funding source to build needed transportation improvements as well as a transportation management tool to reduce congestion and people's dependence on the automobile. In light of the fact that essential transportation improvements are required, tolling is a publicly sensitive topic as it is still viewed as another tax. In order for tolling to be successfully implemented, government must understand the impacts and benefits of tolling. The full merits of applying tolls must be reviewed case by case and considered carefully.

The feasibility of applying tolls on a project will depend on public acceptance and toll revenues. The selection of projects suitable for tolling requires careful analysis and evaluation. The financial viability of a project is dependent upon toll revenue forecasts. These forecasts are used to determine the ability of a project to pay debt service on bonds or to provide returns on equity to private developers. The accuracy of the forecasts is critical in determining the credit quality of potential projects.

After identifying potential toll projects, the technical implementation of tolling must be considered. There are many different ways to implement and collect tolls. An appropriate design and technology should be selected to ensure toll revenues are efficiently collected.
Toll roads can be publicly or privately developed. There are essentially three options for the development of roads: status quo highway development is traditional project delivery with public financing; public toll highway development is tolling with public ownership, typically under the responsibility of an authority; and, private sector toll highway development is tolling with private sector financing and ownership over a concession period. Each option should be evaluated to determine the best value for money and cost-effective delivery method. For status quo highway and public toll highway development, a public-private-partnership model using design-build should be considered. For private toll highway development, public-private-partnership model using build-operate-transfer is normally used.

The development of private toll roads is complex financially and legally. Private road development requires government support in a number of areas in order to be successful. Significant upfront planning should be undertaken to define responsibilities and allocation of risk. This thesis provides a general background on tolling and public-private-partnership issues when developing both public and private toll road projects. However, there is more emphasis on the review of issues specific to the development of private toll road projects because of its complexity.

The methodology used in this thesis is based on thorough research of materials and case studies on the topics related to tolling and public-private-partnerships. Chapter 2 provides a brief background in the history of toll roads. Chapter 3 provides some insight into the application of road tolls and the implications of tolling as well as a discussion of the criteria in identifying tolling projects. Chapter 4 provides information on some of the issues to be considered in public-private-partnership arrangements when developing private toll roads. Then in Chapter 5 a sample of different public and private toll projects is reviewed to learn from experiences encountered in past toll road projects. A detailed discussion of nine agencies is undertaken to identify the high level issues each agency dealt with during the development of the toll projects. As the level of information varied among the agencies, the discussion cannot be structured using a standard format. However, a structured summary table is compiled at the end of the chapter to provide detailed information on the sample of toll road projects reviewed for
comparison purposes. Chapter 6 provides conclusions and some recommendations to be considered for future toll road development.
2 History of Toll Roads

Toll roads date back to the 17th Century in France, Britain, Ireland, and the United States where companies invested in the construction of highways and turnpikes and obtained a return on their capital investment by applying tolls. In United States, toll roads continued well into the first half of the 19th Century, often considered the era of private turnpike building. However, private turnpike building ended in the second half of the 19th century with the construction of railroads. The railroads provided transportation for long hauls and allowed the use of steam locomotion technology. With the introduction of the railroads, most toll roads fell short in profit and went into bankruptcy. The control of most toll roads was then assumed by the public sector.

In the early part of the 20th Century, road-building interest rekindled when internal combustion engines came into being. The majority of road building was focused on building primary systems and paving roads between farms and markets. In the 1920s and 1930s, many states used road tolls as a means of financing the construction of higher performance facilities. Although toll roads re-emerged, they were unlike the 19th Century turnpike era insofar as the public and not the private sector built them.

The outbreak of World War II stopped all road construction. At the conclusion of the war, toll road construction began in earnest especially in the northeastern area of the United States (US). By the end of 1950s, over 3000 miles of toll roads were in service or under construction. This surge in public toll road building came to a halt in the mid-1950s when the United States decided to build a fully integrated high-performance national highway system. Most existing toll roads were adopted into the Interstate Highway Program as it was thought a national highway program would be more easily financed or cross-subsidized by a tax-funding program than through a state-by-state development of toll roads.

With most of the Interstate System completed by the 1970s, major concerns arose regarding the maintenance of the existing roads and the development of new roads, which were under capacity or required extensions to serve new growing
areas. With high inflation in the 1970s and a lack of funding, consideration of toll roads re-emerged. Due to the growth of skepticism in the capabilities and effectiveness of government in the 1980s, toll roads were now being considered in the context of both public and private facilities. Thus, in the 1980s, private toll roads were again seriously considered and developed. "A report by the International Bridge, Tunnel and Turnpike Association cited the following reasons for the resurgence of toll roads in the US: limited government resources are available to fund new highways and/or upgrade current highways since taxation revenue has been outstripped by the increasing cost of building and maintenance; a growing deterioration of transportation infrastructure at a time when demand for surface transportation is accelerating; public recognition that there are no free highways, users ultimately pay for highway facilities whether by tax, toll or some other method; and development of new tolling technologies that can reduce the cost of toll collection while also reducing motorist delay and traffic congestion; and tolling is recognized as an opportunity to attract private sector financing and therefore leverage scarce public resources." (Gomez-Ibanez, Meyer, and Butler, 1991)

In Canada, the history of toll roads is not as substantial as in the United States. Toll roads have occurred in both Ontario and British Columbia. In British Columbia, tolling occurred on the bridges over the Burrard Inlet. The first privately financed bridge over the Second Narrows of the Burrard Inlet was conceived in 1909 but not completed until 1927. The onset of the First World War from 1914-1919 caused some delay but the company was responsible for the majority of the delay. Various municipal and regional governments purchased shares in the company; however, they received almost no return on their investment due to the 18-year delay.

The second privately financed bridge was the Lions Gate Bridge over the First Narrows of the Burrard Inlet. Due to the lack of return on investment and the delay in the construction of the Second Narrows Bridge in 1909, government maintained their involvement and investment at a minimum. In 1928, the Lions Gate Bridge officially opened. In 1953, with the bridge free of debt after a 25-year concession
period, the provincial government purchased the bridge from the First Narrows Bridge Company.

A new crown corporation called the British Columbia Toll Highways and Bridges Authority was established to administer the Lions Gate Bridge. From 1953 to 1964, the Authority administered the collection of tolls from a number of provincial bridges, tunnels and highways. The tolls collected were generally used to service the interest costs on the construction debts. Although the tolls were intended to service the debt, the newspaper and political opposition attacked the government for not utilizing the tolls to generate extra revenue. W.A.C. Bennett's government was politically attacked and rather than defending the Authority, the government abandoned tolling.

The next development of a toll facility in British Columbia was the Coquihalla Highway opened in 1986 for the World's Exposition Fair. The Coquihalla Highway is somewhat unique compared to most of the recent toll road projects, as neither a public authority nor the private sector delivered it. The provincial government developed the Coquihalla Highway through tax-supported debt because traffic volumes were not sufficient to recover the cost of construction.

Recent interest in toll roads have been developed by a public authority or by private developer as seen in the examples in Canada such as the Highway 407 in Ontario, the Fredericton-Moncton Highway in New Brunswick, and the Northumberland Strait between Prince Edward Island and New Brunswick. The procurement of these projects along with some examples from the United States will be discussed in more detail later.
3 Tolling

Tolling has been used in most countries in the past, but it remains a very controversial and politically charged topic. This section will discuss the justifications of tolling, impacts of tolling, identification of tolling projects, and tolling implementation. Even though there may be valid reasons for applying tolls, it is important to understand who would and would not benefit from tolling to assist in developing tolling policies. For tolling to be an acceptable means of cost recovery, it must be publicly acceptable and provide sufficient toll revenues. Finally, although logistically tolls are desirable, there remain some basic considerations in implementing tolls.

3.1 Justifications of Tolling

Governments will be financially challenged to build new road infrastructure to meet growing public demands and expectations. Governments are looking toward tolling as a way of financing new transportation infrastructure where it was previously financed purely from tax revenues. Tolls are a way of distributing the cost to those who receive the benefits. For some government agencies, tolls are also used to manage traffic congestion and to maximize the use of certain facilities. If it is more expensive to travel, commuters will look to public transit or car-pooling to reach their destinations. By applying peak hour pricing, tolls can be applied to adjust the time when people travel to reduce rush hour traffic and spread out traffic patterns over the day.

Government resources are limited for transportation improvements due to aging infrastructure, rising cost of road maintenance, and growing population demands for new road infrastructure. In addition, the public has as its' number one concern a high level of social welfare to maintain quality of life. Particularly in Canada, priority for tax spending has been allotted to health care and education. Most governments' primary reason for looking at tolls is the lack of government funding to meet vital transportation needs. Even so, other justifications
of tolling are based on opportunity cost, externalities, and fairness/equity. The most controversial justification is fairness/equity.

3.1.1 Opportunity Cost

Tolling can finance new infrastructure where financing was previously based purely on tax revenues, thus, freeing taxes for other use. "Taxation issues are a substantial concern of many Canadians, and it is generally recognized that the public has reached its limit in terms of the tax burden presented by all levels of government. The reaction from the public to any general tax increase will be negative." (B.C. Ministry of Employment and Investment, 1998) Although tolls are still viewed by some as another tax, tolls target those who directly benefit. Tolls will fund transportation facilities, which would have required funding from general taxes used for other government programs.

Based on a report Going Places: Transportation for British Columbians: "If the government maintained its average per capita transportation investment of the past 10 years (some $400 per person), its expenditures for transportation would have to increase to $1.5 billion per year. The public will not accept further tax increases and it is difficult to reallocate the government's existing revenues to transportation, given growing health, education and other public sector needs". Existing roads have been deteriorating and cannot meet public demands and expectations. The situation will not improve because there are other competing public needs that must be met. Thus, tolls will provide the funding for transportation facilities where tax revenues are unavailable.

3.1.2 Externalities

Most people view the cost of travel as the internal cost of transportation, which are the vehicle operating costs (gas and maintenance) and the value of their time. Individuals usually ignore the external costs of traffic congestion and pollution imposed on the environment and society as a whole. Tolls are one way of adjusting people's attitudes towards the real cost of travel so commuters will look at alternate ways of reaching their destination such as public transit or car-pooling.
Tolls can be used as a means to control traffic patterns, reduce urban sprawl, and reduce people’s dependence on automobile usage. Tolls can adjust the time when people travel to reduce rush hour traffic and spread out traffic patterns over the day to reduce congestion during peak periods. As established in a document produced by the Greater Vancouver Regional District (GVRD) in British Columbia, “the primary economic goal of the transport system is to move people and goods effectively, efficiently, safely, and reliably. In addition, the region’s citizens expect their transport system to meet social and environmental goals, such as to help reduce its negative impacts on the region’s livability (e.g. limit urban sprawl and land consumption, preserve green space, limit congestion and traffic intrusion into local neighborhoods, and cut air and noise pollution).” (GVRD, 1993)

“The present free use of highways and bridges amounts to a large subsidy to car makers, car owners, and those who fled cities for the manicured lawns of suburbia. The subsidy diminished the advantages of railways and their commercial value, while increasing pollution and congestion, and emptying the downtowns of cities. With the car infrastructure subsidized, privately financing other means of transportation becomes harder, leading to their decline or disappearance.” (Brenner, 1999)

3.1.3 Fairness

Roads are generally considered as a public good that is non-rival in consumption and non-exclusive. Thus, government should provide some means of transportation. In order to server the people, transportation is best provided through transit initiatives rather than building new roads. All taxpayers through taxes regardless of extent of use normally provide the funding for costly transportation infrastructure. The use of tolls attempts to make users pay for the direct benefits. Tolls will allow new infrastructure to be constructed to meet the demands of certain users such that those who want higher level of road service will have the option to pay for the service rather than having all taxpayers pay for it. Although it appears to be fair in that road users pay for the benefits received, there are distributional issues
that need to be reviewed and they are discussed in greater detail in the next section on impacts of tolling.

### 3.2 Impacts of Tolling

By understanding the sensitivities and the impacts of tolling, it allows tolls to be implemented in a publicly acceptable manner. There are "important social objectives of tolling: maintaining the users perception of fairness, promotion of certain usage of the facilities and discouragement of others, and incentives to use the facility based upon time of day, congestion levels, etc." (Transport Canada, 1998) Even though tolling will increase societal benefits, there will be winners and losers. In order to understand the concerns regarding tolling, it is important to recognize who will gain and who will lose from tolls. "An important consideration in assessing ... pricing options is equity – how costs and benefits of the options affect particular groups. Such consideration will help chart the most politically feasible course, help determine those made worse off and where compensatory actions, if needed, should be focused" (Bhatt, 1993).

As the system works right now, everyone subsidizes road transportation regardless of frequency of use. Although there are benefits to tolling, some still view tolling as inequitable or just another tax. Thus, it is important to understand the impacts of tolling so when government chooses to implement tolls, the policies are based on the desired outcomes with the least impact.

The magnitude and incidence of impacts to who would and would not benefit depends on the design and scope of the tolling program: area wide pricing and single facility pricing. Each method will have different impacts and will have different effects on different user groups. The discussion below is based on an analysis of both who would benefit and who would lose as a result of a single facility tolling program.

It is important to note that area wide pricing will achieve different objectives. Area wide pricing is often implemented to manage traffic patterns and to promote more efficient use of the overall transportation network. The primary justification for area wide pricing is traffic management while revenue is secondary. Area-wide
tolling programs are normally developed by the public sector because the tolls are applied to existing and new facilities. It is understood that area wide pricing will be a more efficient means of managing the overall transportation network, however, this thesis focuses more on the opportunities for the development of single facility toll projects in order to assess private toll road development. Nevertheless, it is important for government agencies to assess area wide pricing and single facility pricing prior to adopting a tolling program.

Normally, single tolling facilities have competing free routes, which cause trips to divert from existing routes. This may have significant traffic impacts on supporting road networks especially between the tolled and competing toll-free route. In some cases, vehicles may also travel further to change their trip patterns to either pay or avoid a toll, which works against demand management initiatives. Although area-wide pricing would reduce both trip attraction and diversion from surrounding road networks, it may be more controversial from an equity point of view in that there are no free alternatives.

3.2.1 Who Would Benefit From Tolling

Facilities funded through tolls provide a choice to people who would be willing to pay for a less congested and faster service. These users value their time highly and the value of timesavings obtained from lower congestion and increased speeds outweigh their toll payments. Commercial vehicles will also benefit from improved services, as delivery costs are a significant portion of their cost of doing business.

Generally, the users who would benefit are high-income groups but their willingness to pay for transportation will reduce their demand on free facilities. Thus users of the free facilities will also benefit from reduced congestion from trips that are attracted to the tolled facilities. Although this is an equity concern, there are benefits to both toll free and tolled users. The equity issue should be dealt with to ensure that government does provide an adequate free transportation service.

Taxpayers would also benefit from reduced taxes or no increase in taxes, especially for those who are not big consumers of transportation services. Toll revenues collected can also be used to compensate or improve other services such
as transit. Although it is unfair to use toll revenues to subsidize transit, the overall benefit to society is greater both from a social and environmental perspective.

People located in geographical areas where there is limited transportation facilities would benefit because roads can be constructed to developing areas where general tax revenues would either not be able fund them or they are low in priority. This would also be a benefit to businesses and developers where new access would be provided.

3.2.2 Who Would Lose From Tolling

Although users of the new facility would benefit from the increased level of service, they may feel that it is unfair they have to pay for a facility that was previously provided free. They may feel the service should be provided from the taxes paid. People who cannot afford to pay a toll will feel it is inequitable and that there is a two-tier system for the rich and the poor.

Generally, tolls have a negative impact on low-income groups. In theory, users will pay for the service if there is a gain in travel speed as a relation to the value of time saved. For low-income groups, it is perceived from an economic sense that their value of time is low; hence they would not benefit from paying a toll.

Tolls may have a disproportionately greater adverse impact on women road users compared to men, as women tend to be a larger proportion of low-income road users. In addition, women generally have travel needs that are more difficult to satisfy via alternative modes such as transporting children to day-care facilities. As well, women workers are more likely to hold inflexible jobs in terms of work schedules that do not allow them opportunity to shift to other travel means and periods. The value of time to this group does not adequately reflect the true value of their time in terms of social values.

Tolls applied on certain facilities and not other facilities may appear to be unfair to those who have to pay both taxes as well as tolls. Equity issues related to geographical areas where toll facilities are implemented will be a concern to different geographical groups. In locations where tolls are applied on an existing facility, the impacts are greater because it now affects existing users of the facility as well as
users of other competing toll-free facilities. Travelers who are on toll-free facilities may experience increased congestion as a result of people diverting from the toll route to the toll-free route. This may cause an involuntary shift to other transportation modes, routes or travel times. In some cases where the shift is to other routes of greater travel time and distance, this is a negative impact on the user as well on the environment.

Although many businesses will benefit from improved speeds for the delivery of goods, some businesses may be disadvantaged from new competition entering the area. In addition, local businesses around toll routes where it was previously free may suffer if traffic is diverted from toll routes to non-toll routes.

Diverted trips from tolled facilities to non-tolled facilities may have negative impacts on neighborhoods around the toll-free facility. Noise and air pollution may increase around the toll-free facilities and impact the local road system. Tolls may create impacts on other road networks and on businesses as a result of trips diverting from tolled facilities to non-tolled facilities.

3.3 Identification of Tolling Projects

The success of a toll project is dependent on public acceptability and toll revenues. The following section will discuss these criteria as well as a brief discussion on projects in urban versus rural locations.

3.3.1 Public Acceptance

Most governments, transportation planners and economists support the concept of tolls; however, the success and viability depends significantly on public support. Some people acknowledge the benefits of tolls; however, the overall attitudes still vary around different areas. A poll completed by Transport Canada on Public-Private Partnering showed that public attitudes improved over time. "Prior to the opening of the Oslo toll ring in Norway in February 1989, the polls indicated that 71% of the public expressed a negative or neutral opinion regarding the toll scheme. Public opinion polls from 1990 to 1992 were also conducted after the tolls were introduced. The evidence from these polls suggests that the number of people who
supported the toll system increased over time (i.e. after it was opened and people could see the benefit associated with the toll facility), while the opposite was true for the number of people who opposed the toll system." (Transport Canada, 1998) The negative reaction to tolls reduced by approximately 10% from 1989 to 1992.

"In California, surveys were conducted before and after variable-toll lanes were opened on State Route 91 (SR 91). The idea of providing toll-financed lanes to bypass congestion consistently met with a 60-80% approval. However, ideas for varying the tolls based on congestion levels only met with a 45% approval." (Transport Canada, 1998) The low support rate for congestion pricing may be both a result of it being a new concept as well as not knowing what the tolls will be. "In 1988, the Urban Transportation Monitor conducted a nation wide survey of public attitudes toward toll roads as a funding source. The results indicated that over 66% expressed a negative or neutral opinion when offered a choice. However, when asked if they would support a toll road if a system of automatic tolls were implemented, the acceptance rate was 85%." (Transport Canada, 1998) In essence, the public is willing to pay for convenience, and is not opposed to a user-tax if it is properly administered. In some places the public’s willingness to accept toll roads depends upon the technique that would be used to collect tolls. However, this may not necessarily be true in Canada. Compared to the 1988 study conducted by the Urban Transportation Monitor mentioned above, the acceptance level of Canadians towards automatic toll roads is lower. On average, only 65% of Canadians would be willing to accept toll roads even with automatic tolling, compared to an 85% acceptance rate identified in the United States.

Prior to the opening of Highway 407, a survey was conducted to determine the potential toll road users (Transport Canada, 1998). Results indicated that, of the total of 1,657 people surveyed, 35% would not use the toll road at all; 17% would use the toll road under any circumstance; and 47% would use the toll road under some circumstances but not all. It was identified the biggest reason why public opinions regarding toll roads vary from country to country is due to the experience and familiarity each country has with toll roads and road pricing. This may explain why toll roads have been more easily implemented throughout most of Europe and
some parts of the United States. It is likely that as the public gradually becomes comfortable with toll lanes and can identify with the benefit; their support for them will increase with time.

Public support for toll roads depends on a person's financial and travel characteristics, such as income, trip purpose, frequency of travel, length of travel, and payment methods available. In addition, public perception of fairness or acceptance will depend on the current level of transportation service provided by tax dollars. It will be more difficult for the public to accept a tolled highway when most of the current highway system is provided free. In addition, people in one community where the toll highway is being implemented will consider it unfair and unjust when they look upon their neighboring communities where there are free highways. The issue may depend on the following: whether there is a free alternative available; if the public believes that the new road is needed; and, if the public believes that the highway would not be built soon with tax dollars. Whether it is tolled or untolled, another issue is public reaction to the impact the project has on land expropriations, unsightliness, environmental problems, and the land development or growth that the new road may generate. Over the last few decades, a big concern in overall transportation developments has been an increase in opposition from environmentalists, community activists, and others to new roads in their neighborhoods.

It is likely the public will accept tolling as a means of financing new infrastructure when it is clear there are no government resources to finance a desperately needed project. However, it is important that government has clearly reviewed how funding priorities will be allocated within different regions. For example, in British Columbia, tolling on the Lions Gate Bridge was difficult for the public to accept because the government had just spent over one billion dollars constructing the Vancouver Island Highway Project. The public will closely evaluate the fairness in government's allocation of resources.

In the U.S., the movement of toll roads "suggests that the American public will accept tolling when they perceive that public budgets are constrained and new roads are badly needed. Both Virginia and California adopted highway privatization
programs only after state studies revealed a large backlog of needed projects that could not be financed from existing revenue sources. In both states the studies recommended a gas tax increase, which were adopted, but forecast that resources would not be sufficient to meet highway needs even with these added revenues. A statewide shortfall may not be enough, however, to convince local communities and their elected officials that their particular road should be among the minority financed from tolls. Two general rules seem to apply. Tolls will be accepted only if local residents and officials feel (1) that there was little prospect that their road would be built as a free road; and (2) that the process for determining state or local road funding priorities is fair.” (Gomez-Ibanez, Meyer, and Butler, 1991)

Most transportation agencies and economists have viewed tolling to be successful in California, particularly on SR-91. However, in a report for the U.S. Department of Transportation prepared by the University Transportation Center, there are several examples where public acceptance and fairness were an issue at the onset of the SR-91 project. At one point, a dispute over tolling almost threatened to stop the project. SR91 connects Riverside County and Orange County and both counties planned to build a free high occupancy vehicle (HOV) median lane. Riverside County had begun construction of its portion when a private consortium proposed to build the Orange County segment as a tolled facility. As a consequence, Riverside County argued that high occupancy vehicles (HOVs) should be allowed free access to the tolled Orange County median lanes, in keeping with the original plan. A guarantee of free access for HOVs would have threatened the viability of the private proposal in Orange County because HOVs would eventually congest the toll facility making it unattractive to toll-paying single occupancy vehicles (SOVs). Eventually Riverside compromised to allow HOVs with only two persons to be tolled because Riverside residents wanted the facility built quickly. In addition, Orange County would not agree to free passage for all HOVs because it would require public funds to be taken away from other road projects of greater importance to Orange County residents. In the end, it was agreed that HOVs of 3 or more would be able to travel free on the route.
Two other projects in California, Midstate and SR-125, also demonstrated the mixed public reactions that can be encountered with tolling. For Midstate, the strongest objections was by California State Senator Lockyer who objected to tolls in principle because he felt it would create a two-class system where the rich would enjoy high quality toll roads while the less well off were forced to use inferior roads. Opposition to Midstate tolls was also fueled by the long-standing objections of Bay Area residents to tolls on the San Francisco Bay bridges. Furthermore, there was a feeling that tolls collected in addition to fuel and other vehicle excise taxes represent double taxation. Of the opposite view, there were neighboring communities on the Midstate alignment who supported the toll road largely because they perceived state and local resources to be inadequate to finance free highways needed near their communities.

For SR-125 in San Diego, the report for the US Department of Transportation states: "While not objecting to tolls in principle, some local officials in San Diego have argued that tolling SR-125 is nevertheless inequitable. The San Diego Association of Governments (SANDAG) had programmed segments of SR-125 north of San Miguel Road for construction as untolled freeways in the 1990s, but construction of the section in the south, which the private consortium proposes to build as a toll road, was deferred for almost 20 years. ... A state assemblyman from the area therefore now argues that his South Bay constituents were cheated in the complex countywide negotiations in which SANDAG's priorities were established, and has filed a bill that would essentially prohibit construction of the free sections of SR-125 until his objections to the inequity of tolling the southern sections are addressed. ... Nevertheless, debate over tolling is likely to seriously delay some projects. Equally important, potential objections about the equity of tolls may limit the opportunities for future private projects to those where the public very clearly perceives that a free road was not a realistic or timely possibility." (Gomez-Ibanez, Meyer, and Butler, 1991)

The examples above show the importance of public acceptance for the successful development of toll roads. Without public acceptance, implementation of toll roads can become a political battleground. If politics do not stop the project, it
will surely delay the process significantly and undermine the original goals of the project. In California, Caltrans selected 4 private toll road proposals in 1991. To date, it appears only one is actually constructed and operating. It is likely that the other three projects will never be constructed because of public opposition to tolls and other controversies.

The public is not accustomed to paying tolls in Canada, but as toll roads become more common in Canada it is likely that Canadians will adapt to the idea and tolling will become more publicly acceptable. Unfortunately, the removal of tolls on March 1, 2000, on the Fredericton-Moncton Highway in New Brunswick works against the development of toll roads. However, it does highlight some of the important lessons to be learned from the project such as public acceptance and toll revenues, which were not evident in the project. A retraction of tolls after implementation is costly to all parties and deters future toll road development. A more detailed discussion is undertaken in Section 5.1.3. It cannot be stressed enough the importance of public acceptance for the development of toll roads.

3.3.2 Toll Revenues

One of the obvious reasons to apply tolls is for project financing. Tolls should be applied only when revenues collected are sufficient to recover most, if not all, of the construction, operating and maintenance costs. For private toll roads, toll revenues should also provide a reasonable return on the investment over a 25 – 35 year concession period. Thus, in order to select a profitable project, the project must have sufficient traffic volumes to support the required toll revenues.

The financing of projects is based on the analysis of an investment grade traffic and revenue study to determine the project viability. These studies model and forecast traffic volumes and project anticipated revenues over the length of a tolling period. Normally, a number of surveys and data are collected and examined on traffic volumes, trip purposes, value of time, economic and business forecasts, origin-destinations, and willingness to pay. If the results of the study show that a project is financially viable, the studies are used to obtain financing from lenders.
The traffic and revenue study is one of the most important elements to determine the feasibility of the project. The accuracy of these studies is critical as the financial success of the project relies heavily on the forecasted results. The variables or calculations that are most crucial are timesavings, cost of travel, value of time, and ability and willingness of potential users to pay. Most of these variables are collected based on survey data; therefore, there is no one industry standard but a generally accepted range. Model results can be sensitive to these values; therefore, projections vary depending on the values selected by the transportation agency or the economists who conducts the study.

The test to see if people are willing to pay a toll, and the amount of toll they are willing to pay for the time saved, is conducted from contingent valuation of stated preference surveys. The context used in contingent valuation surveys is extremely important in order to obtain good valid results. The context, such as nature of the good, availability and cost of substitutes, cost of accessing the good, and respondent's income constraint should all be defined in the survey. These studies attempt to obtain information on the amount of toll that a person is willing to pay; however, it should be remembered that they are not based on actual observed behavior but on information obtained from hypothetical questions. Therefore, traffic and revenue studies are difficult tasks to accomplish with great certainty.

Clear identification of the competing road networks is another element that is important in modeling. It is important that models are developed to clearly represent the traffic flows and conditions so that actual time saved is realistic. Traffic consultants should also ensure that start-up is adequately discounted as most roads seldom obtain projected traffic volumes on opening day or even in the first year.

The rate of revenue growth is another area where most forecasts fall short. Rate of revenue growth is affected by the assumed rates of economic development, assumed toll rates, assumed traffic growth and the steepness of the toll ramp-up period. A study by Muller and Morgan (1996) comparing actual against original forecasts of 14 toll roads found that most studies were optimistic in revenue growth: “In general, forecasted revenue growth for all of the successful forecasts was under
30% during the first five years, indicating both the expected high initial demand for the road and the lack of toll increases to pay for debt service.

Realistic and accurate toll forecasts are essential to the success of a project. These forecasts provide the basis for the project and all the financial arrangements. In Muller and Morgan's study, only two out of fourteen projects actually exceeded projections during the first four years of operation. They identified some common characteristics of apparent success and failure of forecasts as follows:

- The most successful forecasts generally had accurate or even conservative economic forecasts with moderate levels of growth anticipated.
- The highways were generally constructed in corridors that were already built up and generally congested, making the road's existence apparent to potential users.
- Corridor income levels were generally well above regional levels. The timesavings were generally in excess of five minutes and, in some cases, more than ten minutes versus competitive routes.
- Toll charges were moderate averaging under eight cents per mile.
- Revenue growth forecasts were under 5% per annum during the initial four years after opening, and these revenue projections generally did not have periodic toll increases programmed into the forecast.

3.3.3 Urban versus Rural Locations

Generally, profitable projects are located in urban centers in high-density areas. Although these projects are ideal, the opportunities of finding these projects are limited in that: "most low-cost new roads in built-up areas have probably been built already or are already planned as free roads and thus may be difficult to toll. ... In short, there may be relatively few opportunities either to build a project the public authorities had abandoned because of high cost and still finance it out of tolls or to find a low-cost project that public authorities had overlooked." (Gomez-Ibanez, Meyer, and Butler, 1991) Another problem in building toll roads in urban areas, where an established network of roads have already been constructed, is the competition of the tolled route with existing free routes. When there are competing
free routes, benefits of the tolled routes are limited to the peak hours when free routes are congested and there is an obvious travel timesavings to the user. Therefore, the opportunities of collecting toll revenues are available for limited periods of each day during the dominant peaks.

Even though urban roads will likely provide more secure toll revenues, it does not solve the transportation needs in rural or developing areas where there may be economic importance to justify and accelerate the delivery of the project to support economic developments. In these locations, government contributions may be required to make the project viable because of low traffic volumes and growth. The amount of contribution will not be as high as one may think. Urban projects may be more attractive for toll revenues but at the same time, rural projects normally have lower property costs and hence, lower overall construction costs. Similarly, unlike the urban environment, the problem of competing free routes with the new toll route is also limited for rural toll roads. Therefore, toll revenues collected are stable throughout the day and are not restricted to the peak revenue periods.

Where tolls are not sufficient for both urban and rural roads, contributions can be made in the form of land donations from the government (provincial, regional, or local) and local land developers. In some cases, alternative revenue sources such as leasing of land for utilities or air rights may also be an option. Although it appears that roads in urban areas will not require subsidies, this is untrue. In a report for the US Department of Transportation on SR-57 and SR-91 in California, right-of-ways for both of these urban projects were donated. “The fact that only SR-57 and SR-91 rely entirely on tolls suggests that the problems of toll financing may be somewhat easier for congestion-relieving than development roads, but this impression is misleading. In the first place, both SR-57 and SR-91 do in fact receive non-toll support in that much of their rights-of-way will be provided without charge by state authorities (air rights over the Santa Ana flood channel for SR-57 and land in the median of an existing expressway for SR-91).” (Gomez-Ibanez, Meyer, and Butler, 1991)

Even with land contribution, profitable toll roads are still very difficult to find. An example is the SR-57, which was selected by the private sector after it was
determined that it would be too costly to construct by the public sector. The government provided the right-of-way required to the private sector. Even still the projected peak period tolls are the highest of all the private toll roads proposed in California, while off-peak tolls were only slightly lower than average. The reason for this is because of the high construction cost of around $70 million per route mile for two lanes in each direction and the number of free alternative routes nearby. SR-57 had to design a toll structure where most of its toll revenues would be obtained in the peak hour. The projected peak period tolls are around 50 cents per vehicle-mile and off-peak tolls are around 10 cents per vehicle-mile. Even with extremely high peak-period tolls, SR-57 would have to operate near capacity in the rush hours to recover its projected construction costs. The developers for SR-57 claim their forecast is reasonable. However, most people feel that the project will not succeed without additional government aid. SR-57 is still waiting for financing and environmental approval.

Toll revenues will generally be more certain in urban areas. However, where toll revenues may be insufficient on rural roads, they should still be considered as they may have economic benefits. It appears that regardless if projects are located in urban or rural areas, they may require some level of government aid. The opportunities for projects to stand alone on tolls are limited.

3.4 Tolling Design Considerations

When designing a toll collection system, the main objective is to ensure the toll collection system is operational and reliable for 24 hours, 7 days a week, year round in all weather conditions such that if there are any failures, it will not lead to any revenue loss. The toll collection system should provide convenience to all potential users. The toll collection system should minimize the opportunities for fraud and be fully auditable by the government.

The type of tolling system, collection, structure and design implemented will affect the success of a project. Ideally, it is important to ensure the cost of collection is minimized and throughput is maximized. The following brief discussion provides a general understanding of toll technology and highlights some considerations in
designing a toll collection system. The intention is not to provide a detailed discussion on tolling technology but a brief overview of considerations in toll collection system design.

### 3.4.1 Types of Systems

There are two types of tolling system: closed and open. The open system is based on collecting a flat toll from users. It is commonly used at crossings or tunnels where the length of the project is short and difficult to toll by distance. For longer road projects, tolls are collected based on a fee to use a section of road. Tolls are collected at entry and exit locations. The closed system is based on paying a toll for a length of distance traveled along the toll project, calculated from the point of entry and point of exit. For some facilities the tolls actually reflect the true cost per distance traveled and for some, it is based on paying a toll to travel a section of the road. For example, Highway 407 in Ontario is based on actual kilometers traveled and the Dallas North Tollway in Texas is based on a flat toll to travel each section of the tollway. Both facilities are considered to be closed systems in that you pay for the distance used. For a closed toll system, the collection can be costly to implement for projects that have many entry and exit points. However, the use of electronic toll collection can significantly reduce implementation and operating costs.

### 3.4.2 Toll Collection Methods

There are two main methods of toll collection: manual and electronic. A combination of the two methods is normally used. Manual collection is the most basic where a person manually collects the tolls by cash, token or credit card from a driver in a vehicle stopped at the tollbooth. Manual toll collection can also be done through automatic coin machines where the vehicle slows down to drop money into a coin machine.

The other method is electronic toll collection (ETC), which uses advanced communications, computers and electronic devices. An electronic toll collection system has three main elements: automatic vehicle identification (AVI), automatic vehicle classification, and video enforcement system via electronic photo tracking.
AVI is used to administer the tolls. The AVI tag is a communication device that is mounted normally on a car windshield. The tolls are collected by a reader, which reads the information on the tag and debits an authorized account. For closed systems, the tag is read at the entry and on exit the toll is calculated and debited from the registered account. Typically, the computer technology that calculates the tolls and determines the cost is conducted off-site at a main computer system located at a central operation center. Video enforcement via electronic photo tracking is used as a backup to the AVI system for enforcement purposes. When implementing video enforcement, consideration should be given for enforcement of out-of-province license plates.

On Highway 407, use of transponder tags are not mandatory so electronic photo tracking is used to administer tolls. AVI is generally used for electronic tolling because it is more accurate and easier to administer. Electronic photo tracking as a method to toll collection has not been widely used to date due to cost and accuracy concerns. Electronic photo tracking also has higher potential for revenue leaks or fraud because of illegible dirty plates, obstructed plates (e.g. obstruction from bike racks), and sensitivities to weather and level of light in heavy fogs or snowstorms. Electronic photo tracking is generally more costly to implement both because of the data storage and matching requirements as well as the manual verification required to ensure plate identification.

The advancement of toll technology has considerably simplified the toll collection process. The entire process can now be electronically administered so a vehicle does not have to stop to pay a toll. Not only does electronic tolling increase throughput four times compared to manual, it is also far less expensive. The higher throughput reduces right-way-requirements for toll plazas, thereby, significantly reducing land costs. Overall, the use of ETC allows toll operators to improve customer service and satisfaction by speeding their trip through the toll plaza and removing the need for the customers to stop. Most of the recent toll facilities constructed use some level if not all ETC.
3.4.3 Tolling Structure

There are three major considerations in developing a tolling structure: time of day, vehicle classification, and discounts. Tolls normally vary by the time of day to reflect the value of the time saved, which is normally greatest during peak hour congestion. Tolls vary by vehicle size to reflect the impact imposed on the roadway as well as the value of time for truck drivers. For some agencies, discounts are provided to disadvantaged groups or high occupancy vehicles to support demand management initiatives. A rational tolling structure should be developed to ensure that toll levels are optimal while at the same time addressing social equity issues by providing discounts or incentives. Whatever tolling structure is used, it should be simple to ease implementation and minimize enforcement cost.

Congestion pricing and road pricing is a type of time of day pricing except that it is 'real time' based on the actual level of congestion on the roadway. The fee varies in response to changing levels of demand, rising during periods of heavy congestion and falling in off-peak times when demand is low and traffic flows freely. Congestion pricing is often used in conjunction with highway-occupancy toll free lanes or referred to as HOT lanes. If congestion pricing is selected for the toll structure, electronic toll collection must be used.

3.5 Summary

3.5.1 Advantages and Disadvantages

The following are advantages of tolling:

- Can be a more equitable approach to finance highway development than direct taxation because it links user benefits with user fees.
- Provides a source of funding for operations and maintenance.
- Accelerates the construction of projects where funding may not have been available.
- Limits urban sprawl and pollution.
- Maximizes the use of transportation facilities (when a system of toll roads are developed).
The following are disadvantages of tolling:

- Not widely accepted by the public.
- Public view tolling as another tax.
- Viewed as inequitable for low-income motorists in that there is a two-tier system for the rich and for the poor.
- Affects traffic patterns and may not be the most efficient use of highways.
- Cost to implement and operate toll collection can deter tolling; however, electronic tolling has reduced costs significantly.

3.5.2 Guiding Principles

There is no single formula to determine when tolling can be successfully implemented. However, tolling will generally be most successful when there is a high level of public acceptance. Before implementing tolls, government must know why tolling is being adopted, the objective of tolling, and public policies regarding tolling. Some of the issues were raised earlier in this thesis but these questions are public policy questions that must be addressed by policy makers. Although the development of tolling policy is outside the scope of this study, there are some general principles to consider that will increase the potential for success:

- Public acceptance: A project must have public acceptance in order to succeed.
- Political acceptance: Local political support which crosses party lines is required or else some politicians will use it as a voting platform.
- Communication: Public communication should be developed at the outset of the project to provide ongoing information and to solicit concerns. Good communication will market the project.
- Sufficient revenue: The toll revenues generated should cover a significant portion of the construction, operating, and maintenance costs. Ensure the financial benefits outweigh the cost of implementing tolls.
- Conservative revenue forecast: Traffic revenue projections should be conservative, as shortfalls can be detrimental and embarrassing for all parties involved.
• Equity: Address equity issues when applying tolls to ensure that there is overall fairness to as many members in society as possible. Consider discounts in the toll structure where possible and feasible.

• Existing free roads: Do not apply tolls on existing free routes except where demand management policies (ex. congestion pricing) are in place.

• Simple toll structure: The tolling structure should be as simple as possible so that it is easily understood by the public and easy to implement and enforce.

• Convenience to users: The toll collection system implemented should provide convenience and a high level of service to users.
4 Private Toll Roads

This thesis focuses on the development of private toll roads. However, a discussion is provided in this section to highlight some of the advantages and disadvantages of both private and public delivery to ensure that a thorough analysis is considered before proceeding with private ownership. In some situations, public ownership may still be the best structure. Where toll roads are publicly owned an established authority or commission normally delivers it. For the purposes of this thesis, public delivery or public ownership refers to the delivery through an authority or commission unless otherwise noted. For private toll roads, the government still owns the road but it is assumed that it is privately owned over the concession period.

After a decision is made to proceed with private sector involvement, the next step is to determine the type of public-private partnership model to use. The type of delivery model will vary dependent on the level of private sector involvement. The different types of public-private-partnership models are briefly discussed. In most cases where there is private financing, the partnership is structured on a build-operate-transfer (BOT) model. For public toll roads, they are structured as design-bid-build (traditional) or design-build delivery models. The design-build model is discussed to provide some insight into the advantages and disadvantages of using design-build as it can be used for public delivery and is also used in the BOT model.

The following section discusses the issues to be addressed in the development of private toll roads such as financial feasibility, government support, and risk allocation. In order for a private toll road to be successful, it must be financially viable. If it is financially viable then the private sector can obtain financing from lenders to construct and operate the project. Even when projects are financially viable, financing from lenders may depend on some level of government commitment or support to the project. Generally, government support is required in a BOT project whether it is to acquire financing or to develop partnerships. Lastly, the allocation of risk is discussed as the private sector normally undertakes greater risk in a BOT project compared to a traditionally delivered project.
In essence, "if the project is properly structured, the benefits of such enhanced performance will be shared with the government. Having the design, implementation, and operation of a BOT project largely in the private sectors’ hands may provide economies and efficiencies that balance or even outweigh the higher financing costs of non-sovereign borrowing and equity investment. But a government that wants to promote BOT projects must understand and be willing to accept the complexity and time-consuming nature of the process, the extensive government support that must be provided, and the rates of return that commercial lenders and private equity investors will expect." (Augenblick and Custer, 1990) Thus, it is extremely important that all parties are aware of the issues and ensure that all parties understand their risks and responsibilities.

4.1 Public vs. Private Delivery

There are three options in pursuing a project as defined in a Feasibility Study for Toll Highways and Private Sector Involvement for Highway Development in New Brunswick. The first is status quo highway development consisting of traditional project delivery with public financing. The second is public toll highway development with tolling under public ownership. The third is private sector toll highway development which involves tolling with private sector financing and ownership over a concession period.

“As interest in toll highways has grown, a distinction between ‘public’ toll highways and ‘private’ toll highways has developed. Public toll highways are facilities where the ownership and tolling authority is retained by the government, whereas, private toll highways involve private sector ownership and tolling authority.” (ADI, Price Waterhouse, and Transroute Consultants, 1994) Generally, private toll highways will only be successful on projects where there is a guaranteed revenue stream to provide an adequate return to private investment. Projects that have low traffic volumes will generally be delivered by the public sector, unless government is willing to provide financial backing or equity to the project. Opportunities for projects to be supported by tolls alone are limited.
Even if tolls alone are sufficient to support the project, it still begs the question if privatization should be undertaken. There are advantages and disadvantages. People who support privatization claim several benefits, such as: the ability to attract added investment to the highway sector, lower cost of construction and operation, more innovative project designs and services, and transfer of risk from the public sector to the private sector. People who argue against privatization feel that: private ownership creates problems of monopoly; cost savings of construction are generally minimal; and government can normally borrow at lower rates thus lower construction costs. In addition, public ownership provides government more flexibility to ensure equity and to implement discount programs.

Typically, to fund public infrastructure, government either borrows or guarantees the borrowing of other agencies or crown corporations. The interest and principal repayments are placed on the government’s books as tax-supported debt in that the interest and principal repayments are made with tax dollars. Public toll roads can be funded through taxes but generally are financed through revenue bonds sold on the private financial market. The bonds may be taxable or tax-exempt bonds and are generally backed by the ‘faith and credit’ of the government to assure repayment of the bonds.

When government decides to deliver a public toll road, normally an authority is created and the authority obtains financing. The government can borrow at lower rates than the private sector. “Crown corporations are able to borrow more easily than a private firm, because their debts are assumed to be guaranteed by the government.” (Brander, 1995) Another advantage of using a public corporation is that government can subsidize development of activities with positive externalities in that they can pursue distributional or equity objectives.

In Orange County, California, an authority called the Transportation Corridor Agencies (TCA) was established to plan, design, finance and construct toll facilities. TCA sources of funds are as follows: 86% bonds, 7% development impact fees, 5% state dollars, and 2% from other sources. Bonds are paid solely from toll revenues, development fees and interest earnings. The bonds are ‘non-recourse’ bonds, which means that the bondholders can only look to the corridor revenues for
payment of the bond principal and interest. The bonds are not backed by the credit of the State of California or any local governmental entity; thus, state and local taxpayers have no responsibility or liability for repayment of the bonds. Although this is an ideal way to fund toll roads, all of the toll roads constructed by TCA have fallen short of projected toll revenues that may make non-recourse financing more difficult in the future, for all parties, even more so for the private sector.

One of the reasons why government pursues private toll roads is it increases private investment in highway development. In almost all cases, private toll roads are considered because of limited government resources to fund the needed transportation projects. Private financing supplements limited tax revenues to deliver needed transportation projects. Private financing is normally "off" of government books and the majority of the risks are transferred to the private sector.

In private sector delivery, private developers are normally responsible for both design and construction (i.e. design-build model) thus they have greater flexibility to be innovative and efficient to achieve cost savings. Private developers are cost conscious and profit driven to overcome construction problems by fast tracking or using other innovative construction management methods. In addition, private developers are not constrained by complex and time consuming competitive bidding and bureaucratic administration. However, most construction bids in publicly delivered projects are based on competitive bidding and generally the construction methods used in these bids are also very efficient.

People who argue against private toll roads are generally concerned about private sector monopoly. In most cases, the chances for monopoly are small because of competing free routes nearby. In most provinces and states, tolling policies require that a free alternative is available to address equity concerns. Even if there is the potential for monopoly, the public sector has the opportunity to build new infrastructure to compete or overcome the monopoly. Normally, the private sector is more concerned about competing free routes that an agreement is required to protect the private sector from competing free routes rather than the public sector from monopoly. It is important that a balance exists where the private sector profit
does not exceed a certain profit level while its’ financial viability is not jeopardized at the same time.

With traditional procurement methods, the public sector is responsible for the risks associated with the various stages of project development and contracting for private sector expertise for the design and construction. The project usually goes to public tender, taking the lowest qualified bid from the private sector. With private sector investment, the risk is transferred from the government to the private sector. However, one must realize that the cost or return on investment is related to risk. If the private sector has to assume more risk, they will demand more compensation to assume it. In some situations, the cost to pay the private sector to assume it may not be worth the cost to government. Highway 407 in Ontario had initially requested private financing in the “Request for Proposals”. However, because of the low initial traffic projections, it is likely the private sector requested a high return on their investment as compensation for assuming the financing risks. The cost for the private sector to assume the financing risk would be part of the reason why private financing was not pursued on Highway 407. Where risk can be assumed by the private sector at reasonable costs, private sector delivery can be desirable.

The advantage of public delivery is that government is less sensitive to lengthy delays. Regulatory approvals can cause significant project delays that may impact private sector delivery and ability. The public sector is normally more experienced with the procedures in acquiring regulatory approvals. Most cost overruns in private toll projects are related to an underestimate of the development cost required because of legislative and regulatory approvals as seen in the case studies.

It is difficult to say if privatization does provide value for money. Theoretically, it could but based on some of the toll road projects discussed at the end of this thesis there is no clear comparison of what the outcome may have been if the project was developed differently. In some situations, it appears that without private ownership, the project would likely not have been constructed or would at least have been delayed as a tax supported project.
The above discusses some of the advantages and disadvantages of public and private delivery. There are definitely advantages in partnering with the private sector. However, it is important to choose the appropriate level of partnering. There is a wide range of partnership models depending on the level of public or private sector involvement. When you move away from a completely public approach and increase the amount of private participation in a cooperative venture, it becomes a public-private-partnership.

4.2 Delivery Models

4.2.1 Public-Private-Partnership Models

“A public-private-partnership is a partnership between the public and private sectors where there is a sharing of risk, responsibility and reward, and where there is a net benefit to the public. Specifically, a public-private-partnership is a partnership for some combination of design, construction, financing, operation and/or maintenance of public infrastructure which may rely on user fees or alternative sources of revenue to cover all or part of the related costs of capital (debt servicing and principle payment and return on equity if applicable), operations and capital maintenance.” (British Columbia Ministry of Employment and Investment, 1998)

The following are examples of some of the different models based mainly on the definitions developed by the public-private-partnership task force for the B.C. Ministry of Employment and Investment (1998):

- Contribution Contract – the private sector agrees to contribute to the construction of a public facility in exchange for acceleration of the project.
- Operation and Maintenance Contract – a private operation, under contract, operates a publicly owned facility for a specified term.
- Design Build – the private sector designs and builds a facility to meet public sector performance specifications – often for a fixed price so risk of cost overruns is transferred to the private sector which has the ability to employ the techniques it wishes provided it meets the performance specifications.
- Design Build Major Maintenance - the proposed design-build facility will be the operating responsibility of the public sector, with certain maintenance responsibilities given to the private sector under contract.
- Design Build Operate (Turnkey) - design-build contract for construction followed up with an operating and maintenance contract. The facility remains publicly owned throughout.
- Lease Develop Operate - a private operator, under long-term lease expands and operates an existing public facility. The expanded facility remains publicly owned and is transferred back to the public sector at the end of the lease term.
- Build Lease Operate Transfer - the private sector designs, finances, and constructs a new facility on public land under a long-term lease and operates the facility during the term of the lease. The private owner transfers the new facility to the public sector at the end of the lease term.
- Build Transfer Operate (BTO) - a private developer designs, finances, and constructs a facility, which upon completion, is transferred to public ownership. The public sector then leases the facility back to the private sector who operates it in order to get a reasonable return for construction and operation while avoiding liability/complexity of private ownership.
- Build Operate Transfer (BOT) - A private developer receives a franchise to finance, design, build, and operate a facility (and to charge user fees), for a specified period after which ownership is transferred back to the public sector at some future date.
- Build Own Operate Transfer (BOOT) - the private sector finances, builds, owns and operates a facility in perpetuity. The public constraints are stated in original transfer document and in ongoing regulatory authority.

There are very few projects in operation that reflects the different range of public-private-partnership models. Many people also use different names for each of the models. Essentially, the intent of the different models is to represent the ownership and allocation of responsibility. The delivery models identified above, from Contribution Contract to Build Transfer Operate, are essentially based on public ownership. The BOT and BOOT models are based on private ownership. This
thesis concentrates on private ownership projects, mainly the BOT model, although it is important to acknowledge that the level of private involvement can be adjusted depending on the type of public-private-partnership model used.

The BOT model is basically an arrangement where the public sector allows a private consortium to design, finance, and build an infrastructure over a period of time with ownership by the private sector. Over the ‘lease’ period, the private consortium is empowered to collect tolls and operate the facility to recover the project costs while earning a reasonable profit. At the conclusion of the concession period, the ownership of the facility is transferred to the government. This arrangement allows capital intensive projects to be funded outside of government and transfers the majority of risk to the private sector.

BOT models require the private sector to have a long-term vested interest in the project. As BOT models require private companies to have substantial equity commitment into the project, this normally assures that the company will be committed to the success of the project over the length of the concession period and the project performs above minimum expectations.

4.2.2 Design-Build

The design-build model can be incorporated in the BOT model and can be used for publicly owned roads regardless if it is a toll or toll-free road. Therefore, the benefits and concerns related to design-build are discussed.

Design-build allows creativity and innovation in the design and construction of projects while reducing delivery time and hence costs. Paul Giannelia from Strait Crossing Inc. (successful proponent for the Confederation Bridge project) provided a comparison of traditional delivery versus design-build: “It works like this: A Municipality decides it needs a new bridge. Traditionally, the city would hire a consulting engineer who would spend six months designing the structure and putting together a bid package of drawings and specifications. The city would then call for bids from construction companies. Each interested company would get copies of the drawings and specs and after six or eight weeks would submit a price for building exactly what the drawings and specs called for. The city would review the
bids, and the bidder with the lowest price would normally get the job. There are many varieties of bridge designs, many construction techniques, and many possible combinations of the two. Many different pairings of design and construction method would result in a functional and safe bridge. But among those pairings there would be major differences in what it would cost and the time required to build it. Giannelia sensed that if you brought design expertise and construction expertise together right at the beginning, you could often come up with a cost-saving or timesaving solution. This would please the customer and give the bidder a competitive advantage.” (Macdonald, 1997)

Most owners recognize that design-build shortens project delivery time, reduces project costs, and creates single point responsibility. Design-build facilitates fast tracking without the loss of cost control that occurs in the administration of change orders undertaken in traditional competitive bid projects. Generally, design-build projects are based on performance standards rather than traditional prescriptive standards and specifications. One of the disadvantages in using the performance specification approach is the owner loses some control over the design process. In essence, contractors are asked to be innovative and creative to determine the lowest delivery costs as long as it meets the performance standards. But in the author’s opinion, often the design is compromised such that it provides what you ‘need’ but not necessarily what you ‘want’.

Part of the reason why the design may be compromised is that the design is led and driven by the contractor rather than the engineer. The prime member in a design-build is typically a contractor who is heavily capitalized to secure the contract. Contractors are often more capable of assuming the risks involved in design-build projects and possess the entrepreneurial skills necessary to prosper. Therefore, the contractor leads and directs a design-build contract. There are potential problems arising from this type of arrangement. When the engineer reports to the contractor and not the owner, the design and project objectives may be compromised. Usually, the engineer has greater understanding of the owner’s project goals and purposes; however, the engineer is not acting as an agent for the owner as in traditional delivery organizations. The engineer is responsible to the contractor who is driven
by profits and often will only do the minimum required. Contractors have the
discipline to bring designs into conformity with schedule and price constraints.

Design-build can be effective means for project delivery but owners should
understand the drawbacks. Design-build works well for projects where the 'needs'
are clear and the 'wants' can be compromised.

4.3 Financial Feasibility

The financial feasibility of a project is important to all parties involved, as each
party will have something to lose. The public sector will have an interest to ensure
that the project is completed to improve transportation service and may have equity
invested. The lender will have the loan at risk. The private sector will have equity in
the project and liability of the loan at risk. In addition, the private sector will carry the
risk to ensure that financing for the project can be obtained from a lender. The
financial soundness of a project will give lenders confidence in the project and
facilitate private sector borrowing. Even when the project is financially viable, a
lender will still be concerned with project cost overruns and potential delays or non-
completion due to political risk and unforeseen circumstances that may arise. Thus,
lenders will also want assurance and guarantees that the project will be completed
and operated successfully. In most cases, lenders will still want government
guarantees in order to be fully satisfied.

4.3.1 Financial Viability

In order to conceive a private toll project, the project must be financially
viable. There must be assurances that the project will be profitable, the market for
the end product is secure, and the private consortium will be capable of successful
completion and operation over the concession period.

To determine if a project is viable, the net present value (NPV) should be
positive using a discount rate that includes a risk premium over the lending rate and
the cash flow for each year over the concession period should be positive.

(Harrison, 1981)
The financial viability of a project will depend on toll revenues and the long-term market for the output. Typically, significant effort is required to ensure that feasibility studies and economic projections are realistic and confirm that the project will obtain a conservative return over the life of the project. In essence, a private developer must "for its own purposes as well as for those of the lender: determine that the project is viable; study its technical and economic feasibility; prepare a financing plan with debt/equity ratio, sources of equity and loan capital, local/international borrowings, relationships between loans, sources of goods and services and markets for output; project cash flow and interest expenses; assume rates of interest and discount; and, evaluate and protect against risks." (Harrison, 1981) The information will be used to determine the viability of the project for the developer and the developer will use it to secure financing with lenders. Even if a developer is confident in the analysis, a lender will independently review and analyze the financial aspects of the proposal submitted by the developer to ensure the estimates are conservative and reasonable. Financial viability of a project is extremely important to ensure that financing can be obtained.

4.3.2 Financing

Even though the project is financially viable, there are many obstacles to overcome in order to get the project financing in place. Project financing is the financing of integrated investment projects to be carried out by a new company. For most BOT projects, the project is carried out by a consortium of several firms rather than by one firm alone. "The three main reasons for this are risk sharing, the need for money, and the need for special expertise. Governments normally require performance bonds and other types of financial guarantees, and insist that project developers have a sizable amount of their own money at risk. All this takes deep corporate pockets, and normally no single construction firm would -- on their own -- want to accept all the risk for a project". (Macdonald, 1997)

Normally private sector sponsors that are construction contractors together with (local) partners provide the financing. The equity contributions are normally around 10 – 30 percent of the total project cost. The equity is invested in a private
project company that will build the project and operate it over the concession period. The project company raises the remaining 70 – 90% of the project cost from debt financing. (Augenblick and Custer, 1990)

The debt financing is obtained from lenders. In BOT projects, the private sector normally assumes most of the financing and revenue risks. Some of this risk is then transferred to the lenders when they provide the financing. In order to compensate lenders to take on some of the risks, lenders normally charge higher loan interest rates than the average market rates. Thus, monetary compensation is provided to both private investors as well as lenders for the risks they assume. The cost of compensation in the end is reflected in the total construction cost that is used to calculate the required toll rate.

The advantage of project financing is that revenues generated directly from the project are used to pay the loan. “The difference between project financing and ‘normal’ lending, is that the credit worthiness of the new company is not based on its own Balance Sheet and Income Statement, nor on those of its parents or sponsors, but on the assets and expected revenues or profits which will accrue from the completed projects. Project financing has several distinct characteristics: it is concerned with well-defined projects and not with the total financial needs of the corporation; the draw down of the loan occurs over a period of time as the project is completed; repayment is made from the cash flow generated by the ongoing operation of the project; and the essential guarantee of repayment lies, therefore, in the success of the project.” (Harrison, 1981)

Project financing as defined above is ideal, but generally unrealistic for toll roads to obtain only payback directly from the project. It would only occur when the private sector has such a strong financial commitment in the project that the debt/equity ratio is low and there is limited risk. Non-recourse financing requires large financial capital investments or revenue guarantees. For service projects, such as sewage treatment plants, the government will guarantee the purchase of the service. For toll roads, the government does not directly purchase the service and therefore guarantees are not usually available.
Michael Harrison iterates the difficulty of non-recourse financing in a report discussing Canadian Business Management Development. "The parent company or sponsor of a project seeks, ideally, a project-financing package which will not restrict the company's own borrowing limits, debt/equity ratios, and other investment objectives; and will be off balance sheet and without recourse to the parent or sponsor in the event of problems arising with the project. Such an ideal, true non-recourse financing seems rarely to be achieved in practice. ... Reality, then dictates that, to a greater or lesser extent, the economic viability of the project and the credit worthiness of its parent company or sponsor remain related no matter how much one or more of the parties might like to divorce them." (Harrison, 1981) Generally, the private sector will not assume the project guarantees alone and will request government to undertake some of the risks.

Most public sector agencies continue to pursue non-recourse financing. For example, the B.C. Ministry of Employment and Investment (1998) recommends non-recourse financing for public private partnership adventures. "Government has indicated that non-taxpayer supported debt financing for P3 project is preferred in so far as the incremental cost of finance, if any, is commensurate with business risks assumed by the lenders. Therefore, ideally a P3 arrangement should: have no recourse to government financing over the life of the project (e.g. no guarantees, indemnities, contributions or operating subsidies, etc.); and clearly meet the accounting requirements necessary for government to treat the project as an operating, as opposed to a capital, transaction." Although it would be ideal to have non-recourse financing for toll projects, it is important for government to realize it is generally difficult for the private sectors to provide. Even if non-recourse financing can be obtained, government should realize the cost to have the private sector assume the risks and responsibilities will be reflected in the toll rates to be paid by the public.

Financing of toll projects is dependent on the financial viability of the project, the financial strength and contribution of the developers, and the level of government support available. When all three variables are maximized, financing will be easier to obtain and at lower costs.
4.4 Government Support

One of the advantages of private ownership in a BOT arrangement is the ability to transfer project risk to the private sector. However, this concept is misleading because normally some level of government support is required in order for project success.

A paper by C.M. Tam (1999), on BOT developments in Asia, identified that the three different types of risk in a public-private partnership are technical, financial and political. Tam noted that amongst the three, technical risk is comparatively the easiest to manage, financial risk is harder but manageable, and political risk is the most difficult element to handle. Although the study was based on projects in Asia, other countries face the same challenges.

A report by Augenblick and Custer (1990) identified a number of areas in which support may be required and some of the issues where governments will be asked by sponsors and lenders to resolve. Although Augenblick and Custer's work is related to BOT projects in third world country, the concept is still applicable and requires consideration in other countries. The following are some of the issues to be considered as identified by Augenblick and Custer.

4.4.1 Regulatory, Political and Bureaucratic Support

There is a wide range of legislative, regulatory, and fiscal support a government should be prepared to provide to a BOT project. The government may have to provide basic legislative and regulatory authority for the project to be built and operated in the private sector. Special legislation may be required to authorize the private ownership and operation of toll roads. The authority to acquire land for the project by expropriation may need to be specially provided. These various authorizations may be provided by general legislation or by a “single purpose” law or decree providing all of the necessary powers and authorizations for the BOT project in question. The chances for success will be greatest if general legislative authority is obtained early in the process.

The government should provide bureaucratic support to resolve political or bureaucratic issues as they arise. A government mentor should be provided to
ensure success of the project from project inception to completion. The government mentor should have sufficient political standing and bureaucratic ability to maintain support over the life of the project and to mitigate political opposition. The government should assign trained and experienced personnel to negotiate the terms and should have sufficient authority to commit the government to the terms of the transaction in a timely manner. Without experienced personnel, negotiations are likely to drag on to a point that could jeopardize a project. Even then, if it is implemented, the delay will have imposed substantial opportunity costs and frustration among the parties.

A report by Fielding and Klein (1993), recommends government complete all necessary regulatory approvals before awarding the contract to a developer to complete the final design and finance, construct, and operate the facility. This would include clearing the project by assembling the right of way, completing the preliminary design and satisfying the environmental requirements before awarding it to a developer. Fielding and Klein feels that too much “uncertainty hangs over a project until it obtains full approval. The uncertainty applies to whether the project will survive, when it will be approved, its magnitude and its final design. These uncertainties make ex ante franchise bidding less competitive and ex post outcomes less efficient.” In addition, a pre-approved project of all regulatory issues would reduce the opportunity of post-contractual political involvement.

4.4.2 Outside Advisers

BOT projects usually have unique technical, financial and legal complexities that differ from standard government protocols. Thus, at the onset of the project, government should retain competent outside technical, financial, and legal advisers familiar with the types of private sector arrangements involved. The private entity will normally have substantial technical expertise. For large projects, the private sector will normally have experienced international legal counsel and investment bankers on their side of the negotiating table. No matter how experienced or sophisticated the government negotiators may be, by adding outside technical advisers, investment bankers, and legal counsel of stature to their team, the
government will be able to structure the BOT proposal in the most optimum way. The use of outside advisers should ensure that the project is structured in a way that is realistic and both parties win. The presence of advisers will provide credibility to the government's negotiating position and help find creative solutions to problems that arise in the course of the negotiations. Although the cost of employing outside advisers will be significant, the benefits in large BOT projects will normally be worth it.

4.4.3 Assured Revenues

For most toll projects, lenders are reluctant to accept revenue risk if traffic volumes are too low to pay off the debt. Equity investors will also be reluctant to take significant risks. Equity investors will only increase their acceptance of risk if they are given a chance to reap significant rewards when traffic meets or exceeds projections. One solution to this problem is for the government to agree to provide subordinated loans to the developer whenever toll revenues fall below a certain minimum. At the same time, government should also ask for a return when toll revenues exceed a certain maximum.

The government may also be asked to protect the lenders against risk if their debt is not serviced by the private sector due to project failure. The solution may be for government to commit to making subordinated loans available on a standby basis, over a certain period of time, to provide for senior debt service when and if the private sector's cash flow is insufficient for such purpose. Without government backing, some lenders may not provide the financing to the private sector.

4.4.4 Loans and Equity Contributions

Often in BOT projects, government is asked to fund part of the project costs by direct loans or an equity investment in the project company. Opinion is divided as to whether having the government, as an equity partner in a BOT project is helpful. One view is that BOT projects should be completely privately financed and privately run. In this view, having the government as an equity partner is likely to bring government influence that may lead to bureaucratic inefficiencies in management.
and operation. The opposite standpoint is that having the government, as an equity partner may be quite helpful. It may help make the project company independent of its sponsors and better able to negotiate with major stakeholders for construction contracts and equipment suppliers. It may help convince the government of the transparency of the project's financial structure. Finally, it may make it easier for project companies to obtain lending, as some lenders will require government guarantees before they will provide loans or equity contributions. (Augenblick and Custer, 1990)

4.4.5 Land Contributions

Provincial, regional, local or private landowners often own the land required for the project. Even for private sector projects, government will contribute right-of-way to a project. In most situations, contributions, more so by local or private landowners than provincial or regional, are based on the level of potential benefits that can be obtained from the project. Landowners will place conditions on the contribution, such as accesses, which will require design changes and other modifications adding to the construction costs. Roads may sometimes become circuitous in order to serve the properties of large landowners in order to receive the land contributions.

Land contributions are ideal in BOT projects, yet they can sometimes be complex and work against the project because of private interests. Government support may be required in three-way negotiations and to assist with permits or other requested concessions. "Relying on land developer or local government contributions creates its own problems, as the cases of the DTRE, SR-125 and the Midstate illustrate. These contributions are uncertain and landowners and local communities may insist on costly design modifications to garner their support. Negotiations over contributions with landowners and local governments may also delay and complicate projects that are already difficult." (Gomez-Ibanez, Meyer, and Butler, 1991)

Thus, if land contributions are made, it is best to negotiate these during the development stage of the project. Ideally, land contributions should be negotiated
and determined prior to soliciting proponents. In some situations, the private sector may be more innovative in assessing alternative revenue sources and negotiations with landowners. However, it is important to understand that land negotiations can cause lengthy delays in a project and some government support may be required.

4.4.6 Protection from Competition

A private facility with the potential for monopoly will be easier to finance than a facility with competition. Project sponsors will normally want assurances that any parallel toll or non-toll roads will not be built during the concession period. Thus, regulations will be required to protect private operators from excessive free-road competition to ensure they can earn a return on their investment while at the same time protecting the public from potential monopoly abuses.

4.4.7 Credibility of Process

It is important that the process is conducted in a fair and open manner to gain private sector confidence in the government. Developing proposals is expensive for private developers. If the private sector lacks faith in government or the process, they will not bother to compete for the project and government will receive fewer competent and competitive submissions. The process should be efficient to ensure it is not prohibitive for proponents to prepare proposals. Proposal calls should be clear with all submission requirements identified up front.

For large complex projects, the cost of submitting a proposal can be substantial as can the cost of proposal evaluations. For these projects, government should consider compensation for short-listed proponents. Compensation will encourage and increase innovation and competition in the proposals.

4.5 Risk Allocation

The public sector generally attempts to transfer as much responsibility and risk as possible to the private sector in a BOT project. However, it is important that risk is appropriately allocated so it does not reduce the benefits of a public-private-partnership project. When risks are not appropriately allocated, it becomes a costly
venture for both parties to avoid the risks after the fact and may result in a legal battle. "Merely dumping risk without consideration of whether the party is able to control or deal with it usually results in a costly game of risk avoidance." (B.C. Ministry of Employment and Investment, 1998)

Generally, the amount of risk transfer will identify the type of public-private-partnership model to use. "There is a broad range of P3 options available and the most appropriate one for a particular circumstance will often be determined by consideration of risk. The goal should be clear and unambiguous allocation of risk between the public and private participants on the basis of which participant is best suited to assume the risk." (B.C. Ministry of Employment and Investment, 1998)

When risks are allocated, it should be to the party who has control over that risk. It is especially important for government to understand this, as government often wants control over most projects. If government wants the private sector to assume the risk, they must be prepared to allow the private sector to have full control over the risk assumed. "More important, with risk goes responsibility or control. For instance, if the public sector wishes to assign the risk of, say construction cost overruns, to the private sector, it must also be prepared to give them control over construction so they can manage that risk." (B.C. Ministry of Employment and Investment, 1998)

A risk analysis should be conducted during the project procurement. The B.C. Ministry of Employment and Investment recommends that a risk analysis be conducted to: identify the significant risks, estimate the probability that each event will occur; estimate each event's economic (or other) impact on the project; determine how best to manage, avoid, or pay for each event's consequences; and, determine whether risk transfer to the private sector is optimal and appropriately reflected in the project costs.

In some cases, advisers should be considered to help in identifying the risks and evaluating the financial impact. "The public sector and private sector proponents may need assistance in identifying risks, attaching probabilities to them, working out the financial impact if the risk occurs, and carrying out appropriate discounting calculations. Professional advice is usually required on how risks should
be managed, for example by absorbing them, reducing them, pooling them, transferring them, insuring them, or avoiding them altogether by changing certain aspects of the project. The financial structure and the contractual arrangements will need to be constructed in such a way that each party bears the appropriate risks at each stage of the project." (Huggett, 1997)

When identifying the responsibilities for risk, government must also realize that the cost of the project or the tolls levied is directly linked to the risk transfer. The party who can control the risk should assume it, but they should be compensated appropriately for taking on that risk. When risks are appropriately allocated, it maximizes the benefits and reduces the costs for all parties.

The following are some examples of risks in BOT projects and a discussion of what should be considered or how it can be addressed.

4.5.1 Political Risk

4.5.1.1 Change in Government

BOT projects are normally developed over a long period that can span the life of several governments. Therefore, it is important that changes in the government will not change the agreed contracts. In C.M. Tam's (1999) review of BOT projects in Asia, the causes of project failures in Thailand were political instability and changes in government and its' direction.

Changes in government compositions can threaten BOT projects. It is important that a government representative is identified at the start of the project to lead and manage the BOT contract from project inception to completion. Once a contract is entered into, it is crucial government follows the contract and keeps its' promises even if there is the potential for adverse political effects. If government breaks the contract, the private sector will mistrust the government and the process, deterring future private sector involvement in BOT projects.

Using BOT is a business decision that should not be mixed with politics. Private developers incur significant costs to enter and develop BOT projects. It is important that private sector is confident that a change in government will not
change original established contract conditions. Government should assume this risk and compensate the private sector for any associated costs if it does occur.

4.5.1.2 Regulatory or Legislative Risk

Regulatory and legislative approval is usually obtained prior to government involving the private sector. It is easier for the public sector to obtain regulatory and legislative approvals as they are familiar with the process and, in some cases, applications can only be made by the public sector. Agencies may be more inclined to allow governments to have special privileges and leniency compared to the private sector in acquiring approvals and permits. The public sector should assume regulatory and legislative risks as their knowledge of government process helps them manage and control these risks as well, government can normally do it at lower costs.

4.5.2 Financial Risk

4.5.2.1 Revenue Risk

Revenue risk is likely the most difficult to determine in terms of who should assume risk responsibility. As discussed earlier, traffic revenue studies are often unreliable. For most toll projects constructed to date, revenues are normally lower than projected. The results of a study completed by Muller and Morgan (1996) showed that: “For 10 of 14 toll road forecasts studied, revenues on average missed projections by anywhere from 20% to 75% in the initial years after opening. A majority missed or are likely to miss the revenue forecast in the second year by 40% or more”.

Normally, lenders will want assurances that there is sufficient revenue to cover debt service and protect from variances in cash flows. If a private company can obtain insurance for cash flow risk, the cost would be high and would be reflected in the required project return to the project company. “The enormous variability in the accuracy of toll road forecasts in the past decade suggests a potential need for added protection and security during the early years of a toll
Reducing the uncertainty associated with these forecasts represents one of the major challenges for transportation agencies, traffic consultants, investment bankers and investors. Continued forecast variability could dampen investor interest at the very least and could lead to actual defaults at the extreme". (Muller and Morgan, 1996)

One method of increasing revenues is to increase toll rates. In California, toll rates are allowed to be raised in three ways: 1) concession contract provide a cost increase formula as a hedge against inflation, 2) improvements in quality index measures that effectively reward operators for service reliability, 3) political increases, to increase the tax revenue paid by concessionaires to the state. In most situations, tolls are restricted by market prices. If tolls are too high, the facility will operate under capacity with low demands. If tolls are too low, the facility will be congested with high demands. The private sector should have control in establishing toll rates but at the same time, government should have some leverage to ensure the public is protected.

As the cost of revenue risk is high and revenue is sensitive to many variables that are outside the control of the private sector, revenue risk should be shared. The public sector should take some risk for minimum revenue while the private sector should provide a return to government if revenues exceed established maximum return.

4.5.2.2 Inflation Risk

Both lenders and equity investors will normally insist on some mechanism to protect against inflation risk. Clauses in the concession agreement may provide protection against price escalation by allowing the project company to increase the tolls. Price escalation clauses attempt to take account of increased project costs due to inflation. Clauses may also be drafted with the intent of maintaining the purchasing power of the project's net income and equity. Normally such protection is not complete, and negotiation of the terms of the price escalation formulas in BOT projects is time consuming and detailed that government will have to provide some level of support. (Augenblick and Custer, 1990)
Inflation risk is beyond the control of the private company and is a risk that concerns both equity investors and lenders. For most BOT projects, the rewards are not sufficient to compensate the private company for undertaking the risk of inflation. Thus, the government normally assumes inflation risk through allowing costs to be passed through to the consumer. To cover inflation, an agreement for the upside and downside of inflation should be agreed upon between the public and private sector where costs are shared as well as benefits.

4.5.3 Force Majeure

Force majeure risks that cannot be reasonably covered by insurance pose a dilemma. Lenders will rarely undertake force majeure risks. Equity investors, unless offered considerably more upside potential, are also reluctant to take force majeure risks. They will not guarantee the lenders against force majeure risks except to the limit of their own equity investment. Thus government will normally be required to assume force majeure risks.

4.5.4 Technical Risk

4.5.4.1 Design and Construction Risk

In most cases, when the public sector enters into a public-private-partnership with a private sector at an agreed price, the private sector will be responsible for cost increases related to design and construction. If changes to the original performance specifications are made by the public sector or certain responsibilities are not met by the public sector, then it will be responsible for costs incurred as a result. If the private sector is expected to assume the design and construction risk in a BOT project, it should have control over project delivery. Any interference by the public sector in the delivery will contravene the original process. An important element during the procurement stage is to clearly identify the 'change order' process especially for unusual circumstances, such as addressing changes as a result of legislation or regulation. Design and construction risks in BOT projects should be
assumed by the private sector but it is important that the government also allows the private sector to have full control and responsibility to manage it.

4.5.4.2 Commissioning and Operating Risks

In BOT projects, commissioning and operation of the project are the responsibility of the private sector operator. The private sector would be responsible for delays in commissioning as well as increased costs associated with operation. In some instances, the public sector may want to assume some risk related to labor unions for operation if the private sector is asked to use existing public sector staff. The private sector will want to ensure that there is full training and certification completed by the staff prior to starting work. Overall, this risk is best allocated to the private sector but if the public sector does assume some risk, it is important the nature and extent of the risks are clearly defined.

4.5.4.3 Performance Risk

Performance risk is covered by warranties from the consortium construction contractors and equipment suppliers and by performance guarantees in an operating and maintenance contract. Generally, the project company assumes the risk for performance and operations because they have control over the project.

4.5.4.4 Technology or Obsolescence Risk

BOT models may span a concession period of 20 to 40 years. Over the contract life, technological solutions can develop or technology used may become obsolete. Generally, the private sector has invested interest in the project and will ensure the project is as efficient as possible in order to obtain the desired revenues. Thus, the private sector would be in the best situation to control technology risk.

In a situation where the public sector may wish to upgrade the technology for information technology systems, the risk should be shared and the details of this agreement identified before project inception. The public sector may want technology improvements especially near the end of the concession period when the ownership of the project will be transferred to the public sector. During these
periods, it is reasonable for the risk or cost to be shared proportionately based on the benefits to be gained by the private and public sector.

### 4.6 Summary

#### 4.6.1 Advantages and Disadvantages of Private Toll Roads

The advantages of private toll roads are:

- Opportunities to proceed with infrastructure when public funds may be limited.
- Provides alternative sources of revenue so that other social programs are not displaced or reduced.
- Require the private sector to have long-term vested interest in the project.
- Require private sector equity commitment into the project to ensure project success.
- Sharing of risk with the private sector.
- Private financing is off of government books.
- Faster procurement because private sector is less constrained by administrative and bureaucratic policies and procedures.
- Project is not subject to the availability of funding over a number of years.
- More acceptable by the politicians and public because it will be viewed more cost efficient and less risk to government.
- More acceptable for private sector to deliver toll financed projects because the public sector is associated with roads financed from taxes rather than tolls.
- Create a better relationship between the public and private sector.

The disadvantages of private toll roads are:

- Higher total project costs to compensate the private sector for undertaking investment risk and other shared risks.
- Higher total project costs because of higher private sector financing rates.
- Minimal cost savings in the design and construction because competitive bidding is used already in traditional government contracting procedures.
• Requires complex legal agreements, which may be costly to develop for both parties.
• Private sector may exploit a monopoly by pricing services above costs.
• Public sector is more experienced in obtaining land and environmental approvals.
• Special interest groups may feel that the private sector will not prioritize and respect environmental and social issues.
• Private sector may have problems acquiring right-of-ways. Local governments may have difficulties in expropriating land for the private sector in that they would be exercising public power for private interests.
• Government will still be associated with private sector project problems and project failures.

4.6.2 Guiding Principles

Private toll roads are financed by private investment. They are normally structured in a BOT arrangement, which gives the government an opportunity to transfer as much risk as possible to the private sector. There are certain advantages of having private sector involvement; however, private toll roads cannot succeed unless both parties are rational to ensure that all interests are considered.

Private toll projects have been delayed or costly as a result of land negotiations, lack of definition in the preliminary design, and environmental approvals. Government support is required in these areas. As recommended by Fielding and Klein (1993), government should clear the project first by assembling the right-of-way, completing the preliminary design and satisfying the environmental requirements. This will increase project success and decrease uncertainties: if the project will survive; when it will be approved; its magnitude; and its final design.

The following is a guideline of some of the principles that should be considered in developing a private toll road:
• Enabling legislation and regulations: Ensure that all required legislation, regulations, and approvals are in place at the outset of the project.
• Clearing the project: Where possible, clear as much of the project as possible by assembling the right of way, completing preliminary design and satisfying the
environmental requirements before awarding a contract to complete the final
design and to finance, construct, and operate the facility.

- Rate of return: A project must offer a reasonable rate of return in order to attract
private investments. Where rates of return are high, government should consider
public ownership.

- No competition zones: Government should provide a guarantee that there will be
no competing projects nearby for a stipulated period of the contract. The
competition zone granted should not create a monopoly.

- Toll revisions: A process should be defined to allow the private sector to fix and
adjust toll rates, which will not create a monopoly for the private sector. To the
extent possible, it should be free from political influence.

- Strong consortium: Project should have a reliable, committed and strong
development consortium capable of weathering revenue shortfalls.

- Development cost and time: All parties should understand that development of
toll roads is a costly and time consuming process to obtain private financing and
environmental approvals. Be prepared for long delays. Where government can
help to simplify and shorten the process, they should.

- Competent construction contractors: The project should have strong and
technically competent construction contractors, which can guarantee a timely
delivery of the project.

- Fair and reasonable allocation of risks: The risks should be allocated to the party
that has the capability to control it. The amount of risk assumed by the private
sector should be reflected by the rate of return in a project. Government should
ensure that public risks are minimized but understand the costs of risks,
insurance, and bonds are all part of the construction costs, which is directly
related to toll rates paid by the public. Some risks are best shared. If risk is
allocated to the private sector, government should ensure that they allow the
private sector the ability to control and manage it.

- Government that is equitable and experienced: A project must have government
support. If the government is not experienced, advisers should be obtained to
provide the experience to ensure that legal framework and contractual conditions
protect both parties' interests. Select a government representative that will be continuous through the contractual process. Understand that changes in government can delay the process and can be expensive for the private sector.

- Credible process: Ensure there is an open and fair process. Understand that the development of submissions and proposals are expensive ventures.
5 Review of Toll Roads in North America

The following is a review of different provinces and states where toll roads have been implemented. Each province and state has approached tolling in a different way.

In Canada, recent toll road projects in Ontario, New Brunswick, and Prince Edward Island have been based on the BOT model with private ownership over the concession period and then transferred back to the province. A brief discussion on the Lions Gate bridge project in British Columbia is provided to highlight the importance of public acceptance and the cause for its failure. Although Coquihalla Highway is operating as a toll highway in British Columbia, no detailed discussion was undertaken because the project was delivered by a 'purely' public entity through tax-supported debt on the government books. The tolls collected on Coquihalla are part of general revenues and do not support the project itself or go directly to any other transportation projects.

Most toll roads in the United States are publicly owned. The following state agencies are reviewed in this thesis: Oklahoma, Texas, New York and New Jersey, Virginia and California. Only over the last decade have privately owned toll roads under BOT arrangements occurred in Virginia and California. The toll roads in Oklahoma, Texas, New York and New Jersey are all delivered and operated by an authority.

A variety of agencies are studied to understand some of the issues encountered in developing both public and private toll roads as well as to review the characteristics of the various agencies and projects to see the differences and similarities. Although this thesis is focused on the dynamics of developing private toll roads, there are many ideas that can be learned from agencies with only public toll roads developed through public authorities or commissions that are also applicable to private toll roads. By reviewing the development of toll roads in a variety of provinces and states, it is hoped that knowledge can be gained on potential problem areas and to learn from past successes and failures.
Of necessity, the discussion varies in depth depending on the level of information that was available from different projects and agencies. However, a summary table provides the following information, where available, on each of the projects and agencies reviewed: project information; policies; financial, delivery, and contract details; risk allocation; bonds; toll collection system; enforcement information, toll structure; toll tag administration; and electronic toll technology information.

5.1 Projects in Canada

5.1.1 British Columbia

In 1995, the Province of British Columbia published an integrated, multi-modal transportation plan entitled Going Places: Transportation for British Columbians. The report outlines the Province's new approach to doing business and its' goal to finance capital and operating expenditures within the limits of its Debt Management Plan without increasing taxes. The ability to apply road user fees is the responsibility of the BC Transportation Financing Authority established by the Build BC Act (1993). The Act states that the purpose of the BCTFA is: "...to plan, acquire, construct, improve or cause to be constructed or improved transportation infrastructure throughout British Columbia and to do such other things as the Lieutenant Governor in Council may authorize." The BCTFA business plan states: "The Province of British Columbia has announced that it intends to finance future transportation infrastructure without increasing general taxes. To achieve this goal, it will look for new sources of revenue from road users. These revenues will be directly linked to specific transportation improvements. Road tolls will only be charged where and when free alternative routes are available." (BCTFA 1997) Going Places also announced that in the future, "as new projects are completed, regional gas taxes, tolls and other revenue sources will replace the need for dedication of additional provincial taxes”.

Since the beginning of the 1990's, the Provincial Government has been looking at options to repair or replace the Lions Gate Bridge in Vancouver B.C. In
April 1997, the government proposed two main options: (i) a 4-lane rehabilitated bridge with northbound traffic using a two-lane causeway through the park and southbound traffic using a two lane tunnel under the park; or, (ii) rehabilitate the existing 3-lane bridge and causeway. The 4-lane option, which called for a $400 million investment, would have required bridge users to repay investment via tolls.

"By extolling a user pay policy our politicians are telling the driving public from now on you need to pay your way. The government is no longer willing to subsidize construction and maintenance of major road facilities to serve an implied wanton wastefulness by drivers who insist on using private automobiles." (West, 1997)

After spending $6.9 million from 1993 to 1998 on studies, plans, and public consultation programs that looked at merits of building a tunnel or a new bridge, the government announced a $78 million renovation of the Lions Gate Bridge. The "one-way, two lane bridge and a one-way two lane tunnel combination was rejected by local politicians primarily because it would require tolls." (Barr, 1998) "All three North Shore municipal councils are now united in their opposition to the use of tolls to pay a new Lions Gate crossing. In a five-to-two vote, North Vancouver City council agreed this week to ask the provincial government to proceed with a $70 million rehabilitation of the existing bridge. North Vancouver City councilors noted that the government wants to impose tolls as a way to punish North Shore residents for voting Liberal in the last provincial election. I think it's a measure to punish us for not voting NDP, said Councilor Bob Fearnley, who was angry that tolls would only be applied to the Lions' Gate. It's petty." (Morton, 1997) "Obviously there was no support for tolls, Lali said." (Bohn, 1998) The 3-lane rehabilitation project, a back-up to the 4-lane proposal, was considered a "quick-and-dirty solution, the least intrusive, politically easiest (no tolls, no heated negotiations with community or business organizations or Indian Bands over right-of-way or neighborhood devastation) and cheapest. Do best – do least." (The Vancouver Sun, 1998)

Due to voting concerns and lobbying by the North Shore residents, the government decided not to proceed with the 4-lane option with tolls. The Lions Gate project is an example where the public strongly opposed the application of project tolls. There are five main reasons why tolling would be difficult to implement for this
project. First, other than tolls applied on the Coquihalla, the Lions Gate Bridge would be the first project tolled in an urban area in the Lower Mainland. The idea of paying a toll was not supported by majority of the public. Being the first urban tolling project, the public had difficulties accepting tolls and the benefits of tolling. Second, the project was located in an area where most of the political riding was the Liberal opposition. Thus, the neighboring communities felt that the tolls were politically motivated. The Liberal politicians reflected on other current projects that were toll-free, in particular the recent Vancouver Island Highway Project, which were located mostly in NDP ridings. Third, the project only increased one lane capacity in the off-peak direction; thus, travel-time savings for the peak users were minimal. There were no benefits obtained by paying a toll for users in the peak direction. The cost for the project also increased due to changes in the project scope; thus, the users would be burdened with higher toll rates. Fourth, a free alternative was available at the Second Narrows Bridge. Diverted traffic would actually increase total distance traveled. From a transportation demand management perspective, it would compromise the overall goals of reducing congestion and pollution. Lastly, the project is situated in a location where there are 7 major stakeholders: the Provincial Government, Vancouver Park Board, the Squamish First Nations, City of Vancouver, City of North Vancouver, District of North Vancouver, and the City of West Vancouver. The most challenging are the Vancouver Park Board and the Squamish First Nations, which both own right-of-ways in the project area. The project was also located through a well-respected park area that is a major tourist attraction with extremely high profile.

The Lions Gate Bridge is an example where tolling would be extremely challenging regardless if the project were publicly or privately owned. The project environment had too much opposition and difficulties for tolling to succeed.

5.1.2 Ontario

The planning for the development of Highway 407 started in the late 1950's. Highway 407 was required to relieve congestion on Highway 401, as well as to serve development in the adjacent regional municipalities. In 1992, senior executives of
the Department of Transportation requested staff to explore Highway 407 as a toll road due to the fiscal situation, growing debt and high unemployment. In February 1993, Premier Bob Rae announced Highway 407 as a toll road project seeking public-private partners. The Ontario Transportation Capital Commission (OTCC), a crown corporation, was formed under the Capital Investment Plan Act in 1993 to finance transportation projects and recognize economic benefits from public-private-partnership arrangements. The OTCC has three conditions for the imposition of tolls: the facility must be a new one; there must be an untolled alternative; and tolls must be removed when the project is fully amortized.

In May 1993 the Crown issued a Request for Qualifications to two Consortia who expressed interest in delivering the facility. The RFP requested the respondents to finance, design, construct, maintain, operate and transfer Highway 407, as a toll highway from Highway 403 to Highway 48, a 69 km 6-lane highway. Highway 407 is planned with additional future phases as follows: Highway 427 to Highway 400, Highway 401 to Highway 48, and Highway 403 to Highway 401.

Canadian Highways International Corporation (CHIC) was awarded the contract in May 1994. The CHIC toll collection system was designed and developed in partnership with a second consortium, Advanced Toll Management Corporation. The toll collection system is based completely on electronic toll collection. There are no tollbooths and motorists are not required to slow down. The Highway 407 toll collection system is one of the world’s first all electronic highways. It makes use of a transponder tag attached to a vehicle’s interior windshield and which is read as the vehicle enters and exits the highway. The computer technology is located at a central operations center where it calculates the distance traveled and determines the cost and deducts the toll from a prepaid account. For occasional users, the tolls are administered by reading the license plate using a photo-based license plate recognition system that sends the video images to a central processing computer at the operations center. An invoice is generated and then issued to the vehicle’s owner.

In regards to financing, the Crown had requested the Consortia to provide project financing. The RFP stated, “The Crown will not provide any guarantees as to
traffic forecast levels, the amount or timing of capital expenditure estimates or any other factor or condition which may impact the Respondent's calculation of revenues and cost. ...Proposals shall include a description of arrangements for the proposed debt and equity financing of the Facility. Respondents will not be required to demonstrate at the proposal stage that debt financing is in place, but should be aware that one of the evaluation criteria is the amount of equity committed at the time of submission of the Proposal." (Ontario Ministry of Transportation, 1993)

However, the rate of return and cost for private financing was considered to be too high by government, consequently, the project was delivered as a public toll facility based on a design-build contract and operations contract. The funding for the project was obtained through a bond issued by the government. The total cost of the project was approximately $1 billion.

What is unique about Highway 407 is that it opened on June 7, 1997 for free use with traffic volumes much higher than forecast. The first 36-km highway section completed was expected to generate around 150,000 trips per day in free-use, but averaged 300,000 trips per day. Unlike most toll facilities, which have come up short on traffic forecast and revenues, Highway 407 had the opposite problem. The toll collection system was under designed to handle the high volumes. The road operated as a free road for almost five months until the system was upgraded to accommodate the additional capacity. "A senior official told us that the delay in starting tolling is caused by a fear that they can't cope with the sheer volume of data being generated by unexpectedly large traffic volumes. Technicians from Bell Canada and Hughes Transportation Management Systems are engaged in a frantic effort to tweak extra capacity out of what is turning out to be an undersized toll system. The target of this upscaling of the toll system is to get it to handle 16,000 license plates imaged toll transactions per hour, compare to 11,000 being currently achieved. Alternatively, the authorities will have to abandon the complex per-kilometer toll schedule for the time being, and begin tolling with a simple flat rate toll." (Samuel, 1997) Flat rate tolling was being considered because it reduced the data load by more than 50 percent as vehicles only needed to be identified on either entry or exit and no matching is required. Officials from OTCC indicated that
approximately $2 million per week were being lost in toll revenues. Tolls were finally implemented on the project on October 14, 1997.

No documentation or information was available to clarify who was responsible for the lost revenues during the first five months of opening. It is likely that all parties were responsible to some degree. Wilbur Smith and Associates may be partly responsible for the low traffic and revenue forecasts. CHIC may be responsible because the toll technology and system selected under estimated the data capacity requirements. OTCC may be responsible because they may have specified the volumes the toll collection system must meet which were below the actual amount. Even though the road was open for free for the first five months, the project is still successful in that actual volumes and revenues were higher than anticipated.

The volumes on Highway 407 are approximately twice the amount of what was anticipated. The consultants, Wilbur Smith and Associates, hired to do the traffic and revenue estimates had forecasted that the busiest stretch of Highway 407 would carry an average 55,000 vehicles/day on opening, but the actual volumes are over 100,000 vehicles/day. Even though it is best to forecast toll revenues conservatively for financing purposes, it is important to design the toll collection system to meet optimistic forecasts to avoid or reduce similar problems as occurred on Highway 407.

Normally, when electronic tolling is implemented, a manual method is often available for occasional users and/or people who choose not to apply for a transponder. Highway 407 is a full electronic toll facility where transponder use is optional. For people who choose not to use a transponder, they are billed through video imaging of their license plates. The data capacity required for video images is extensive. In addition to the image storage requirement, a distance based toll collection system also adds another level of complexity, as data is required to match a vehicle's entry and exit to the system. Most combination manual and electronic toll collection system have approximately 30% electronic toll users. Based on a study by Daniel Greenbaum (1997) on "The Realistic Limits of ETC Market Penetration", he states: "as electronic toll collection is initiated on more and more toll facilities, we find that two interesting conditions occur: 1. the number of tags sold
greatly exceeds expectations; and 2. while peak hour ETC market penetration can reach 70 to 75 percent of all traffic in those periods, the overall market penetration – that is the average during the year – is amazingly consistent in the 30 to 35 percent range on facilities with both high and low volumes of commuters.” Therefore, the basis for collecting tolls from majority of users will likely be license-based thereby requiring large data storage systems. Although Highway 407 charged $1 to administer the license-based transaction, which may decrease the number of license-based users, the problem still initially exists, as most electronic toll systems require a ramp-up period before electronic users reach the saturation point. In most toll collection systems, discounts are provided to electronic toll users to provide incentives as well as to reflect the reduced administration costs. Thus, the 30% market penetration identified by Greenbaum already accounts for the discounts provided to transponder users.

For most electronic toll collection systems, transponders must be acquired in order to use the electronic toll lanes. License plate video images are also collected but they are used as an enforcement method to ensure valid users of the electronic toll lanes. Therefore, the volume of video images or reliance on video images is reduced. Although license plate video imaging eliminates the need for transponders, the cost to administer video images is far greater. In addition, license plate imaging has far more potential for revenue leaks in the system due to inaccuracies, dirty license plates, obstructed license plates (e.g. obstruction from bike racks), and sensitivities to weather and level of light in heavy fogs or snowstorms. License plate billing is also costly because of the high administrative requirements. On Highway 407, users of the system without transponders pay a $1 surcharge. This surcharge is well below the actual cost of collection. For all these reasons, license plate video imaging has not been widely used as a method of toll collection in general.

There are several issues that have come to light on Highway 407 as to the number of people who have not paid their tolls or who have been wrongly billed. In Ontario, the penalty attached to not paying the toll issued is license suspension. A recent news article stated: “At least 190,000 Ontario motorists have been threatened with not getting their licences renewed if they didn’t pay up to a newly privatized toll
road, the highway owner's revealed Thursday. The information came to light as the
government unveiled a plan to combat Highway 407's apparently widespread billing
errors, described by Premier Mike Harris this week as a 'mess'. The action includes
temporarily halting the practice of denying a license to anyone whose bill to 407 ETR
is overdue, and setting up a dispute resolution system." (Blackwell, 2000)

After the announcement of the licence denial, "The 407 ETR and the Ministry
of Transportation have jointly agreed to temporarily suspend the practice of denying
the renewal of vehicle licence plates for those customers who have outstanding 407
ETR balances. 'We think that some of these people may have legitimate concerns
about their invoices, but they couldn't get anyone on the phone to hear them. They
couldn't reach us by phone and were given little option but to pay their bills.' In order
to ensure these customers have recourse, 407 ETR plans the following:

- Those customers who, in the past, settled 407 ETR accounts at the ministry's
  Driver and Vehicle Offices in order to have their vehicle licence plates renewed
  will receive a letter from 407 ETR in the coming weeks explaining how they can
  access a dispute-resolution procedure to address any concerns they may still
  have about those payments.

- About 110,000 407 ETR customers were in plate denial as of yesterday. Effective
today, they will be temporarily taken out of plate denial. While they will be able to
renew their vehicle licence plates, the amounts owing 407 ETR remain due.
Those customers may also access the dispute-resolution procedure. At the
conclusion of a customer's dispute, if they are found to owe the monies, their
plate denial will be reinstated.

'We believe temporarily suspending plate denial will allow us to address customer
billing issues while we implement our customer service plan, including an improved
dispute-resolution process,' he says." (407 ETR International Inc., 2000)

Although there are lost revenues as well as the difficulties in the initial
operations of the toll collection system, the high traffic volumes and toll revenues are
a positive attribute of the project. The strength of the toll revenues has allowed
Highway 407 to investigate the sale of the highway to the private sector to
accelerate the construction of the extension. In February 1998, the government
announced its intention to sell the 407 ETR to the private sector. At the time the highway had a fixed asset worth of $1.87 billion of which the province owes $1.42 billion.

On May 5, 1999, 407 International Inc. purchased the highway from the Province of Ontario for $3.1 billion. 407 International Inc. is owned by a consortium comprised of Spanish company Cintra, SNC-Lavalin, and Capital d'Amérique CDPQ, a subsidiary of the Caisse de dépôt et placement du Quebec. The new owners are committed to investing another $900 million in construction and debt service costs to finish the 15 km east extension to Brock Road, and the 24 km west extension to Brant Street. The owners have also committed to widen the 407 ETR as congestion levels increase, in order to provide a high quality of service to customers. In return, 407 International Inc. has concession rights for 99 years.

5.1.3 New Brunswick

The New Brunswick Department of Transportation (NBDOT) identified a shortage in their transportation facilities and expressed a concern over the widening gap between existing transportation facilities and their ability to meet current demands. The NBDOT determined that the minimum and most urgent improvement required in their transportation system would be to upgrade their National Highway System to a modern 4-lane facility. The estimated cost to construct the upgrade program would be approximately $2.4 billion. Based on the rate at which capital expenditures could be made, it was identified that it would take 32 years or until 2025 to complete the system. Premier McKenna acknowledged the needs and approved the acceleration of project delivery with tolls for some of the upgrade program.

In June 1996, the New Brunswick government announced its' intention to pursue a four-lane 195-kilometre highway project between Fredericton and Moncton. The New Brunswick Department of Transportation completed “A Feasibility Study for Toll Highways and Private Sector Involvement for Highway Development in New Brunswick” (ADI Limited, Price Waterhouse, and Transroute Consultants, 1994). Request for qualifications was solicited in December 1996 and five submissions
were received and a short list of three was identified in January 1997. In March 1997, the RFP was issued to the three short listed proponents: Maritime Highway Corporation, Maritime Road Development Corporation, and Peter Kiewit Sons Co. Ltd. The RFP deadline was September 1997. In November 1997, Transportation Minister Sheldon Lee announced in the New Brunswick Legislative Assembly the preferred proponent was Maritime Road Development Corporation (MRDC) and the Fredericton-Moncton Highway Financing Act was created to allow private financing for the project. The Province created the New Brunswick Highway Corporation (NBHC) a statutory crown corporation under the New Brunswick Corporation Act as the entity which would implement the Fredericton-Moncton project on behalf of the Province.

The organizational structure was based on the use of a not-for-profit company (the Project Company) as intermediary between NBHC and the private consortium. "The Project Company will receive the concession of the Highway Corridor from NBHC, sublease the Highway to NBHC and enter into the Project Agreements. This organizational structure has been designed to minimize tax costs to the Project, access financing based on toll and ancillary highway revenues to support a portion of capital costs and result in operating lease treatment for the payments to be made by NBHC to support a portion of the capital costs. The project company will be the borrower of the financing required for the Project. This financing will consist of: lease based debt which will be arranged for the Project Company by NBHC based on the commitment of NBHC to make sublease payments to the Project Company; and toll based debt which will be arranged for the Project Company by the Successful Proponent supported by the gross toll and ancillary revenues of the Highway." (NBDOT, 1997)

MRDC submitted a guaranteed maximum price of $584 million to construct the facility. The total capital cost was approximately $877 million, which includes interest costs during construction; and, other miscellaneous costs such as land acquisition, independent agents and closing costs. Under the terms of the operating lease, the government has the option to buy the highway, for fair market value, after 30 years or after 40 years. Fair market value was defined as the present value of
the project company's projected net cash flows for the remaining years of the concession agreement. If the Province does not exercise its right to buy the completed highway after year 30 or year 40, ownership reverts to the Province for $1 in year 50. MRDC raised $149.5 million in toll-based debt, which will be paid back, through revenues generated by tolls. The toll revenue was expected to average $22 million annually over the 30-year lease. Lenders have no recourse to the Province if toll revenues fall short of expectations. If toll revenue is higher than expected, after toll-based bondholders are paid, the excess revenue will flow back to the Province to reduce lease payments. MRDC also guaranteed to provide $2 million in ancillary revenues from commercial enterprises along the route. The remaining capital cost was estimated at about $725 million, which was raised through lease-based debt. The financial commitment by the government was in the form of a sub-lease payment to lease the highway and to pay operating, managing, maintenance and rehabilitation costs. The annual lease payment was approximately $58 million, which began after the project was completed.

The announcement led to many controversies. Some controversies are based on the fact that taxpayers end up paying twice for the highway, tolls and taxes to subsidize the lease payments, and other controversies are related to conflict of interest over a former cabinet Minister Doug Young. “When details of the deal were disclosed in January – just as the current Liberal Leadership race got under way – they were greeted with howls of protest. Part of it was the price tag: over the next 30 years, motorists and New Brunswick taxpayers will be on the hook for $2.6 billion in lease fees and tolls. But just as controversial was the fact that Doug Young – the former federal Liberal cabinet minister who lost his New Brunswick seat in last June’s election – had emerged as chairman of The Maritime Road Development Corp., the consortium that is to build the new highway. Young’s involvement led to opposition charges that he was in a conflict of interest. This was because on 23-km section of the expanded highway had already been built – and partly funded by Ottawa while Young was transport minister. At the time, no tolls were envisioned. Now, motorists can expect to pay 75 cents every time they use that part of the road – and part of that money will go to Young’s consortium." (Bergman, 1998) Even
though the federal ethics commissioner cleared Young of any wrong doing, this did nothing to reduce the public's perception of the toll policy and the politics underlying the policy.

Although New Brunswick has implemented tolls on the Fredericton-Moncton highway, there remains a lack of public support for tolls. The tolling policy has been received with public opposition from its inception. Tollbusters, a citizen's group, has been lobbying the three Liberal leadership candidates to scrap tolls on the entire highway. While all three candidates felt that the deal was already settled and not open for litigation, the University of New Brunswick political scientist said in reference to the Liberal Party, "There's no way they can avoid this in the next election. The opposition is going to hammer them on it." (Bergman, 1998)

The New Brunswick Progressive Conservatives, led by Bernard Lord, did not waste any time in the 1999 Provincial Election. He proceeded to 'hammer' the Liberals on the tolling issue. The Conservatives included in their 1999 '200 Days of Change' platform the promise to stop the collection of tolls on the Fredericton-Moncton highway. "The Conservatives said, if elected, the tolls booths would come down. And just to underline his personal commitment, Mr. Lord refused to allow his campaign bus to travel the toll road. The long way around became a short cut to office." (MacGregor, 1999) The strategy seemed to work, as the Conservatives took 44 of possible 55 seats and amassed 53% of the popular vote.

The Fredericton-Moncton Highway project is another example where tolling was not publicly accepted and used by the Conservatives for their own self-interest to gain political leverage and public support. The Conservatives have not been in power since 1987 and this was one way for them to gain votes. As a result of the public backlash, the opposition government used the issue for political gains. Part of the reason why the public did not support the project was because tolls were not envisioned during project inception. The Liberal government had constructed 23 kilometers of the proposed highway prior to looking at tolls or private sector involvement. Thus, the public was not prepared for tolls on the highway.

Another concern expressed by the public was they felt they were paying twice for the highway, tolls and taxes to subsidize lease payments. In some respect, their
concerns are valid as the toll revenue paid for less than 20% of the total project cost (i.e. toll based debt is $149.5 million and the lease-based debt is $725 million). Thus, the cost recoveries from tolls are limited. The RFP requested for only a minimum of 13% for toll-based debt recovery.

After operating for two years on the completed sections of the highway, on March 1, 2000, the toll was removed. "New Brunswick Premier Bernard Lord has eliminated the controversial tolls on a highway between Fredericton and Moncton, fulfilling a campaign promise that many observers believe vaulted him into office. As tollbooths were being shut down yesterday, Mr. Lord told reporters the elimination of the toll collection system would reduce the cost of the highway project by $34.5 million, to $910.7 million. 'It is simply unfair to have tolls one stretch of the Trans-Canada four-lane highway in the province,' Mr. Lord said at a news conference where he delighted in checking off the last of 20 promises he made during spring's election. ... The Liberal deal to have the road built by a private consortium and leased back to the province over 30 years and financed partially through the collection of about $13 million a year in toll revenues became a lightning rod for voters. During the campaign, the finance minister Edmond Blanchard said the province would have to pay as much as $225 million to get out of the highway construction scheme with Maritime Road Development Corp. But Finance Minister Norman Betts said the Conservatives were careful to avoid opening up the entire construction contract and changed only the sections that dealt with tolls. 'If we had said we were going to cancel this agreement, we would have been faced with a Pearson Airport or a helicopter deal scenario and we weren't prepared to go there and incur huge legal costs,' Mr. Betts said." (Cox, 2000)

The Fredericton-Moncton Highway is another example where the project failed as a result of the lack of public acceptance and used for political positioning. In addition, toll revenues did not recover a substantial portion of the total project cost making the use of road tolls open to discussion.
5.1.4 Prince Edward Island

The Confederation Bridge is 12.9 kilometers spanning the Northumberland Strait in Atlantic Canada. The bridge was completed in 1997, connecting Prince Edward Island with the mainland. Not only is it one of the longest continuous multi-span bridges in the world, and the longest bridge over ice covered water, the overall delivery of the bridge itself shows innovation and creativity. The story of the Confederation Bridge is told by Copthorne Macdonald and in his words, “at one level it is the tale of a concrete and steel structure. At another, it is the story of a historical problem: the need for reliable and convenient transportation across a sometimes menacing body of water. It is also the story of a vision – the vision of a long-term solution to that problem, and the challenge of maintaining the vision until it became a reality. It is a story about smarter and wiser ways of doing things – about tailoring solutions to circumstances – about marrying design and construction activities more intimately – about creating significant public works in time of fiscal restraint – about mitigating negative socio-economic impacts – and about environmental concern, not as the developer’s enemy, but embraced as legitimate part of the development process at every stage, and with a monitoring aspect to mitigate environmental impacts and verify environmental assessment predictions.” (Macdonald, 1997)

The story of the bridge started in the 1870’s when the Island Government and the newly formed Dominion of Canada negotiated terms for Prince Edward Island’s entry into Canada. The main issue in the negotiations was transportation between the Island and the mainland. On May 20, 1873 Parliament petitioned the Queen to admit Prince Edward Island (P.E.I.) into the Dominion of Canada under conditions that efficient service would be provided for the conveyance of mail and passengers between the Island and the mainland of the Dominion, winter and summer. This became part of the Canadian constitution.

However, the promise made by the Dominion Government was not met with efficient and reliable transportation service. The ferry service was often unreliable and sometimes people would be icebound for days. The Islander was very upset with the conditions and often dreamed of a tunnel or bridge. The first Islander to press for an alternative was George H. Holwan who promoted the construction of a
subway in 1885 until his death in 1901. In the early 1900’s people began to push for a causeway. In 1962, with an election on the horizon, Prime Minister Diefenbaker announced that the project was technically and economically feasible, and that the federal government would supply the $105 million needed to build the causeway. After a number of consulting engineers reviewed the project, it was concluded that the best approach would be a combination of bridge, causeway, and tunnel that would accommodate both road and rail traffic.

In 1965, newly elected Prime Minister Pearson announced that the government would move forward on the construction of the combined causeway, tunnel, and bridge. The first contracts were awarded later that year and a few days before the federal election, sod was turned and work began on the PEI highway approach. In 1967, bids for the causeway on the New Brunswick side were received but rejected because the bids were much higher than the estimated cost. The Federal Government was concerned about the cost and decided to reassess the project and review alternative crossing schemes and the cost and benefits of a fixed crossing.

In 1968, after already spending $15 million on the approach road, the Federal Government cut causeway yearly expenditure to $5 million. Pierre Trudeau became Prime Minister that year, and had new initiatives for economic expansion and economic development on the Island. On March 1969, the project was cancelled and instead of the project, the government announced they would contribute to $225 million over the next 15 years toward a Comprehensive Development Plan for the Island.

Through the 1970s, there were improvements to the ferry service and talks of a fixed crossing diminished. However, at the same time, the ferry system became increasingly expensive to run consequently, the government had to continue increasing the subsidy as well as the ferry tolls, which rose faster than inflation. The federal government was spending millions of dollars each year to subsidize the ferry service. In 1982, Public Works Canada (PWC) reviewed a proposed bridge design at a cost of $640 million in 1982 dollars. Then, in 1985 and 1986, PWC received three unsolicited proposals from the private sector. What made these proposals
attractive was the fact that all three was based on private financing. The basic idea was to have private sector loans finance construction, then use ferry subsidy money and ferry user fees to pay back the loans.

The unsolicited proposals were extremely attractive to the government because the cost for this major infrastructure would not increase government debt and would eventually end the ferry subsidy. In December 1986, the government gave PWC the mandate to examine the technical, financial, environmental, social, and economic dimensions of the proposed fixed-link concepts. PWC was also asked to assess the private sector interest in financing, building, operating and eventually transferring the facility to the federal government.

PWC commissioned ten studies on topics such as the physical oceanography, fishery resources and impacts, socio-economic impacts, vessel traffic and bridge safety, and tunnel feasibility in order to answer a variety of questions. The results of these studies were completed spring of 1987 and on May 12, PWC called for “Expressions of Interest”. The document stated three objectives: private sector participation and involvement (BOT model), maximization of economic benefits to Canada and the Atlantic Region, and value for money. The “Expressions of Interest” is only one of the three stages of the selection process. The second stage is the unpriced technical proposals and the third stage is the priced proposals. Twelve organizations submitted expressions of interest.

Before PWC called for proposals, they completed one more study to evaluate the environmental impacts. On November 16, Public Works Minister Stewart McInnis announced that “these studies have indicated that there are no environmental impacts that cannot be mitigated by proper design and construction procedures” and gave the green light to call for proposals early 1988 as long as the people of P.E.I supported the project. A plebiscite was held January 1988 and the Islanders were asked: “Are you in favor of a fixed link crossing between Prince Edward Island and New Brunswick. Yes or No.” (Macdonald, 1997) The final result of the plebiscite was 59.4% for yes, and 40.6% for no. For the people who supported the crossing, the reasons were: “building and operating a fixed crossing would cost less than operating a ferry system. There would be major timesavings
for users. Users would have improved access to mainland markets. A fixed crossing would provide a reliable, low-cost power and communication utility corridor. And the amount of fuel consumed by vehicles driving across the Strait would be much less than that consumed by a ferry carrying those vehicles.” (Macdonald, 1997) The opposition of the crossing disliked the overall idea of the fixed-crossing and/or concerned about the consequences of a fixed link to the environment, safety issues, and socio-economic concerns.

There were ten conditions that the project had to meet before the government would support it. The ten conditions were: “financial support for connecting highways; continuation of the Wood Islands ferry at the eastern end of the Island; an agreement concerning the land under the Strait which the fixed crossing would occupy; tolls (which had to be fair and reasonable); compensation for displaced ferry workers; economic development in Borden; economic benefits to the Atlantic region, the resolution of ‘all significant environmental issues’; compensation for adversely affected fishermen during construction; and a utility corridor within the tunnel or bridge through which cable could be run.” (Macdonald, 1997) With the approval of the project from the Islanders, all conditions were met and a call for proposal was made on March 28, 1988 to the 7 short-listed candidates.

On June 13, 1988 a total of 6 firms submitted a total 7 bridge proposals and 1 tunnel proposal. The PWC set up 5 working groups to evaluate the proposals over the summer months. Each group focused on a separate aspect of the proposal: management, technical, environment, Canadian and regional benefits, and financing. What is unique about the process is that after the evaluation the shortcomings of the proposals were discussed with each of the developers individually. After the discussion, the developers had a second chance to submit amended proposals within three weeks. On September 30, 1988, the government announced that three (all were bridge) of the eight proposals met all requirements of the proposal call. The original plan was to call for the priced proposals on October 10, 1988; however, PWC postponed it due to the upcoming of the federal election.

In February 1989, the Prime Minister Mulroney picked his new Minister for Public Works: Elmer MacKay. During the election campaign, concerns for
environmental issues were high on the public agenda, particularly in P.E.I. with regard to the fixed crossing. The federal Environmental Assessment and Review Process (EARP) required that if a proposed project may cause significant adverse environmental effects or engender public concerns, the proposal had to be referred to the Minister of the Environment for an independent public review of the project's environmental and socio-economic effects. The fixed-link project was submitted and over 15 months an environmental review was conducted. On January 30, 1992, the Minister of Public Works announced that all three-bridge proposals met the environmental requirements and directed the companies to submit their bids and their financial and security packages.

The federal government was prepared to pay no more than $35 million annually in March 1988 dollars, $42 million in 1992 dollars for a period of 35 years to avoid a ferry service subsidy during that period. On May 27, 1992, the bids were revealed and the Strait Crossing Inc. (SCI) bid was $40.6 million, which was less than the amount the government had established. The other two bids were over the amount, being $46.2 million and $64.2 million respectively. Although SCI had the lowest bid, PWC's Financial Evaluation Committee ruled that all three financial proposals did not comply with the terms of the Proposal Call process.

Even though all three financial proposals did not comply with the proposal call, on July 17, 1992, the government announced that it would start discussions with the low bidder, SCI, to see if a plan could be worked out between the two parties. On December 2, 1992, the Minister of Finance announced that SCI was selected for the project. The company was allowed to start engineering and environmental work during the negotiations to finalize the terms of the contract.

In addition to the negotiations between the federal government and SCI, three-way government negotiations took place between the federal government, Premier of P.E.I., and the Premier of New Brunswick because the undersea land the bridge would be built on had to be deeded by P.E.I. and New Brunswick. A tripartite agreement was reached in early December 1992. In late December, SCI released their Environmental Plan for public review.
It appeared that the negotiations would be completed soon for the 1993 construction season. However, it did not occur. "For one thing, the negotiations were more complex and prolonged than anyone had anticipated. The project was breaking new ground in many areas. There were no precedents for some of the agreements that were needed, and all parties were trying to minimize their exposure to unfamiliar risks." (Macdonald, 1997) Another reason for the delay was court actions brought against the Government of Canada by the Island group, Friends of the Island, who opposed the project. Friends of the Island claimed that the Minister of Public Works had failed to follow certain procedures under Section 12 of the Environmental Assessment Review Process Guidelines Order and that a fixed link contravened the 1873 terms of union.

"The case was heard before Madame Justice Barbara Reed in March 1993. In her decision later that month she agreed that the Minister of Public Works had failed to comply with the requirement to make a Section 12 decision 'respecting the specific SCI proposal' but did not say that the SCI proposal had to be reviewed by an EARP Panel. She agreed that discontinuing the ferry service without a constitutional amendment would be breach of the Terms of Union, and ordered that "the Government of Canada shall not make any irrevocable decision relating to the specific SCI proposal until after a section 12 decision is made". (Macdonald, 1997)

After SCI completed the report and satisfied the Section 12 assessment, the Friends of the Island launched another court action against the federal government. "On August 12, Mr. Justice Bud Cullen, denied that motion. In his 88-page decision he said 'I believe the very extensive assessment done here was far more than the minimum called for under the guideline order. One has to be impressed with the extent of the work done' ...Regarding whether it had been done properly, Mr. Justice Cullen said: 'The Special Environmental Evaluation runs through chapters and then in Chapter 10 reaches its conclusion which in my view is unassailable and certainly the applicant (Friends of the Island) has been unable to mount any real attack on either the methodology or the conclusion'. On the constitutional issues, Mr. Justice Cullen declared that 'there is nothing inherently unconstitutional about building a bridge or entering into a contract to build a bridge... What is
unconstitutional is discontinuing the ferry service without an amendment to the Prince Edward Island Terms of Union.’ He saw no problem with ‘PWC and SCI entering into an agreement to build a bridge, if such an agreement contains an undertaking to amend the Constitution prior to discontinuance of the ferry service.” (Macdonald, 1997)

The Terms of Union was amended to pass enabling legislation to allow the Minister of Public works to build a fixed link and collect tolls and pay an annual inflation-indexed subsidy up to $42 million in 1992 dollars for 35 years. After completing the contract documents, the documents were finally signed in October 1994, six years and five months from the first request for expression of interest. After looking back at the experience, Paul Giannelia’s comment is “The ongoing challenge for me was dealing with all the negativity. Today, it surprises me that there was so much of it, and that it took so long to die out. The biggest challenge, at the end of the day, was to make believers of the bystanders, the people in the middle, and people on your own team”.

The cost of doing proposals is extremely expensive especially in this type of project. Not only does it require a large experienced team but also the length of time for the approval is also costly for all parties as stated by Giannelia. “Back in 1987 I estimated the cost of bidding the job at $243,000. In the end it was a hundred times that - $20 or $25 million. Once we started spending that kind of money it was easy to stay focused on winning it. But the overriding thing about the project that gave me the confidence to push on was that it made economic sense to build it. I knew that it would eventually get built. It wasn’t as if; it was always a when. The arithmetic told you that. It made economic sense for the taxpayer: after 35 years the ferry subsidy was no longer needed. And there were other economic pluses such as getting goods to market more easily. It made economic sense, and that’s what kept us going.” (Macdonald, 1997)

The following are the financing details for the project as explained by Macdonald. “The final agreement between Strait Crossing Development Inc. and the federal government stipulated that the annual subsidy will be $41.9 million in 1992 dollars, adjusted each year in accord with the Consumer Price Index.
Discounting the future value of this stream of yearly payments, fully indexed to inflation and guaranteed by the government of Canada, made it possible to issue Bonds yielding a guaranteed 'Real Rate' of return in the Canadian Capital Markets. The Real Rate Bond mimicked an existing federal debt instrument, and its use was researched and developed by SCI in its proposals in the late 1980s. A company called Strait Crossing Finance Inc. was set up as a New Brunswick crown corporation to receive the annual indexed payments from the federal government and passes them on to a Trustee for the Real Rate Bond holders. This structure resulted in the Bonds not being exposed to any credit or litigation risk other than the credit risk of the Government of Canada. Consequently, the bonds received an AAA credit rating from Moody's and Standard & Poors, and pricing comparable to the Real Rate Bonds offered directly by the government of Canada. This offering raised approximately $660 million, and it is this money plus the interest it earned during the construction period that would pay bridge construction costs. It was held in trust and withdrawn upon approval of the Independent Engineer who monitored design and construction activities. To secure the government against failure to complete the project, the developer provided an extensive security package consisting of parent company guarantees, a $200 million Performance Bond, a $20 million Labor and Material Payment Bond, and a $35 million Defects Assurance Bond. To secure it against cost overruns, the government required a separate Letter of Credit for $73 million – 10% of the estimated direct construction cost of $730 million. Return on investment and risk for the project partners will come from toll revenue stream after bridge operating and maintenance expenses have been paid.” (Macdonald, 1997)

The annual bridge toll increases were limited to 75% of the annual rise in the Consumer Price Index. After the 35-year period, the federal government agreed to the Premier's that bridge tolls would be limited to an amount covering only the operating and maintenance costs of the bridge and not the cost of replacing it.

The bridge was open to traffic in 1997. The bridge posed many challenges with the tradition of the people and history of the land, the public opposition to physical and social changes, the environmental challenges, the revolving government and political changes, the fiscal constraints, and the technical challenge
itself. Even though this project demonstrates an engineering feat, the political changes are what complicated and delayed the process.

Although there were a number of controversies over the project, Macdonald states, "... about some things, there is no controversy at all. Debt-strapped governments can no longer handle public infrastructure projects in the old way. Private-sector involvement is here to stay, and with it will come some of the things pioneered on this project: smarter, more cost-effective designs resulting in part from tight integration of structure designing and construction planning; making environmental protection, management, and monitoring an integral, high ranking part of the job; analyzing socio-economic impacts early, and including appropriate economic mitigation in the overall plan; private sector financing so that governments can have these projects without going further into debt; and the one-stop shopping approach of design/build/operate/transfer/finance". (Macdonald, 1997)

An advantage this project had was that the tolls replaced the ferry user fees. People were use to paying for the ferry service and the tolls did not impose any additional financial burden to the users. The bridge also provided an increased level of service and travel timesavings, which contributed to the higher than forecasted traffic growth rates.

5.2 Projects in the United States

5.2.1 Oklahoma

The State of Oklahoma created the Oklahoma Turnpike Authority (OTA) in 1947 for the purpose of constructing, operating, and maintaining the Turner Turnpike. The original purpose was redefined in 1953 to allow Oklahoma State Legislature exclusive right to authorize construction of turnpikes if they approved the engineering and economic feasibility analyses.

The OTA projects are coordinated with Oklahoma Department of Transportation (ODOT), City of Oklahoma, Chamber of Commerce, and regional agencies. All projects are done through traditional tender. The OTA has never delivered a design/build or private/public/partnership project. The turnpikes are
funded through bond sales approved by the Executive and Legislative Bond Oversight Commissions and the Oklahoma Supreme Court, and must comply with all rules and regulations of the United States Treasury Department and the United States Securities and Exchange Commission.

The OTA is not prohibited from the transfer of funds from one project to another. Toll facilities are not operated as stand-alone projects, but as components of a system, each operating for the overall good of the state. Tolls are also applied indefinitely on the turnpikes in order to assist in the overall development of road infrastructure. Thus, the OTA has the ability to build turnpikes through sparsely populated regions, which would be unable to support a project supported solely by toll revenues from that region. Since 1953, the OTA has constructed 10 Turnpikes. The net toll revenues system-wide during 1996 exceeded 1995 toll revenues by 5.8% and transactions for 1996 exceeded those of 1995 by 7.4%.

The Trust Agreement dated February 1, 1989 establishes the flow of funds with which the Authority must comply. The OTA must deposit toll revenue into the Revenue Fund on a daily basis. All monies in the Revenue Fund at the end of the month (less a reserve for current operating expense not to exceed 20% of the amount of current operating expenses shown in the Authority's latest budget) are transferred and deposited as follows: 1) bond service accounts; 2) bond reserves; 3) the Reserve Maintenance Fund; and 4) the balance to the General Fund. Under the Authority's Enabling Act and amendments, a portion of the motor fuel excise taxes collected on fuel consumed on the turnpikes is made available to the Authority from the Oklahoma Tax Commission since July 1, 1992. All motor fuel taxes apportioned to the Authority are available to fund debt service where other funds are not available. If the motor fuel tax money is not required, the money is paid back to ODOT. In 1996, the Authority returned all of the motor fuel excise taxes apportioned back to ODOT.

Toll projects in Oklahoma have been developed with little public controversies. The public seems receptive to paying tolls because they see a benefit. Tolls have also allowed Oklahoma to build transportation facilities to undeveloped areas where it would not have been constructed if they had relied on
tax funding. Rural toll roads have been successful probably because they are public
toll roads and because tolls on the project do not have to support the project alone.

5.2.2 Texas

Texas Turnpike Authority was organized and created in 1953 as an agency of
the State of Texas. The Authority was created because the Texas Department of
Transportation (TxDoT) did not have funds to build every road in the state. In
particular, lack of efficient travel was identified between major population centers like
Dallas and Fort Worth. The cost of building an expressway between Dallas and Fort
Worth was $58 million in 1953, twice the amount of federal funds allotted for the
entire state of Texas.

There were already two existing private turnpike authorities that were trying to
build turnpikes in the state. They were not well received by the public or the state
and the state tried to make things as difficult as possible for the private turnpike
companies. The City of Dallas actually tried to sue the private toll roads and taxed
any land they bought. Eventually, the Supreme Court held that the property was
taxable. This put a stop to private toll roads because the private sector could not sell
revenue bonds and it was difficult to acquire financing when tax burdens were
unknown.

The people of Texas were more supportive of allowing a state agency to use
private funds to plan, finance, build, and operate turnpikes and other toll facilities.
The legislation created the Texas Turnpike Authority, which authorized the agency to
plan and build transportation facilities including roads, bridges, and tunnels, where
there is a need and it is financially feasible, and public tax funds are not readily
available.

Texas Turnpike Authority finances projects strictly through the sale of bonds
not backed by the Authority. The costs of maintaining and operating the facilities are
paid entirely from the tolls collected. After bonds are paid off, the facility then
becomes the property of the TxDoT.

At the time the legislation was written, there was a great deal of concern that
an agency should not be in competition with the TxDoT, or that toll roads do not take
place of free roads. Each project had to be a stand-alone project where the revenue from one project was not to be used to defray the costs of another. The legislation also specified that once toll facilities are paid off, the facility would be turned over to the TxDoT and would be toll-free. The rationale behind the legislation was that people of Texas were generally opposed to toll roads, but an exception would be made in the case of the Dallas-Fort Worth project. The legislation, therefore, restricted the operation and also included detailed provisions outlining the relationship with the Highway Department.

As part of the Turnpike Act, for a toll project to be feasible, it had to generate sufficient toll revenue to pay for itself – including not only the costs of construction, but principal and interest on bonds, maintenance, administration, operation and even the feasibility study themselves. The Dallas-Fort Worth project was the only project at the time that indicated financial feasibility. In December 1954, a comprehensive study determined that the cost would total $52 million, and with total interest, financing expense, and reserves added, a total bond issue of $58.5 million would be required. The bonds were sold in June 1955 by competitive bidding at a net interest cost of 2.93%. This was the lowest cost received by any turnpike Authority to date in the initial financing of a new turnpike financed by bonds secured solely by toll revenues.

In September 5, 1957 the turnpike was completed. In its first full year of operation, 121,904,664 revenue miles were recorded with toll revenue of $2,178,779.15. By 1977, traffic on the turnpike had tripled, and revenue increased nearly four-fold. The financial success of the turnpike is attributed to the fact that motorists are willing to pay a toll to use the facility, and the project was well managed. The bond debt was retired seventeen years ahead of schedule. On December 31, 1977, the Dallas -Fort Worth Turnpike was declared toll-free and was turned over to the Highway Department.

The next toll road was the Dallas North Tollway delivered through the same process as the Dallas-Fort Worth Turnpike. It too was a big success and well ahead of their bond retirement schedule. After the Texas Turnpike Authority passed its 15-year mark, a new state law was passed to permit the Authority to use certain excess
revenues from existing projects for the study of other proposed new projects, as long as the use did not violate the trust agreements for the existing projects. The law also stipulated that the studies had to first be approved by the Authority's board of directors and the State Highway Commission, and that the advanced funds had to be paid back from the sale of revenue bonds if the project were determined to be feasible.

After numerous studies, two potential projects were identified and further detailed feasibility studies were conducted. The results of the feasibility studies concluded that the project could not stand-alone on toll revenues. Although the need for these projects were evident, these projects were located outside of urban centers, where traffic volumes were low, or at least not enough to service the debt alone. One of these projects, the Trinity Route, was located almost parallel to the Dallas-Fort Worth Turnpike. A proposal was reviewed to use both revenue bonds as well as subsidies from tolls collected on the Dallas-Fort Worth Turnpike to finance the project. The tolls on Dallas-Fort Worth Turnpike would be extended until the Trinity route could stand-alone. Even though the Trinity Route will benefit the Dallas-Fort Worth Turnpike when it reaches capacity, the continuation of tolls on Dallas-Fort Worth Turnpike to pay for the Trinity proposal was controversial. The Trinity proposal was eventually approved but it did not get built for other reasons.

Due to the success of the Texas Turnpike Authority and the growing gap between the need for transportation projects and the decreasing availability of tax dollars, the Texas Turnpike Authority was in constant demand to look at more proposals for toll facilities. In 1991, the people of Texas approved new legislation, which authorized the Texas Transportation Commission to provide funds from any of its sources to projects of the Texas Turnpike Authority. The 1991 legislation approved the mission of the Authority to plan, finance, through both public and private resources, build, operate and maintain a system of toll roads, bridges, and tunnels for all the people of Texas in partnership with TxDoT. The ability to finance through both public and private resources represented a major breakthrough, which authorized the Texas Turnpike Commission to provide funds from any of its sources to projects of the Authority but funds had to be repaid by the Authority within 2 years.
The Turnpike Act of 1991 also allowed the Authority to use surplus revenues from one project to support less successful projects. This issue brought heated debates if projects should stand on their own. In addition, Dallas residents were concerned that tolls paid on projects in the Dallas area would be used for other areas such as in Houston. In the end, the bill permitted the use of surplus funds from turnpike projects financed after September 1, 1991. At the end of 1997, the legislature abolished the Texas Turnpike Authority and transferred all of the Texas Turnpike Authority functions to the North Dallas Turnpike Authority.

Toll roads have taken many forms in Texas. Although it started with the potential for the development of a private road proposal for the Dallas-Fort Worth turnpike, it was delivered through an Authority. Texas formed the Authority because the public was more in favor of public ownership than private ownership. When tolling was first allowed, it was allowed only to pay for the road it was collected on. Although it worked for the Dallas-Fort Worth turnpike, other similar opportunities were scarce. Thus, legislation was changed to allow the Authority to use surplus tolls from one route to help supplement other toll roads until they were self-sufficient. This allowed the Authority to build other needed transportation facilities.

5.2.3 New York and New Jersey Area

Three authorities have been created in the New York and New Jersey Area: Port Authority of New York and New Jersey (PANYNJ), New York Thruway Authority (NYTA), and Metropolitan Transportation Authority (MTA). Each Authority is responsible for a number of toll transportation facilities in their area. All the projects constructed and operated in New York and New Jersey are publicly owned and operated. All the authorities were created to deliver system wide transportation needs and to use toll revenues to develop mass transportation services where feasible.

5.2.3.1 Port Authority of New York and New Jersey

The PANYNJ was formed in 1921 by the two states with the consent of the Congress to oversee commerce in New York and New Jersey. The objective was to
secure funding through tolls for infrastructure projects. The PANYNJ today is a
diverse organization responsible for more than 30 facilities including: tunnels,
bridges, transportation terminals, airports, marine terminals, industrial parks, the
PATH rail transit system, and the World Trade Center. The Port Authority is self-
supporting and derives its revenues from the tolls charged to cross bridges and
tunnels, fares for the use of the rail system, fees to operate the airports and
terminals, and rents from office and retail tenants. The Port Authority receives no
funding from the state. The interstate system operated by the Port Authority
consists of: George Washington, Goethal, and Bayonne Bridges, the Outerbridge
Crossing, the Lincoln and Holland Tunnels, the Port Authority Bus Terminal, the
George Washington Bridge Bus Station, the Port Authority Trans-Hudson rail transit
system, the Hoboken-Manhattan ferry and the Journal Square Transportation
Centre. The Port Authority’s Interstate Transportation Department operates and
funds all vehicular crossings and transit services as an integral network.

5.2.3.2 Metropolitan Transportation Authority

The Triborough Bridge Tunnel Authority (TBTA) evolved from the Triborough
Bridge Authority, a public-benefit corporation created by the New York State
Legislature in 1933 to build the Triborough Bridge when the city’s attempts were
halted by the Depression. Between 1934 and 1968, under the leadership of Robert
Moses, the Authority grew in a series of mergers involving four other agencies: the
Henry Hudson Parkway Authority, the Marine Parkway Authority, the New York City
Parkway Authority, and the New York City Tunnel Authority.

The Authority’s bridges and tunnels made vital links among the city’s
boroughs, ultimately shaping regional travel and economic patterns. Triborough also
built the Battery Parking Garage, the East Side Airlines Terminal, the Coliseum
Office Building and Exposition Center, the Jacob Riis Beach Parking Field, and the
Jacob Javits Convention Centre, and it helped develop numerous parks around the
city.

By the 1960s automobile congestion was becoming a serious problem for the
city’s pollution level, and the need to restore long-neglected subway, bus, and
commuter-rail systems was evident. Accordingly, in 1968 the TBTA was made part of the Metro Transportation Authority (MTA).

Triborough's surplus revenues, previously used to finance new projects for the automobile, were redirected to public transportation. Since that time, bridge and tunnel tolls have contributed more than $5.6 billion to subsidize fares and underwrite capital improvements for the New York City Transit Authority, the Long Island Rail Road, and the Metro-North Commuter Railroad.

MTA's 1st ETC toll plaza was installed at Verrazano-Narrows Bridge in October 1995. MTA implemented full ETC system at all other facilities by December 1996. MTA made a critical decision that ETC would be the primary method of toll collection and conducted all planning on this basis. MTA's priority is to ensure revenue is not compromised while maintaining overall fairness.

5.2.3.3 New York Thruway Authority

The NYTA was formed in 1950 to build a thruway through New York. The project was financed through tolls to finance bonds. The initial policy was to pay off the bonds by 1996 and then remove the tolls. The state later decided not to remove the tolls but instead to use the money for economic development. There are two bridges that were constructed as part of the thruway system: Tappan Zee Bridge and Grand Island Bridge.

When tolls were first considered, there was high political sensitivity to tolls. Therefore, a clear objective was identified before tolls could be applied. During the planning stages, there was high public resistance but the resistance subsided after implementation. As part of the tolling policy, NYTA promoted transportation demand management and provided discounts to transit, high-occupancy, and electronic toll users.

Tolling in general has been successful in New York and New Jersey. The tolling facilities are constructed and operated by public authorities. This public Authority model has worked well because tolls have been used to support transportation demand management initiatives such as transit or used for economic development.
5.2.4 Virginia

Due to development pressures in Fairfax County, the Virginia Department of Transportation (VDOT) in 1984 constructed and operated the Dulles Toll Road. The Dulles corridor extends northwest from Washington D.C. through two northern Virginia counties: Fairfax and Loudon. Even though toll roads are rare in Virginia, the Dulles Toll Road was always planned as a toll road since the 1970's. At the time they did not expect to extend the road past Loudon but the success of the Dulles Toll Road and the westward spread of development made VDOT and Loudon County look at the possibility of the Dulles Toll Road Extension (DTRE). The extension would be funded by tolls generated both from the extension and the original Dulles Toll Road, and VDOT would operate both as a single facility. This way surpluses generated from the original toll road could be used to help support the debt service for the extension, at the start, until tolls alone would be sufficient on the extension.

In 1986, the new Governor L. Baliles announced that he would improve transportation services throughout the Commonwealth and it would be top in priority in his first year in office. The Governor charged his staff to develop a broad financing strategy for improvements. The government appointed a bi-partisan, blue-ribbon committee of civic leaders and public officials, called the Commission on Transportation for the 21st Century (COT21), to develop a consensus on the Commonwealth's transportation needs and resources over two years. The committee spent the first year focusing on highways and the second year on other modes of transportation. In the first year, COT21 identified $7 billion in needed transportation investments and recommended a tax increase to generate $550 million a year to fund it. The tax increase consisted of ¾ percent on Virginia's sales tax, a 3-cent per gallon increase in its gas tax (from 4 to 7 cents per gallon) and an increase in motor vehicle excise taxes and registration fees. The new taxes would be dedicated to transportation improvements and the Commonwealth would be authorized to issue 'pledge' bonds on the basis of anticipated tax receipts. However, the Virginia Supreme Court ruled that the proposed pledge bonds were illegal and that the state constitution required a public referendum. The referendum failed and there were limited funds to complete all the projects proposed by the
This led the Virginia government to explore and consider private toll road proposals. In 1988, the Virginia Highway Corporation Act was established to provide a general framework for government approval and oversight of private toll road projects. The act was created to start building needed projects and partly because of the Dulles Toll Road Extension (DTRE). The Act states: “The General Assembly finds that there is a compelling public need for rapid construction of safe and efficient highways … and that it is in the public interest to encourage the construction of additional safe, convenient and economic highway facilities by private parties, provided that adequate safeguards are provided against default in the construction and operation obligations of the operators of roadways. The public interest shall include without limitation the relative speed of the construction of the project and the relative cost efficiency of private construction of the project.” (Gomez-Ibanez, Meyer, and Butler, 1991)

A four-step process was adopted for licensing a private highway. First, the Commonwealth Transportation Board (CTB) must approve the construction cost, location, and design of the road. The CTB is guided by the following: “The Board shall approve ... if there is a public need for the project and the project and its connections are compatible with existing highway network. ... In making its determinations, the Board shall keep in mind the public interest, which may include, without limitation, such considerations as the relative speed of the construction of the project and the allocation of the financial and human resources of the Department of Transportation.” (Gomez-Ibanez, Meyer, and Butler, 1991) Second, where the road passed, each local jurisdiction must approve the road as well as any interconnections with its streets or roads. Third, after CTB and local government gave their approval, the private company would apply to the State Corporate Commission (SCC) for a certificate of Authority. The application to SCC must include the plans for securing right-of-way and financing with the proposed tolls and projected traffic volumes. The plan had to ensure that all VDOT standards and specifications would be met. Finally, with the CTB approval but not necessarily before SCC approval, the private company would enter in comprehensive
agreement with VDOT: to review the specifications, inspection of construction, and oversight of maintenance. VDOT would be reimbursed by the private company for direct costs of supervision carried out for the project.

The franchise would expire 10 years after the initial debt was paid off. The operator owns the roadway during the life of the franchise and is responsible for liability insurance during the period. However, toll rates must be set or approved by SCC during the franchise at a level that reflects the benefits obtained. The facility would be transferred to the state at the end of the franchise. During the franchise, the state police would enforce the laws and be reimbursed for the cost.

Even after government adopted the 1988 Act, VDOT continued to pursue the extension as part of the publicly owned Dulles Toll Road. Meanwhile, a private company, called the Toll Road Corporation of Virginia (TRCV), formed to explore the Dulles Extension as a private toll road using the 1988 Act. Unfortunately the formation of TRCV also created competition for the construction of the extension between TRCV and VDOT. In March 1989, TRCV submitted an application to build the extension as a private toll road. When the CTB received the TRCV application, VDOT was ordered to stop further work on a public extension. However, VDOT felt that the Act stated in order for a private toll road to be considered it had to demonstrate that the private road would be relatively cheaper and faster compared to a public alternative. Based on that, VDOT hired a consultant to provide a baseline for a public proposal to compare the private proposal to. The consultant’s report showed that the consultant’s baseline was different than the private proposal, in some ways better and in some ways worse depending on the assumptions.

The public vs. private proposals was then brought to public hearings, which turned out to be unproductive in that the each was pointing out the worse in the other proposal. At the first public hearing, it appeared that TRCV won the battle. “Virtually every speaker at the June public hearings spoke in favor of TRCV and against VDOT. Senator Wadell chided the Department for being unreceptive to a private bid in the face of the astronomical cost of transportation needs in North Virginia. The public alternative should be only a standby, in case a private road could not be financed. One Loudon resident, in a statement quoted in many
newspaper accounts, even declared 'Anyone would be better (than VDOT) to build that road ... If Snow White and the Seven Dwarfs asked to build the road, let them do it.' In the following days, many of the local papers printed editorials praising TRCV and lambasting VDOT.” (Gomez-Ibanez, Meyer, and Butler, 1991)

To counter argue TRCV's proposal, VDOT presented the contrast in VDOT's toll of $1.50 for 20 years compared to TRCV's rising toll from $1.50 to $3.25 over the same period. Essentially VDOT's proposal would cost the public half of what TRCV would cost. VDOT made no impact because TRCV argued that VDOT was unrealistic about its construction schedule and the availability of existing toll road surpluses to subsidize the extension. In July 1989, CTB approved the TRCV's application with conditions that a number of design changes would be made and an agreement be reached with VDOT regarding the oversight of specifications, construction, and maintenance. TRCV's changes in design increased the cost of the project by $50 million. Again, VDOT argued that private financing would be more costly than public financing. The public financing issue was still not pursued because VDOT would still not be able to acquire the money for the project.

TRCV's next step was to prepare for a certificate of Authority to SCC. The delay over the previous months cost TRCV over $4 million in capital. TRCV had to acquire another $2.5 million loan that had to be personally guaranteed. TRCV met with SCC to discuss the issues to be addressed in the application. There were two main issues: TRCV's financial structure and regulation, and again the appropriateness of a public-private comparison. It was decided that TRCV would operate under a sale-leaseback scheme. The toll road company would build the road but then sell it back from another company that had other sources of income in order to take advantage of tax shields. TRCV had hoped to organize the company originally as a limited partnership but the Act did not allow it. One of the fundamental issues related to the financial structure was the allowable rate of return on the investment. In the end, “TRCV proposed to SCC staff that the allowed rate of return vary over the life of the project to reflect the varying degrees of risk. While the average lifetime return would be 21 percent, the returns would start at 30 percent for the first 5 years or until cash flow exceeded 1.15 times the lease payment,
whichever was longer. Returns would be 25 percent for the next 2 years or until lease coverage reached 1.25, then 20 percent for 4 years or until coverage of 1.5, 15 percent for 5 years or until coverage of 1.75, and 14 percent thereafter." (Gomez-Ibanez, Meyer, and Butler, 1991)

Most of the issues related to the financial structure and regulation were easily resolved; however, the issue of the private sector involvement was more intricate and complicated. After a detailed public-private comparison, the public road showed that it would be cheaper because it used low-interest, tax-exempt debt and because the public highway authority did not pay federal, state or local taxes or dividends to shareholders. The private road had the advantage that it would be completed sooner. Overall, SCC found that the public option would be cheaper for most groups. In order for SCC to resolve some uncertainties, SCC requested more information from TRCV and VDOT. "The public-private comparison never went any further, however, because on April 30 Transportation Commissioner Pethel sent the SCC a letter stating that VDOT had no plans to build an extension with public funds and that it hoped to sign a comprehensive agreement with TRCV soon." (Gomez-Ibanez, Meyer, and Butler, 1991) It is likely that VDOT withdrew its applications due to potential political motives although Pethel argued, "that no pressure was involved. VDOT had no choice but to back off at this point since, in reality, it had no viable alternative to the private road. Each of VDOT's plans depended to some degree on the use of surpluses from the original toll road, but those surpluses were not really available given the claims Fairfax County and the MWAA were making on them. VDOT's earlier proposals were hypothetical benchmarks - it could not provide SCC with a firm estimate of the toll for a public road because it still had no viable financing plan." (Gomez-Ibanez, Meyer, and Butler, 1991) TRCV obtained the approval from SCC on July 6, 1990.

Through 1990 and 1991, TRCV's had to submit a number of applications and permits, which forced the company to look for additional sources of financing for development expenses. In the spring of 1990, TRCV went to their consultants and contractors for contributions to supplement the $4 million in cash it had raised in 1988 and the $2.5 million in bank loans it had assumed in 1989. In early 1991,
TRCV arranged approximately $20 million in cash, loans and deferred bills from various sources, and was looking for another several million to cover costs while obtaining permanent financing. TRCV came to an agreement in August 1991 for a $3 million loan from Italstat, a government-controlled holding company that owns Italy's largest toll operator, Autostrada. The agreement was that Autostrada's International consulting affiliate, Austrada International, would help TRCV operate the DTRE for a seven-year term.

In May 1991 after TRCV obtained the environmental permit, construction costs rose due to both inflation and design changes. TRCV decided that they wanted to go back to a limited partnership from a sale-leaseback because developments in the financial market had made a sale-leaseback arrangement less attractive. In April 1991, TRCV used the delays in the project to obtain an amendment in the 1988 Virginia Highway Corporation Act to allow limited partnerships. The new proposal created two limited partnerships: Toll Road Investors Partnerships (TRIP) I and II. Trip I would build the extension with TRCV as its general partner. TRIP II would buy and operate the completed road from TRIP I. It was anticipated that construction would begin in 1991 and the road would open in September 1994. The estimated cost was now projected to be $189.5 million in direct construction, $48.3 million in project development costs and $54.9 million in interest during construction. "Permanent financing would be $359.6 million, to cover the $292.7 million in construction costs, $53.5 million in debt service reserves, and $13.4 million in special payments to the original equity investors and the development lenders for interest during construction. The $359.6 million would be raised through a combination of debt ($205 million paying 11 percent over 30 years), commercial bank loans (up to $112.9 million, as needed, paying 10.75 percent for up to 12.5 years), and equity ($41.7 million, including the original $4 million and the balance from new partners). In addition, the partners would irrevocably commit to provide an additional $41.7 million in stand-by equity (the commitment would lapse when revenues exceeded 1.5 times debt service for two years in a row)." (Gomez-Ibanez, Meyer, and Butler, 1991)
DTRE appeared to be a project that had a lot of characteristics that would be in favor of a private toll road, such as: tolling is relatively uncontroversial; public support for the toll road; public support for private financing; route involved few landowners and most were willing to donate their land because of the development it would bring; and, the environmental issues were not severe. However, the project experienced a number of delays. The delays could be attributed to the requirement of a public-private comparison, complex negotiations, rigorous approval requirements, novelty of a private toll road, and obtaining investors. It is difficult to say if a public toll road delivered by VDOT would have provided more value for money. However, it would have been able to overcome some of the difficulties TRCV experienced going through the complex private proposal process established in the 1988 Act.

VDOT's overall proposal was cheaper than the TRCV's proposal. This is a result of some of the advantages VDOT used in their proposal submission. VDOT's had planned on using tolls from the original Dulles Toll Road to cover losses at the beginning of the project and revenue bonds backed by toll revenues and full faith and credit of the state. VDOT would have acquired a much lower borrowing rate but the risk would be shifted to the state taxpayers. Thus, in reality, both proposals were probably closer than it may first appear.

TRCV was awarded the project because they would be able to construct the project quicker and the construction cost was lower. The private toll road proposal submitted by TRCV took much longer and was much more expensive than first anticipated. TRCV's original proposal suggested the DTRE would be open in early 1991. The schedule slipped throughout ongoing negotiations. The project was not completed until 1995 now called the Dulles Greenway. The direct construction costs started in 1989 at $118 million to $189 million in 1991 and the total permanent financing required was $360 million. TRCV's construction cost estimate was $118 million during the initial public versus private proposal comparison. After the design changes were made based on VDOT's submission, the TRCV construction cost became similar to VDOT's.
The development of DTRE highlights the complexities of a private toll road proposal. To date the Dulles Greenway is far from meeting its projections. "The owners of the financially strapped Dulles Greenway will raise tolls and avert the possibility of foreclosure for at least the rest of 1997 under a new agreement with their lenders. Michael Crane, chief executive of Toll Road Investors Partnership II, which owns the $358 million road, said the agreement will let the to group skip quarterly interest payments of $7 million each for the rest of the year. The owners of the 14.5-mile road, connecting Leesburg with the Dulles International Airport, already have missed four quarterly payments totaling more than $28 million. The road has been hurt by lower-than-expected traffic, which has produced revenue that barely covers operating expenses." (Pae, 1997) Although TRCV is responsible for the revenue risk, the failure of the project still affects the government. "The agreement also provided some relief to state transportation officials, who have been trying to collect more than $3.5 million that the toll road operators owe for environmental and other costs incurred before the road's construction." (Pae, 1997) The failure of the project is not surprising as it was apparent from the onset that the project could not stand alone on tolls as VDOT's proposal required subsidies from the original Dulles Toll Road. In light of this fact, private development of this road appears to be doomed to begin with. It is interesting to note that Dulles Greenway is the only private toll road of nine toll roads completed to date in Virginia.

On April 29, 1999, TRIP II refinanced their loans: "Toll Road Investors Partnership II, L.P. (TRIP II), owners of the Dulles Greenway, announced today that closing proceedings have concluded on the refinancing of the $350 million privately owned toll road. The Dulles Greenway's insured AAA rated bonds confirm the solidity of the project's financial status." (TRIP II, 1999) The refinancing reduced the loan interest from 13% to approximately 8%. The refinancing has helped the project in addition to aggressive marketing and discount programs. On opening in 1995, the volumes were approximately 8,000 AADT and the volumes in 1999 were approximately 40,000 AADT compared to the original forecast of 36,500 AADT for the first year.
5.2.5 California

California's review of tolls and privatization was initiated in the 1980's as a result of growing transportation problems and lack of government funding to meet transportation needs. Although toll roads already existed in California for ten of its bridges (five crossing the San Francisco Bay, three crossing the Sacramento River/Straits of Carniquez north of San Francisco, and two in Southern California), all the facilities were publicly owned and financed through gas-tax.

In 1987, Congress authorized demonstration projects with tolls on new federally funded roads in California and eight other states. The roads selected for the demonstration could charge tolls and still receive federal aid to cover up to 35 percent of construction costs. Orange County had applied as a demonstration site for three proposed new public toll roads. Orange County's application was approved for the state's public toll road program.

Meanwhile, in January 1988, Governor Deukmejian appointed Robert K. Best as the Director of Caltrans who recruited Carl. B. Williams as one of his assistants. Best was hired to look at Caltrans shortage of highway funding as well as the agency's design, permitting and contracting procedures for new highways. The idea of privatization did not occur until May 1988, when Robert W. Poole brought the possibility of private toll roads to the attention of state officials in a report he published "Private Tollways: Resolving Gridlock in Southern California" (Gomez-Ibanez, Meyer, and Butler, 1991). Poole felt that California could control traffic congestion and add highway capacity in three ways: congestion pricing to dampen peak hour demand; private toll roads to provide additional capacity; and, automatic vehicle identification and electronic toll collection to make tolling more convenient for motorists. Parsons Development Company was contracted to assist with identifying and developing the privatization framework. The decision to proceed with privatization was made after Parsons and other major privatization experts held a seminar for some of the senior Caltrans Officials. After the seminar, Carl B. Williams, Assistant Director for Caltrans, obtained permission to form a small team of Caltrans official to investigate the potentials of privatization.
In December 1988 Carl William's team drafted the legislation. The legislation was crafted to provide Caltrans and private developers with as much flexibility as possible and yet for it to be politically acceptable. The bill was to allow demonstration projects in a number of regions in California. The projects would have to supplement existing state transportation facilities so users would have an alternative to the private project. Even though private parties would build and operate the facilities, the state would still own it in order to reduce liability risks for private companies as California is considered the tort capital of the United States. The private companies would lease and operate the facilities up to 35 years after it was built and then return it to the state after the lease period. “The facilities would have to be self supporting, with no state or federal funds involved. The state government would have to be fully reimbursed for any police or maintenance services which it agreed to supply during the life of the project. The private developers would have the authority to impose tolls for the use of the facility to recover costs of planning, building and operating the facility plus a reasonable rate of return on their investment. Any excess in toll revenues beyond those needed for these purposes would be either used for early debt reduction or paid into the State Highway Account, however, and the state would have the right to continue to charge tolls at the end of the lease, so that continued operation of the facility would not be a drain on the state treasury. The plans and specifications for any project would have to comply with Caltrans’ standards for state projects, moreover, since the state would own and eventually operate them. The developers were also not excused from complying with other relevant state and local laws, which meant that their projects would have to be consistent with local land use plans and conform to the state’s environmental review process.” (Gomez-Ibanez, Meyer, and Butler, 1991)

The bill was silent on standards for determining a reasonable rate of return on investment, procedures for monitoring the financial performance, compliance with other regulations, power of eminent domain for right-of-way land, and penalties for noncompliance. These would be determined in the franchise agreement negotiated between Caltrans and the private developers. The bill also deliberately bypassed several established state agencies. For example, even though the California Public
Utility Commission (CPUC) has responsibilities over most regulated private industries, the CPUC would have no role in regulating rate of return and tolls. This was very different from the Virginia Act. Caltrans had reviewed the Virginia Act and wanted to design a less bureaucratic process. The bill also avoided the California Transportation Commission (CTC), who approves proposed expenditures for new highways, because the projects wouldn't require state or federal expenditures.

The bill called AB 680 was introduced to the legislature for approval in January 1989. In June 1989, AB 680 passed the Assembly. Caltrans took a four-step implementation process to solicit proposals. "First, Caltrans would issue an Request for Qualifications (RFQ) and select the development companies or consortia. Second, Caltrans would issue the RFP to the qualified consortia and select the four best projects. To keep the cost of developing the proposals reasonable, the consortia would be expected to submit a broad conceptual design at this stage rather than highly detailed or complete engineering, traffic and environmental plans. Third, franchise agreements would then be negotiated with the winning consortia. Finally, the winners would, with Caltrans help, complete the environmental review process and the final design and right-of-way acquisition for their projects. Caltrans would solicit advice from its steering committee at each stage." (Gomez-Ibanez, Meyer, and Butler, 1991) The selection criteria used are as follows: "30 percent of the weight would be placed on the experience of the principal organization and consortium members, another 30 percent on their record of financial strength to commit to a major transportation project, and 20 percent to their ability to work cooperatively with a broad range of governmental entities and the public. The remaining 20 percent was divided between the individual qualification of key personnel, the organizational and management approach of the consortium, and familiarity with automatic vehicle identification and electronic toll collection." (Gomez-Ibanez, Meyer, and Butler, 1991)

On November 15, 1989, Caltrans mailed the RFQ to over 500 private firms, public agencies, and individuals that had already inquired about the program. Caltrans received 13 responses to the RFQ. In February 1990, Caltrans qualified ten of the 13 applicants. The RFP was issued on March 16, 1990 to the ten
shortlisted applicants with the conceptual proposals due on August 1, 1990. Caltrans noted that they would rank and select four projects in September or October and then they would negotiate the franchise agreements by the end of December before the new administration took office. To evaluate the conceptual proposals, Caltrans used the following 110 point evaluation guidelines: transportation services provided (20 points); encourages economic prosperity and good business sense (10 points); degree of local support (15 points); ease of implementation (15 points); experience and expertise of the proposer (15 points); environmental quality and energy conservation (10 points); non-toll revenue support (5 points); degree of technical innovation (10 points); and, civil rights objectives (10 points).

There were a number of concerns raised regarding the evaluation criteria. For example, some of the private companies were uncomfortable about the degree of local support as it would be difficult to keep their plans secret from other competitors if they had to solicit support at the same time. The most controversial part of the guidelines was the role the financial viability of the project would play in the selection. Caltrans did not want to judge the financial viability of the project because they were not experts in the area and that it would constrain innovative ideas. The financial viability would be assessed later after the projects were ranked and selected. If a project failed in financial viability they would replace it with the next highest ranked project. The financial submissions would be submitted in sealed envelopes and be evaluated after the winning projects were announced. The other controversy was related to not establishing allowable rates of return so that the private companies could select the projects accordingly. In order to provide better guidance on the allowable rate of return to the shortlisted applicants, Caltrans hired Price Waterhouse to determine what a fair rate of return should be. However, Price Waterhouse report would not be finished before the August 1 proposal deadline so the consortia would still have to make their own assumptions about the allowed returns in their proposals.

On August 1, 1991, Caltrans received 8 proposals from the 10 consortia, and of the 8 proposals two were for the same projects. Overall, Caltrans had seven
projects to consider in which five were in Southern California and two in Northern California. On September 14, Caltrans announced the project rankings. The top three proposals, all within 1.4 points of the 110 point scale, were Perot’s SR-57 Santa Ana Viaduct Express (SAVE) project in Orange County, Parsons Brinckerhoff’s SR-125 project in San Diego, and CRSS Commercial Group SR-91 median lanes project in Orange County. “SAVE and SR-91 had appealed to the evaluators in part because they met such obvious transportation needs in congested Orange County, the designs (over a riverbed and in a median) seemed acceptable to local politicians, and they both promised to use innovative time-of-day pricing and electronic toll collection. The SR-125 project was attractive because it appeared to have strong local support, would permit the orderly development of San Diego County, environmental problems seemed solvable, and much of the needed land was owned by a few large and cooperative large developers”. (Gomez-Ibanez, Meyer, and Butler, 1991) All three projects were in Southern California so the fourth project had to be in Northern California. Parsons’ Midstate toll road was selected as the fourth project although it ranked sixth and 11 points behind the top three. The fourth road was selected because it passed through a poorly served and developing section of the state.

All four agreements were signed between December 31, 1990 and January 11, 1991 after lengthy and exhausting negotiations. “The negotiations were (with minor exceptions) never acrimonious, but the perspective of Caltrans and the consortia differed greatly. The consortia were most concerned with producing an agreement that was ‘bankable’ enough to satisfy private financial markets. Accordingly, they pressed Caltrans for provisions that would reduce their financial risks or shift them from the private companies to the state. Some observers thought the problem was compounded because the consortia were headed by construction and engineering companies that were not used to assuming substantial financial policy risks themselves, particularly on state contracts. For their part, the Caltrans lawyers were unaccustomed to contracts that gave private parties the potential to earn large returns. Moreover, Caltrans felt that the consortia did not understand that these agreements had to pass in the political arena as well. If the agency gave
away too much, the legislature might modify or cancel the AB 680 program.” (Gomez-Ibanez, Meyer, and Butler, 1991)

All four agreements had four common areas: allocation of risk, non-competition zones, development rights, and maximum rates of returns. For the allocation of risk, Caltrans assumed two important risks: the normal tort liability for accidents and fatalities associated with a highway owned by the state and designed to state standards; and, Caltrans agreed to compensate the developers if the state passed a law or regulation that substantially reduced the value of the developer’s rights under the franchise agreement. The developers would assume all other risks: securing environmental and land use permits; development, construction and operating costs; and traffic and revenue risks. The developers were granted non-competition zones in the franchise areas they served. Caltrans promised not to build a competitive transportation facility and would also persuade other federal, state, or local agencies from building one as well. Developers were also given development rights to lease state-owned land within the right-of-way or the air space above it. Caltrans included this provision because, based on recommendations of their advisers, they felt some projects would not be profitable from toll receipts alone. The developers were also free to set tolls subject only to limitations on the maximum allowable rates of return on their investment. The four Caltrans projects were allowed to earn up to between 17 and 21.5 percent based on evaluation conducted by Price Waterhouse. “The allowable returns included two elements: a basic rate of return plus some incentive returns if the project achieved certain public objectives, such as increasing vehicle occupancy or reducing accident rates. Any excess over the maximum allowed returns would be used to retire project debt early or transferred to the state’s highway account, as the AB legislation required.” (Gomez-Ibanez, Meyer, and Butler, 1991)

The announcement of the franchise agreement in January started the debate over AB 680. An early opponent was Democratic Senator William Lockyer. He was opposed to private toll roads partly because he felt that it would create a two-class transportation system in which the rich would use the high-quality private toll road and the poor would use the unimproved public roads. Some of the other issues
raised by Lockyer were that the legislature and the public were excluded from project selection and the franchise negotiations. "The entire process was done in private, without the public hearings or other opportunities for objections that are normally part of a state project. Moreover, many legislators resented the fact that Caltrans had incorporated compensation provisions that tied the legislature’s hands. If the legislature broke or modified the franchise agreements now, the developers could make claims for damages against the state. ...These procedural complaints carried more weight because some of legislators found certain provisions in the franchise agreements so troubling. Caltrans had committed itself not to build competing transportation facilities in the non-compete zone, and to discourage local governments from doing so as well. This ‘monopoly’ franchise might not be so objectionable in built-up areas such as central Orange County, where there were many existing highways and major new highway construction was probably politically infeasible anyways. But it was a concern in the Midstate’s franchise zone, which was only beginning to develop and where the existing road system was fairly limited. ... The rates of return allowed in the agreements were so generous; Lockyer argued that no local public funds should be given. More important, the use of public funds violated the intent of the original AB 680 legislation, which was to allow privately financed transportation projects". (Gomez-Ibanez, Meyer, and Butler, 1991)

On January 7, 1991, three days after the Midstate franchise agreement was signed, Lockyer introduced Senate Bill (SB) 144 to prohibit the use of any public funds, local or state, to support AB 680 project, in particularly to the four projects Caltrans had selected, as well as any other franchise agreements that Caltrans entered into after February 1, 1991. The bill also mandated that Caltrans hold public hearings before signing any new franchise agreements. SB 144 was a serious challenge to AB 680. By March SB 144 passed the Senate on a party line vote but in May, SB 144 stalled in the Assembly’s Transportation Committee and Lockyer was forced to amend the bill in order to get it through. SB 144 would clear the committee if two Orange County projects were dropped from the bill. However, in the fall of 1991 the fate of SB 144 was uncertain because the amendments had weakened the bill and did not weaken the original intent to reaffirm AB 680. In
addition to the SB 144, there were also a number of lawsuits against the AB 680 franchise agreements. The Professional Engineers in California Government (PECG) claimed that all four projects violated the state's competitive contracting and procurement laws by not putting the construction of the AB 680 projects out to bid. The other suits were based on environmental review laws.

Of the four demonstration projects, SR 91 is the only one in operation. The California Private Transportation Company (CPTC) constructed and opened SR 91 on December 27, 1995. SR 91, a 10-mile four-lane facility, is a variable toll lane located in the freeway median between SR91/55 junction in Anaheim and the Orange/Riverside County line. Tolls on the facility vary with the time of day depending on the congestion level. High-occupancy vehicles of 3 or more can travel for free in the lanes. It is also the first toll road in North America using variable pricing as well as being a fully electronic toll road.

SR-125 in San Diego County is under environmental review. SR-57 is also under review as well as waiting for financing. Midstate will likely not be constructed because of the political and environmental opposition. "Disaffection with the toll road idea first surfaced five years ago, when public criticism killed a proposal for an 85-mile private pay-as-you-drive highway in Northern California. Called the Mid-State Tollway, it was attacked by local government officials and environmentalists who complained that the real motive behind the proposal was to open large agricultural lands to development." (Ellis, 2000)

It is important to note that prior to Caltrans initiating AB 680, Congress, in 1987, had authorized demonstration projects with tolls on new federally funded roadways. Orange County's application for three demonstration sites was approved. Orange County had hoped that some of their sites would be delivered under AB 680 but none of them came to fruition. Nevertheless, the Transportation Corridor Agencies, consisting of 15 Orange County cities, was formed as a separate entity to oversee planning, design, financing, and construction activities of the demonstration projects. "In September 1987, the state legislature approved legislation (SB1413) giving the Transportation Corridor Agencies the authority to construct the roads as toll facilities and to issue bonds backed by future toll and development impact fee
revenues. As they are constructed, the roads are deeded to the State of California (Caltrans) for highway maintenance and ownership. The TCA, through its contractor, Lockheed Martin IMS, operates the toll collection system."

(Transportation Corridor Agencies)

TCA is responsible for the construction of three public toll roads: San Joaquin Hills, Foothill and Eastern Toll Roads. The San Joaquin Hills corridor was completed in November 1996. The Eastern Toll Road was completed in February 1999. The first portion of the Foothill corridor was completed in 1995. The anticipated completion for the remaining portion of the Foothill corridor is 2003. All of the toll roads are below projected revenues. The completed Foothill corridor was 12% below forecast for the first 10 months of operation. With respect to the San Joaquin Hills project, Haldane (1997) states: "A 51% revenue shortfall for projections for the San Joaquin Hills toll road can be blamed on faulty projections made in 1992 when $1.2 billion worth of municipal bonds were sold to pay for the project, Transportation Corridor Agencies officials said Wednesday." For the Foothill corridor and Eastern Toll Road project: "The proposed price hike comes after findings that the projected traffic on the two roads, the Foothill and Eastern tollways linking Riverside to south Orange County, will be 20% to 25% below initial estimates next year. If the proposal is approved next month, the increases would not start until July 2001 at the earliest." (Willon, 1999)

Overall, it is clear that of the four demonstration projects selected under AB 680, only one is constructed and operational. Although two are under environmental review, it is difficult to say if any of the remaining three will be approved for construction. Although AB 680 was approved and implemented quickly, public and political opposition will delay or will stop the final approval for construction. AB 680 was extremely aggressive and completed the contract process within the targeted 1-year schedule for expression of interest to award of the contract. It should be applauded for its accomplishment in overcoming the bureaucratic procedures but in the end, the politics and administration still bogged it down. It is important to realize that toll roads have extreme public sensitivities. Therefore, serious consideration
should be given to communications in order to educate the public. Environmental approval is also a lengthy process that should be understood by all parties.

It is difficult to say if a public or private toll road is preferred in California based on the review. However, the three public toll roads approved and developed by TCA, at or near the same time as the four AB 680 projects, are all nearly constructed. The public toll roads were delivered using design/build and were all constructed ahead of schedule. Although two of the three public toll roads under the TCA are not meeting its projections, it is likely the same would have occurred if it were delivered privately.

SR 91 has been viewed as a successful toll project. However, recently the project has been controversial because of the non-competition clause in the agreement. "Legislative opposition, however, did not become widespread until recent months, when a little-known clause in an agreement between Caltrans and the owners of the only existing private tollway called the whole concept into question. To assure investors that the tollway—a 10-mile stretch of express lanes in the median of the 91 Freeway—would be profitable, Caltrans had agreed to forgo improvements to the public highway that would draw customers away from the private toll road. Yet as congestion along the corridor increased and the number of accidents mounted, Caltrans decided the only way out was expansion of the freeway. The tollway's owner, the California Private Transportation Co., challenged the plan in a $100-million lawsuit. Last October, at the request of his staff, Caltrans Director Jose Medina signed a settlement that shelved the improvements. Later, Caltrans staff insisted he had no choice because the non-competition clause gave the agency scant chance of beating the lawsuit." (Ellis, 2000)

Unfortunately, the exposure of this issue will likely impact future private toll road proposals. "California's flirtation with private toll roads, embraced by lawmakers during the financial hard times of the early 1990s, has lost momentum as its highest-profile project has become mired in controversy. Angry lawmakers, including some who were early supporters of the concept of using private investment to expand public transportation, admitted last week that the idea had lost its luster. For the first time, some talked openly of scrapping it. 'We were hungry to find new
ways to get capital investment in our infrastructure,' said Sen. Kevin Murray (D- Culver City), '[but] in the final analysis this toll road thing is a scam.' ... But for transportation experts like Robert Poole, president of the Reason Foundation, a public policy think tank, the new legislative antipathy to toll roads is distressing. ‘We have to be careful about making short-term decisions in response to problems because of the longer term implications for financing highways in California,’ he said. ‘If we make decisions that scare away investment then it will simply go elsewhere to other states and other countries.’ At a time when there is little appetite for tax increases, Poole said private investment in highways may be the only way California’s road system can keep pace with the state's growth. For lawmakers to abandon the private toll road idea, he said would run directly counter to trends in other states and other countries. Throughout the world, he said, nations are tapping a global pool of private capital to build roads that could never have been constructed with tax revenues.” (Ellis, 2000)
5.3 Summary Table

The following is a compilation of a summary table to show the characteristics of the different toll projects reviewed and delivery agent. The table provides the following information on each of the projects and agencies reviewed:

- project information;
- policies;
- financial, delivery and contract details;
- risk allocation;
- bonds;
- toll collection system;
- enforcement information,
- toll structure;
- toll tag administration; and,
- electronic toll technology information.

The summary table does not include the Lions Gate bridge project in British Columbia because tolls were not approved. Although the Coquihalla Highway is tolled in British Columbia, no data was collected as it was delivered through tax-supported debt not under an authority. The public toll roads reviewed in the summary table are based on delivery through a public authority or commission.

The information collected was dynamic in that the data was sometimes evolving or changing. Therefore, it should be noted that some of the information may not be current. For Highway 407, the information is based on prior to the sale of the highway to the private sector. For Fredericton-Moncton Highway, the information is based on prior to removal of tolls. In some instances, some interpretation was made on the data collected, thus, the values should not be taken as being absolutely precise instead, they provide a representative range.
Where data was not available through research material, personal interviews were undertaken to assist in the data collection. Due to the sensitive nature of financial information, not all information was available for all the projects.
## Summary Table

Note:
Highway 407 information is based on prior to the sale of the highway.
Fredericton-Moncton information is based on prior to the removal of tolls.

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<td><strong>General Project Information</strong></td>
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<tr>
<td><strong>Description</strong></td>
<td>6-lane, 69 km highway from Highway 403 to Highway 48.</td>
<td>4-lane, 195 km highway between Fredericton and Moncton.</td>
<td>2-lane, 12.9 km joins Borden-Carleton, Prince Edward Island and Cape Jourimain, New Brunswick.</td>
<td>4-lane, 9.5 mile highway extending from the Oklahoma City interchange of the Turner Turnpike and I-35 to Portland Avenue/Lake Hefner Parkway.</td>
<td>6-lane, 21 mile, expressway between downtown Dallas and cities in northern Dallas and southern Collin and Denton counties.</td>
<td>7-lane, 3-m long bridge carries the New York Thruway's mainline across Tappan Zee Section of the Hudson River, bridge has a counterflow lane with 4-lanes operating in the peak direction.</td>
<td>4-lane, 14-mile freeway connects Dulles Toll Road at Route 28 at the Dulles International Airport west to Route 15 at Leesburg.</td>
<td>10-mile toll road operates in the median, extends from Riverside/Orange County line to the east, to the State Route 91/State 55, no entrances or exits other than at the end points.</td>
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<tr>
<td>Date opened (planned and actual where avail.)</td>
<td>First section planned to be tolled in June 1997 but actual date was in October 1997. The last section of the 69-km was completed in September 1998. The project was delayed in opening prior to June 1997 due to safety concerns.</td>
<td>Nov. 30, 2001 to full traffic - planned. First section opened in Fall 1998 - actual. The government prior to going to the private sector completed one section.</td>
<td>May 31, 1997 - actual. Took over 30 years from the time when the first bit of construction began in the 1960's.</td>
<td>Project was authorized by State Legislature in 1987. September 1991.</td>
<td>First 10-mile section was opened in July 1968. The second 4.5-mile section was completed in 1986. The final section was completed in 1988.</td>
<td>Plans started in 1988. Opened on Sept. 29, 1995 - actual. The project was 6 months ahead of schedule.</td>
<td>December 1995 - actual.</td>
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<tr>
<td>Privately or publicly owned</td>
<td>Public to start. Project constructed as a Partnership</td>
<td>Private, Maritime Road Development Corporation (MRDC). Not-</td>
<td>Private, Strait Crossing Inc. (SCI) and Strait Crossing Bridge Limited (SCBL)</td>
<td>Public, Oklahoma Turnpike Authority (OTA).</td>
<td>Public, New York Thruway Authority (NYTA).</td>
<td>Private, started as Toll Road Corporation of Virginia</td>
<td>Private, California Private Transportation Company</td>
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<tr>
<td>Challenges</td>
<td>Low traffic volumes initially to attract private financing. Lack of data capacity for an all electronic distance based toll structure.</td>
<td>Public opposition.</td>
<td>Public opposition and environmental issues.</td>
<td>Minimal, people generally support tolls because it allowed roads to be built in developing areas.</td>
<td>Concerns of the Authority competing with Texas Department of Transportation. People generally opposed toll roads and did not support</td>
<td>Minimal.</td>
<td>Decision of public or private delivery delayed the process and the lack of toll traffic at start up.</td>
<td>Public and political opposition to the AB 680 legislation. SB 144 to counteract AB 680 was initiated by one of the Senators who</td>
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<tr>
<td>Considered successful</td>
<td>Yes, in that actual users are greater than anticipated. However, there were a number of problems in opening the project related to safety and tolling issues. A revenue leak in license plate tolling is still a concern.</td>
<td>No, project is not publicly accepted. The Government on March 1, 2000 removed the tolls. The cost recovery from tolls is less than 20% of the project cost.</td>
<td>Yes, after 35 years there would be no more ferry subsidies. The project was also successful because tolls were publicly accepted in that people were use to paying for the ferry tolls.</td>
<td>Did not meet toll revenues in the first 4-yrs of opening. People, in general, supported toll roads because of the benefits it provides to developing areas.</td>
<td>Yes, debt was retired early. Lowest cost received by any turnpike authority to date in the initial financing of a new turnpike by bonds secured solely by toll revenues.</td>
<td>Yes, tolls are used to support transit.</td>
<td>Tolls were far below projections at opening. No interest was paid on the debt the first year. The project has been re-financed and financing is now insured. Loan interest went from approx. 13% to approx. 8%.</td>
<td>Yes, reached cash flow breakeven 2 and half years after opening.</td>
</tr>
<tr>
<td>Lessons learned</td>
<td>Need to over-estimate on the traffic volumes for tolling design</td>
<td>Tolls should not be implemented unless there is significant cost</td>
<td>Although it was successful, need to ensure legislation is in place.</td>
<td>Successful because public support for the project</td>
<td>Successful because project had high traffic volumes and</td>
<td>Tolls are used to support mass transportation services.</td>
<td>Traffic forecast was far too aggressive. Refinancing</td>
<td>Successful financially but viewed that the private sector has a</td>
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<td>Policies</td>
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<tr>
<td>Free alternative</td>
<td>Yes</td>
<td>Yes</td>
<td>No, bridge replaced the ferry.</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Stand-alone project</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes, up until 1991.</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tolls used to supplement transit</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tolls removed after debt payment on</td>
<td>Yes</td>
<td>Yes</td>
<td>Limited to an amount covering the</td>
<td>No, tolls are applied indefinitely to</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Legend:
- to ensure there are no revenue leaks.
- recovery on total construction cost.
- Legislation was completed in 1992 after the proponent was selected. The legislation had to be updated in order to complete the agreements.
- will make tolling easier to implement.
- demands.
- and aggressive marketing helped the project get back on course.
- monopoly franchise. Good to reduce bureaucracy; however, need buy-in by the public and stakeholders on the process or it will be delayed later.
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<tbody>
<tr>
<td>construction cost</td>
<td>operating and maintenance cost</td>
<td>assist in the overall development of road infrastructure</td>
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</table>

**Financial, Delivery, and Contract Details**

<table>
<thead>
<tr>
<th>Public – private – partnership model used</th>
<th>Design-build</th>
<th>Build – Operate – Lease- Transfer</th>
<th>Build – Operate – Transfer</th>
<th>None, traditional delivery</th>
<th>None, traditional delivery</th>
<th>None, traditional delivery</th>
<th>Build – Operate – Transfer</th>
<th>Build – Operate – Transfer</th>
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</thead>
<tbody>
<tr>
<td>Date of Request for Qualifications</td>
<td>May 1993</td>
<td>December 1996</td>
<td>May 1987</td>
<td>N/A, tender call</td>
<td>Not applicable, tender call</td>
<td>Not applicable, tender call</td>
<td>Not applicable</td>
<td>November 1989</td>
</tr>
<tr>
<td>Time taken from soliciting proposals to awarding contract</td>
<td>May 1994, less than 1 year.</td>
<td>November 1997 selected proponent, January 1998</td>
<td>December 1992 selected proponent, October 1994,</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>July 1989 government approved the proposal in</td>
<td>December 1990 selected proponent and completed the</td>
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<tr>
<td>for Public-Private-Partnership delivery</td>
<td>agreements completed, approx. 2 years.</td>
<td>agreement completed, approx. 6 and half years.</td>
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<tr>
<td>Legislation for tolling and/or private financing</td>
<td>OTCC was created by the Capital Investment Act 1993.</td>
<td>NBHC a statutory crown corporation under the New Brunswick Corporation Act was created in 1997.</td>
<td>Terms of Union.</td>
<td>OTA was created in the State of Oklahoma Statute in 1947. In 1954, OTA was statutorily redefined to allow the</td>
<td>TTA was created in 1953 as an agency of the State of Texas. In 1991, the legislation was amended to allow TTA to borrow funds</td>
<td>NYTA formed in 1950</td>
<td>Virginia Highway Corporation Act 1988.</td>
<td>agreements, approx. 1-year. However, approval to construct was not allowed until June 1992, approx. 2 and half years from the Request for Qualifications.</td>
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<tr>
<td>Franchise term of contract</td>
<td>Not applicable, wanted 30 years</td>
<td>Public to buy back at fair market value in 30 – 40 years or transferred to the public for $1 in 50 years.</td>
<td>35 years</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>10 years after initial debt paid off.</td>
<td>35 years</td>
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<tr>
<td>Project cost (estimated during design and actual tendered amount where avail.)</td>
<td>Approx. $1.5 billion total project cost and financing - actual. The design-build contract was approx. $930 million. The highway has fixed asset worth $1.87 billion on</td>
<td>$807 million construction cost - planned, $681 million construction cost - actual, the total project cost is $877 actual.</td>
<td>$730 million construction cost – estimated. The final cost was in excess of $1 billion.</td>
<td>Not available.</td>
<td>First 10-mile section was $58 million in 1988 – estimated. Second 4.5-mile section was $162 million in 1988 and the final section was $121 million in 1988 –</td>
<td>$80.8 million construction cost of structure and approaches – actual.</td>
<td>$118 million construction cost – estimated in 1989, $189.5 million construction cost – actual in 1991. Increase was a result of design changes to</td>
<td>$130 million – actual.</td>
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<tr>
<td>Public and/or Private funding contribution</td>
<td>Project fully financed by the public.</td>
<td>Toll and lease based debt and ancillary revenue, long-term support of the government, $149.5 million is toll based debt raised by the private, $725 million from lease based debt ($58 million a year in lease), $2 million in</td>
<td>Public contribute $42 million/year from ferry subsidies, $660 million raised by private.</td>
<td>Public, bond sales. Revenues from toll, restaurant and service station sales, and motor fuel sold along the route.</td>
<td>Public, bond sales.</td>
<td>Public, bond sales.</td>
<td>Private. The original loan was refinanced with lower interest rates on April 29, 1999.</td>
<td>Private</td>
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<td></td>
<td>which the province owes $1.42 billion.</td>
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<td>estimated.</td>
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<tr>
<td>Rate of return on private investment</td>
<td>Not applicable</td>
<td>Not applicable, not-for-profit project company acquired the loan.</td>
<td>Return on investment is based on previous estimated ferry ridership projections.</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Average lifetime return of 21%.</td>
<td>Between 17 and 21.5%.</td>
</tr>
<tr>
<td>Private development cost (planned and actual where avail.)</td>
<td>Not available. Compensation of approx. $1 million was given to the short-listed proponents. Actual private development cost was likely double.</td>
<td>Not available.</td>
<td>$243,000 in 1987 – estimated $20-25 million actual in 1993.</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>$1.5 million – estimated. $4 million – actual, cost was increased because of delay caused by comparison of public vs. private delivery and necessary approvals.</td>
<td>Not available.</td>
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<tr>
<td>Agency</td>
<td>Toll traffic and/or revenue forecast for opening year (estimated and actual where avail.)</td>
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<td>Ontario, Highway 407</td>
<td>55,000 AADT - estimated, 100,000 AADT - actual, 85% higher than forecast. $13 million - estimated to be collected from tolls each year for the complete highway. $22 million - estimated annually over the 30-yr lease.</td>
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<tr>
<td>New Brunswick, Fredericton - Moncton Highway</td>
<td>Not available.</td>
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<tr>
<td>Prince Edward Island, Confederation Bridge</td>
<td>Actual as percentage of projected results of operation for: 1st yr is 18%, 2nd yr is 26%, 3rd yr is 29%, and 4th yr is 31%.</td>
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<td>Oklahoma, John Kilpatrick Turnpike</td>
<td>Opening year after final completion of project was 61 million toll transactions. Overall, the project is exceeding projections especially for the first section opened in 1968. Actual as percentage of projected results of operation for: 1st yr is 74%, 2nd yr is 91%, 3rd yr is 95%, 4th yr is 99%, 5th yr is 99%.</td>
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<tr>
<td>Texas, Dallas North Tollway</td>
<td>125,000 AADT - actual.</td>
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<tr>
<td>New York and New Jersey, Tappan Zee Bridge</td>
<td>Opening was approx. 8,000 AADT. 40,000 AADT - actual. Original estimated traffic forecast for the first year was 36,500 AADT. Marketing and reducing toll rates increased volume. Original forecast too aggressive.</td>
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<td>Virginia, Dulles Greenway</td>
<td>76,000 AADT - actual 1996, 125,000 AADT actual 1999.</td>
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<td>California, SR-91</td>
<td>76,000 AADT - actual 1996, 125,000 AADT actual 1999.</td>
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<td>Risk Allocation</td>
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<td>Construction cost</td>
<td>Contractor</td>
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<td>Public</td>
<td>Public</td>
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<td>Construction delays</td>
<td>Contractor</td>
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<td>Public</td>
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<td>Revenue</td>
<td>Public</td>
<td>Contractor</td>
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<td>Land</td>
<td>Public</td>
<td>Public to acquire remaining land</td>
<td>Contractor</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Public</td>
</tr>
<tr>
<td>Environmental</td>
<td>Concept by the public, detailed mitigation by contractor.</td>
<td>Provincial approval by public. Federal approval by private.</td>
<td>Contractor</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
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<tr>
<td>Archaeological</td>
<td>Concept by the public, detailed mitigation by contractor.</td>
<td>Public</td>
<td>Contractor</td>
<td>Public</td>
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<td>Bonds</td>
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<td>Performance Bond</td>
<td>Yes, around 50% of</td>
<td>$250 million</td>
<td>$200 million</td>
<td>Not available.</td>
<td>Yes, 100%</td>
<td>Not available.</td>
<td>Not available.</td>
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and 6th yr is 101%.
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<tr>
<td>Labour and Materials Bond</td>
<td>Yes, around 50% of contract value.</td>
<td>$50 million</td>
<td>$20 million</td>
<td>Not available.</td>
<td>Yes, around 50% of the contract value.</td>
<td>Not available.</td>
<td>Not available.</td>
<td>Not available.</td>
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<td>Toll Collection System</td>
<td>Open/closed system</td>
<td>Closed</td>
<td>Closed – by distance</td>
<td>Open</td>
<td>Closed – lump sum</td>
<td>Closed – lump sum</td>
<td>Open – lump sum, one-way</td>
<td>Closed – lump sum, congestion pricing</td>
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<td>Lane based or wide area</td>
<td>Wide area</td>
<td>Lane based</td>
<td>Lane based</td>
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<td>Video enforcement</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Gates</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Police, who is responsible for costs</td>
<td>Yes, paid by public</td>
<td>No</td>
<td>No, not specifically for the project</td>
<td>Yes, paid by public</td>
<td>Yes, paid by public</td>
<td>Yes, paid by private</td>
<td>Yes, paid by private</td>
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<tr>
<td>Penalties for invalid users of ETC lanes</td>
<td>Yes, through motor vehicle licensing</td>
<td>Yes, through motor vehicle licensing</td>
<td>No. Ticket is issued to pay the toll rate.</td>
<td>Fines start at $25 and increase to $50 and $75 over a 18 month period.</td>
<td>Yes, vary with the # times of times violated.</td>
<td>Yes, up to $50.</td>
<td>Not available.</td>
<td>$100 for first fine, $250 for second fine and $500 for third fine.</td>
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<td>Toll Structure</td>
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<tr>
<td>Passenger vehicle toll rate</td>
<td>Approx $0.10 per km</td>
<td>Approx. $0.035 per km</td>
<td>$35 one way toll (Approx. $1.38 per km)</td>
<td>Varies at each tollbooth between $0.25 to $0.80.</td>
<td>Varies at each tollbooth between $0.25 to $0.50</td>
<td>$3/car, roundtrip</td>
<td>Varies at each tollbooth between $1.40 to $1.75.</td>
<td>$3/car during peak hour</td>
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<td>Vehicle class</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time of day</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes, weekday and weekend (no peak and off-peak)</td>
<td>Yes, price varies continuously with congestion</td>
<td>Yes</td>
</tr>
<tr>
<td>HOV discount</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes, HOV 3+ free</td>
</tr>
<tr>
<td>ETC/commuter discounts</td>
<td>No</td>
<td>Yes</td>
<td>Not applicable</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Toll revised</td>
<td>None to date</td>
<td>Rise will be lower than the index with inflation (approx. 90% of rise of inflation).</td>
<td>Limited to 75% of the annual rise in the Consumer Price Index.</td>
<td>Not available.</td>
<td>Not available.</td>
<td>Yes. Tolls were lowered initially after opening because of the lack of traffic. The last revised toll increase was July 1997.</td>
<td>4 times in 3 years to reflect congestion pricing.</td>
<td></td>
</tr>
</tbody>
</table>

**Toll Tag Administration Information**

<table>
<thead>
<tr>
<th>Tag Name</th>
<th>ETR</th>
<th>E-Trans</th>
<th>Not applicable</th>
<th>Pike Pass</th>
<th>Toll Tag</th>
<th>E-ZPass</th>
<th>Smart Tag</th>
<th>FastTrak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charge of tag</td>
<td>$10 deposit</td>
<td>$30 charge</td>
<td>Not applicable</td>
<td>$30</td>
<td>$25 deposit</td>
<td>$10 for cash or check</td>
<td>$15 deposit</td>
<td>3 plans with 3 different rates</td>
</tr>
<tr>
<td>Agency</td>
<td>Monthly account fee</td>
<td>Minimum account balance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
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<td>-------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ontario, Highway 407</td>
<td>$2 monthly account balance statement for all users. For video license, $1 additional fee per transaction.</td>
<td>No, billed after.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Brunswick, Fredericton - Moncton Highway</td>
<td>$25 to open an account.</td>
<td>Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prince Edward Island, Confederation Bridge</td>
<td>$40 to open an account. No monthly account fee, removed in 1989.</td>
<td>$25 additional balance with credit card payment, $40 additional balance for cash payment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oklahoma, John Kilpatrick Turnpike</td>
<td>$40 to open an account.</td>
<td>$40 for cash statements, $10 for preauthorized credit card.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texas, Dallas North Tollway</td>
<td>No.</td>
<td>Established by the user. Account balance must always be above that amount or else an administrative charge may apply.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New York and New Jersey, Tappan Zee Bridge</td>
<td>$2 monthly fee for account statement. $35 to open prepaid account.</td>
<td>$10 minimum balance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Virginia, Dulles Greenway</td>
<td>$2 monthly fee for account statement.</td>
<td>$10 minimum balance.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California, SR-91</td>
<td>$2 for additional statements.</td>
<td>3 plans with 3 different balances of $0, $25, and $10.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Electronic Toll Technology Information</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Supplier</strong></td>
<td>Mark IV</td>
<td>Mark IV</td>
<td>Not applicable</td>
<td>Amtech</td>
<td>Amtech</td>
<td>Mark IV</td>
<td>Mark IV</td>
<td>Texas Instrument</td>
</tr>
<tr>
<td><strong>System integrator</strong></td>
<td>Hughes</td>
<td>Not available</td>
<td>Not applicable</td>
<td>Amtech</td>
<td>Amtech</td>
<td>Lockheed</td>
<td>Transcore</td>
<td>MFS Network</td>
</tr>
<tr>
<td><strong>Type of Tags</strong></td>
<td>Type II – read/write</td>
<td>Type II – read/write</td>
<td>Not applicable</td>
<td>Type II – read only</td>
<td>Type II – read/write</td>
<td>Type II – read/write</td>
<td>Type II – read/write</td>
<td></td>
</tr>
<tr>
<td><strong>Interoperable</strong></td>
<td>Interoperable with Inter Agency Group.</td>
<td>Interoperable with Inter Agency Group.</td>
<td>Not applicable</td>
<td>Interoperable with Texas.</td>
<td>Interoperable with Inter Agency Group.</td>
<td>Interoperable with Inter Agency Group.</td>
<td>Compatible but no link to the other systems.</td>
<td>Yes, with some of the other toll roads in California.</td>
</tr>
</tbody>
</table>
6 Conclusions and Recommendations

6.1 Conclusions

This thesis explored a number of issues related to developing toll roads. The following are a highlight of some of the major findings:

- Build-operate-transfer arrangements are extremely complex financially and legally. The cost and time to develop the agreements are grossly underestimated.
- The major obstacle in developing toll roads is overcoming public opposition. Where public opposition has been fierce, the issues have become political agendas, which have delayed or stopped the project.
- Most toll roads have failed to meet their toll revenues. Based on a report by Muller and Morgan (1996), 10 of 14 toll roads missed their projections by 20% to 75% in the initial years after opening.
- Private toll projects are costly and delayed because of lengthy land negotiations, lack of definition in the preliminary design, and acquiring stringent environmental approvals. As recommended by Fielding and Klein (1993), government should clear the project first by assembling the right-of-way, completing the preliminary design and satisfying environmental requirements.
- Electronic tolling is almost always used in all recent toll road developments.

Overall, it can be said that public-private-partnerships, especially where there is private financing, is an extremely lengthy process. Almost all the private toll roads reviewed took much longer to complete than first anticipated. In both Virginia and California, the project approvals and selection took approximately 1 to 2 years; however, it took another 5 years before they were finally constructed. The Confederation Bridge took almost three decades from the first announcement of the project before it conceptualized. The contract documents were signed after six and half years following the expression of interest and construction was completed less than 3 years after the approval.
BOT projects are complex financially and legally. Augenblick and Custer (1990) recommends that: “If countries can implement the same project in a more traditional way – with sovereign borrowings financing a turnkey construction contract – the time saved and the greater certainty of the project going forward may warrant the more traditional approach. But if a country is unable – or for budgetary or policy reasons prefers not – to finance all needed infrastructure from budget resources or sovereign borrowings, the BOT approach is one option.”

BOT projects are considered to be advantageous in that construction is faster because of design-build. BOT projects have the potential for shorter construction period because the private sector is responsible and has direct control of the construction methods and schedule. The private sector is free to use creativity and innovation for both the design and construction. BOT projects are also faster in the sense that projects can be accelerated with private sector financing where the project may not otherwise have been built with tax dollars. However, BOT projects require complex and exhaustive contract agreements and arrangements between the private and public sector. The upfront planning to define the responsibilities and appropriate sharing of risk during procurement is a lengthy process especially in regards to financing and revenue risks. For public toll roads, the agreements, even with design-build, are generally less complex because there is no sharing or transferring of financing and revenue risks between the public and the private sector.

The major obstacle observed in the development of all toll projects is public acceptance. The lack of public support for the Lions Gate Bridge is the main reason for its failure. Where there is public opposition to toll roads, it normally becomes a political agenda. This was observed to some degree in all the projects. However, public opposition was so overwhelming on the Lions Gate Bridge, Fredericton-Moncton Highway, and Midstate Road that it stopped the construction or tolling of the project.

The use of road tolls has provided government the funding to build needed transportation improvements. However, tolls can also be used as a transportation management tool to reduce congestion and people's dependence on the automobile. In almost all cases studied, government's main reason for tolling is
because of funding shortfalls and growing demand for transportation improvements. Where tolls have been used to support other initiatives, the public sector normally chooses to build the toll road publicly and as an integrated network. Oklahoma Turnpike Authority uses tolls from successful projects to supplement other project shortfalls. This provides them the ability to construct roads in rural developing areas where revenues are low in the early years of opening. The Authorities created in New York and New Jersey uses toll revenues to build new infrastructure and to build new transit services.

The opportunities for private road development normally exist only for stand-alone toll projects. These projects are usually located in urban areas where traffic volumes are high enough to support the project. Prospects for stand-alone projects are rare as most of the easily developable projects are have already been built. In addition, where there are prospects, there will normally be competing free routes, which makes stand-alone projects even more challenging because the majority of the revenues has to be obtained during the peak hours. Private toll road development opportunities lie with unique projects such as the Confederation Bridge, where ferry fees are transferred into road tolls. Other examples of unique projects are high occupancy toll free lanes referred to as HOT lanes used in SR-91. These projects are normally less expensive because it consists widening of existing routes.

Toll roads have re-emerged over the last two decades. Therefore, achievements in the accuracy of forecast levels of toll revenues are only recently shedding light on past projects. In Muller and Morgan's study (1996), they found that 10 out of 14 projects missed their projections by 20% to 75% in the initial years after opening. More attention is required in developing toll road forecasts as they have an immense impact on the success of the project. Where toll revenues are insufficient to cover a project's construction, operation, and maintenance costs, and large government subsidies are required, the implementation of tolling should be seriously reviewed. The Fredericton-Moncton Highway is an example where there was minimal total cost recovery. Generally, the cost and impacts of implementing tolls on these types of projects will outweigh the benefits gained. In these situations,
tolls would be taxing the public twice. It is recommended that these projects be tax supported or subsidized by other alternative revenue sources other than tolls.

Government usually pursues private toll roads because of the opportunity to gain private investment in needed transportation improvements. The investments are also off the government's books. The private sector has the capability at least in theory to be more efficient and cost effective in construction. In BOT models, the investment as well as the long-term operation of the facility is a way to maximize private efficiencies as well as provide a type of guarantee for long-term performance. There are benefits in pursuing private toll roads when a project is in an environment where there is minimal public opposition, toll revenues can be estimated with confidence, and minimal environmental challenges.

The findings from this study show that unless government is willing to provide financial contributions and to clear the project of land and environmental approvals, where possible, the future trend will lean toward public toll road development, assumed by an authority that would be responsible for a number of toll projects for the following reasons:

- Lack of available private toll road projects that would be profitable and capable of being supported by tolls alone. Toll roads will require subsidies or alternative revenue sources from government or other toll projects.
- To increase revenues, the government will need to consider a system of toll roads. Justification for government subsidies may require transportation demand management initiatives to be undertaken such as increasing transit programs.
- Based on past toll road revenues, the private sector will be more cautious in entering build-operate-transfer (BOT) agreements and lenders will be more cautious with their funds. Non-recourse financing will be more difficult to obtain.
- Reduce project cost by reducing the time required: to develop private agreements; and, to obtain right-of-way and environmental approvals.
6.2 Recommendations

Based on a review of tolling and public-private-partnership issues, and mini case studies of toll roads undertaken in North America, the following are some recommendations to be considered in the development of future toll roads:

- Public acceptance: A project must have public acceptance in order to succeed.
- Political acceptance: Local political support which crosses party lines is required or else some politicians will use it as a voting platform.
- Communication: Public communication should be developed at the outset of the project to provide ongoing information and to solicit concerns. Good communication will market the project.
- Sufficient revenue: The toll revenues generated should cover a significant portion of the construction, operating, and maintenance costs. Ensure the financial benefits outweigh the cost of implementing tolls.
- Conservative revenue forecast: Traffic revenue projections should be conservative, as shortfalls can be detrimental and embarrassing for all parties involved.
- Equity: Address equity issues when applying tolls to ensure that there is overall fairness to as many members in society as possible. Consider discounts in the toll structure where possible and feasible.
- Existing free roads: Do not apply tolls on existing free routes except where demand management policies (ex. congestion pricing) are in place.
- Simple toll structure: The tolling structure should be as simple as possible so that it is easily understood by the public and easy to implement and enforce.
- Convenience to users: The toll collection system implemented should provide convenience and a high level of service to users.
- Enabling legislation and regulations: Ensure that all required legislation, regulations, and approvals are in place at the outset of the project.
- Clearing the project: Where possible, clear as much of the project as possible by assembling the right of way, completing preliminary design and satisfying the
environmental requirements before awarding a contract to complete the final design and to finance, construct, and operate the facility.

- Rate of return: A project must offer a reasonable rate of return in order to attract private investments. Where rates of return are high, government should consider public ownership.

- No competition zones: Government should provide a guarantee that there will be no competing projects nearby for a stipulated period of the contract. The competition zone granted should not create a monopoly.

- Toll revisions: A process should be defined to allow the private sector to fix and adjust toll rates, which will not create a monopoly for the private sector. To the extent possible, it should be free from political influence.

- Strong consortium: Project should have a reliable, committed and strong development consortium capable of weathering revenue shortfalls.

- Development cost and time: All parties should understand that development of toll roads is a costly and time consuming process to obtain private financing and environmental approvals. Be prepared for long delays. Where government can help to simplify and shorten the process, they should.

- Competent construction contractors: The project should have strong and technically competent construction contractors, which can guarantee a timely delivery of the project.

- Fair and reasonable allocation of risks: The risks should be allocated to the party that has the capability to control it. The amount of risk assumed by the private sector should be reflected by the rate of return in a project. Government should ensure that public risks are minimized but understand the costs of risks, insurance, and bonds are all part of the construction costs, which is directly related to toll rates paid by the public. Some risks are best shared. If risk is allocated to the private sector, government should ensure that they allow the private sector the ability to control and manage it.

- Government that is equitable and experienced: A project must have government support. If the government is not experienced, advisers should be obtained to provide the experience to ensure that legal framework and contractual conditions
protect both parties' interests. Select a government representative that will be continuous through the contractual process. Understand that changes in government can delay the process and can be expensive for the private sector.

- Credible process: Ensure there is an open and fair process. Understand that the development of submissions and proposals are expensive ventures.
7 References

The following is a list of people contacted during the course of this study to assist in the data collection for Section 6.3, Summary Table. The information collected is purely data and is not the opinions of the interviewees. Any opinions, conclusions, interpretations made are of the authors'.

Ontario

Dave Aspinwall
407 International Inc.

Kenneth A. Walker
407 International Inc.

Ed Ellard
Ministry of Transportation of Ontario

New Brunswick

Brian McEwing
New Brunswick Department of Transportation

Ian Nethercott
New Brunswick Department of Transportation

Prince Edward Island

Arnold Wood
Strait Crossing Bridge Limited

Texas

Jim Griffin
Texas Turnpike Authority

Virginia

Mark Manlove
Toll Road Investors Partnership II
8 Bibliography


Greater Vancouver Regional District and Province of British Columbia. Transport 2021 Long-Range Transportation Plan for Greater Vancouver. GVRD Communications and Education Department.


Sublett, Jesse. History of the Texas Turnpike Authority.


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Distribution in Urban Transportation." Transportation Research Record 1649: 105-112.


