St. Croix River Crossing Project: Innovative Financing Study

January 2011

Your Destination...Our Priority

Cost of Completing this Study

The consultant contract cost to complete this feasibility analysis and report was approximately $146,000. The remaining costs, including Mn/DOT staff time to oversee the contract, provide input to the report and communicate the results, were approximately $5,700.

Prepared for the Minnesota Department of Transportation by HNTB Corporation

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Executive Summary

Purpose of Study

The Minnesota legislature in the 2010 session (MN 2010 Laws Chapter 351, Section 71) directed Mn/DOT to study innovative financing options for the construction of a new St. Croix River Bridge.

This directive includes a report by the Commissioner of Transportation by January 15, 2011, to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation policy and finance on the feasibility of utilizing any potential value capture options or potential public-private partnerships, which may include charging tolls, for construction of a new bridge over the St. Croix River at or near Stillwater.

The evaluation of the financial feasibility of various financing strategies is made for the total project costs irrespective of the cost splits between the State of Minnesota and the State of Wisconsin.

This study explores legislative issues, the potential for toll financing, Public-Private Partnership (P3) approaches, and value capture options for the new St. Croix River Crossing project.

Law Summary

The report summarizes the existing Minnesota and Wisconsin laws and legislation related to tolling and federal laws that apply to tolling. It also summarizes the laws around P3s and value capture.

Several legislative actions would have to occur to enable tolling and the consideration of P3 approaches for the St. Croix River Crossing, such as:

- Repeal the 1929 Federal law H. R. 13502 (Public, No. 740, Chapter 194) to allow tolling and P3 approaches
- Adopt state enabling legislation to allow electronic/video tolling for the St. Croix Bridge
- Amend or exempt the project from Minn. Stat. §160.85, subd. 3 (municipal veto) and § 160.98 (prohibition on privatization) to optimize P3 options

Regarding value capture options, there are no policies or laws developed specifically for transportation projects. Legislative changes could be made to enable the state to utilize specific value capture options for transportation projects, such as:

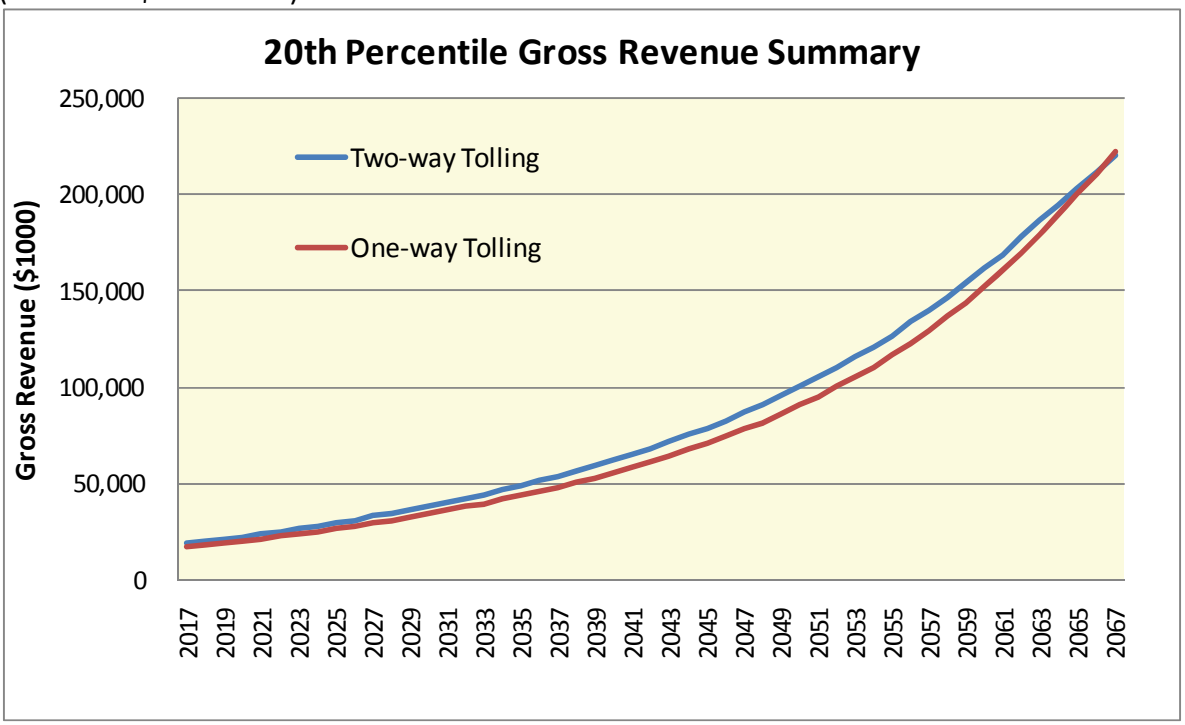
- Amend Minn. Stat. Ch. 429 to allow the state to create transportation assessment districts and pursue special assessments for transportation improvements
- Adopt legislation allowing the state and local governments to utilize development impact fees for transportation improvements

Tolling Options

A financial model was developed to forecast gross revenue for a 50-year period for two tolling scenarios: collecting tolls from traffic in one direction only (one-way tolling) and collecting tolls on traffic in both directions (two-way tolling). The tolls were assumed to keep pace with inflation. The model was risk-based in that it accounted for potential variability in key assumptions. Specifically, the analysis accounted for potential variability in (a) the directional share of traffic, (b) the annual percentage growth in traffic, (c) the overall share of crossing traffic served by the St. Croix River Crossing, (d) the percentage of heavy trucks, and (e) the rate of diversion.

This analysis estimates that tolling the St. Croix River Crossing would generate $17-19 million in gross revenue in 2017 and increasing to $220-$222 million in 2067. These estimated revenues, along with the projected bridge operations and maintenance costs, are then used to evaluate financing options.

Figure ES-1: 20th Percentile Annual Gross Revenue Forecast for the St. Croix River Crossing (escalated $thousands)[1]



Two-way tolling generates the most revenues because it is assumed the toll rate in each direction would be half the rate of one way tolling and would therefore result in less diversion of travelers to other routes to avoid the toll. However, near the end of the 50-year study horizon, both the two-way and one-way tolling scenarios are expected to generate similar amounts of gross revenue. This is because both scenarios eventually become constrained by

[1] Further details on the estimated forecast revenue can be found in Section 3 of this report.

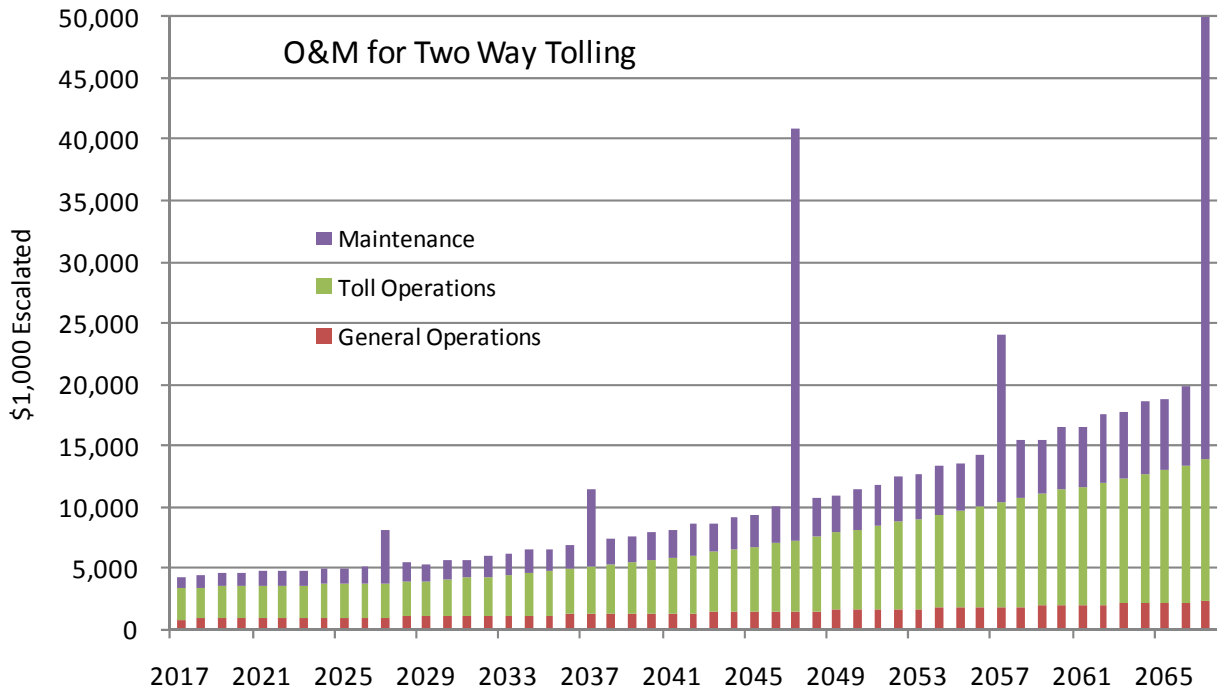
the capacity of the bridge. Once that occurs, diversion ceases to be a factor affecting revenue, and the relative advantage of two-way tolling disappears.

Operations and Maintenance Costs

This study analyzed, on a sketch level, the operations and maintenance costs for the St. Croix River Bridge. The cost categories include general operations, toll operations, routine maintenance and major maintenance. These costs are subtracted from gross revenue estimates to calculate the net toll revenues. The net revenues are then used to evaluate financing options.

Figure ES-2 below shows the annual operations and maintenance costs for the first 50 years. The high cost years are where more significant major maintenance costs such as re-decking or joint replacement are required.

Figure ES-2: Forecast Operations & Maintenance Costs ($1,000s escalated)[2]



Note: The highest values in Figure ES-2 represent more significant major maintenance costs required at these intervals and magnified by escalation. In 2067, the major maintenance cost is $160.6 million. See Table 7 for detailed annual costs.

[2] Further details about the estimated forecast revenue can be found in Section 4 of this report.

Public Private Partnerships (P3s)

Public Private Partnerships (P3s) are contractual agreements between a public sector entity and a private sector entity that allow for increased private sector participation in public infrastructure projects. Design-Build-Finance-Operate-Maintain (DBFOM) delivery approaches allow public transportation owners the ability to accelerate and implement new projects while transferring many of the associated short-term and long-term risks to the private sector.

A major advantage of DBFOM delivery is the introduction of private equity into the financing which can produce more upfront proceeds to fund the capital needs of a project. Additionally, private financing can eliminate the need for public debt.

This analysis compares two types of P3s: Concession and Availability Payment Transaction:

Concession:

- Operates as a long-term lease in which the private sector is obligated to design, construct, finance, operate and maintain a toll facility over the life of the concession
- Private concessionaire bears the toll revenue risk that traffic demand will be less than what is forecast
- Tolls are collected and retained by the concessionaire as compensation for up front financing and risk assumption
- Can result in the concessionaire paying the public owner an upfront payment for the concession or may require a public subsidy to deliver the project depending on projections of traffic
- Also called Demand or Revenue-Risk Concession due to the traffic and revenue risk

Availability Payment Transaction:

- Public owner makes annual availability payments to concessionaire from a general source of government revenues based on the facility meeting the contractual operating and performance standards
- Facility can be tolled or non-tolled
- Private entity's compensation is not tied to tolls on the facility
- If the facility is tolled, the public owner controls the toll rates and keeps all resulting toll revenue (public owner retains the demand and revenue risk)

This analysis compares the advantages and considerations for each of these types of P3s. It also gives examples of both types of P3s that have been implemented in the United States.

P3s can be a valuable project delivery tool, but the applicability must be evaluated on a case-by-case basis. The financial capacity of the project and its owner, along with the project type and risk profile, are key factors in selecting the optimal project delivery method. P3s have been

successfully used in the U.S. and throughout the world to accomplish specific goals of the public owner.

Value Capture

The proposed St. Croix River Crossing does not offer significant real estate value capture opportunities on the Minnesota side of the crossing largely due to the fact that: 1) proposed roadway and access improvements are within an existing travel corridor alignment with no new access points or major system reconfiguration; and 2) the land areas surrounding the corridor are largely developed.

While local conditions and circumstances in any transportation project will provide variable opportunities, in general, Minnesota could generate a greater share of revenue from real estate based value capture techniques in the following circumstances:

- Reconstruction of an existing urban or rural corridor could produce significant new real estate value capture opportunities provided the reconstruction offers new access opportunities to the facility in locations where there is real estate reinvestment interest.
- The development of new access points in largely undeveloped areas can provide significant new value capture opportunities particularly where real estate markets are strong. Mn/DOT would have the greatest flexibility in the design of the facility to serve both travel/access needs and development opportunities in vacant land situations.
- Successful value capture assumes proximity to growing and sustained real estate markets that will support private investment. Urban corridors, with more concentrated and intensive development and with more predictable real estate markets would tend to offer the greatest return from these financing techniques.

There are a variety of tools that can be used for value capture, many of which are clearly set forth in the Center for Transportation Studies' 2009 Value Capture Study. In Minnesota, local governments have authority to use a variety of value capture techniques such as tax increment financing, special assessments, negotiated exactions and joint development. State agencies like Mn/DOT have limited authority to engage in value capture techniques. Neither local governments nor state agencies have the ability to utilize certain value capture techniques like development impact fees.

Financial Capacity

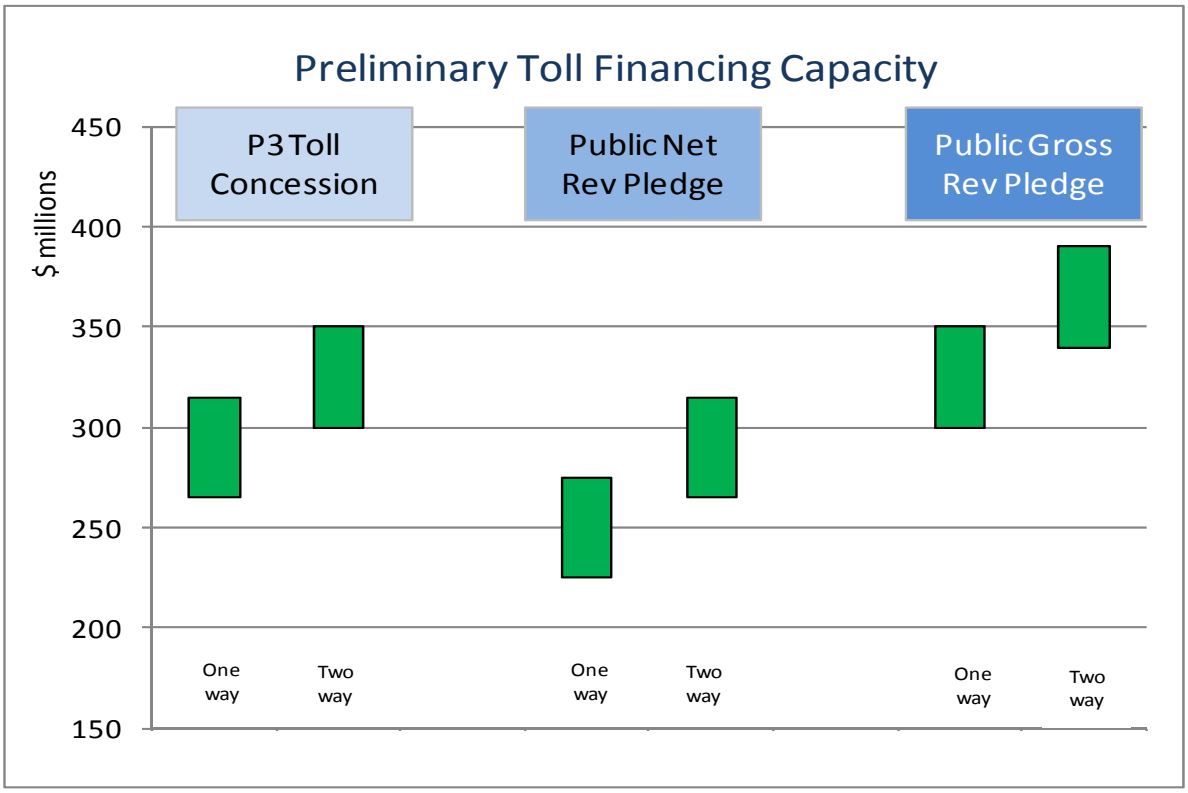
The comparison of the financing capability of a P3 Toll Concession versus public toll financing options is shown in Table ES-1 below. The public options are referred to as a Gross Pledge Option where all toll revenue is assumed available to pay off debt (40 year toll revenue bonds), and a Net Pledge Option where maintenance and operation costs must be paid from toll revenues resulting in less revenue to pay off debt. Mn/DOT could also choose to fund the project using its traditional method of GO Trunk Highway bonds and a combination of state and federal revenues. The Trunk Highway bonds are the lowest cost debt option and would require the least amount of public funds to repay the debt service payments over the life of the bonds.

The Net Present Value of these options is shown in Table ES-1 and Figure ES-3 below. This comparison converts all future costs into present dollars.

Table ES-1: Preliminary Toll Financing Results[3]

($millions)	P3 Toll Concession		Public Net Revenue Pledge		Public Gross Revenue Pledge	
	One-Way	Two-Way	One-Way	Two-Way	One-Way	Two-Way
Net Financing Capacity	265 – 315	300 - 350	225 - 275	265 - 315	300 - 350	340 - 390
Project Capital Cost	642	642	642	642	642	642
Percentage Feasible	45%	51%	39%	45%	51%	57%
NPV of Excess Revs (5%)	0	0	315	340	380	415

Figure ES-3: Preliminary Toll Financing Results



[3] Further details about financial capacity can be found in Section 7 of this report

Toll Finance Findings:

- The project revenues can support 40-60 percent ($265 - $390 million) of the project's upfront construction costs
- A P3 Concession produces more upfront proceeds ($265 - $350 million) than the Public Net Pledge ($225 - $315 million) since the private concessionaire monetizes (provides the financing of the current value of) the full revenue stream
- The Public Gross Pledge produces the most upfront proceeds ($300 - $390 million) of all scenarios since all of the toll revenue is pledged to debt. Mn/DOT or another state or local agency would have to guarantee or pay the project's O&M commitment.
- The Public scenarios have 'excess revenues' ($315 - $415 million in net present value over 50 years) after the payment of debt service (and O&M in the Net Revenue Pledge) to use for other future projects. These excess revenues exist because the rating agencies and investors typically will not allow a new toll facility to sell debt against all project revenues, creating a conservative cushion in case revenues are less than forecasted. When financed under a P3 Concession, there is no 'excess revenue' that accrues to the public since the amount of upfront equity invested by the concessionaire reflected the expectation to retain these revenues.

The P3 toll funding plan was compared against the current Mn/DOT funding plan for this project as shown in Table ES-2 below. The results are that the current Mn/DOT funding plan is the lowest cost debt option, but that option would limit Mn/DOT total debt capacity more than the P3 option.

Table ES-2: Illustrative Toll Funding versus the Current Mn/DOT Financing Plan Scenario

Toll Financing Comparison		
	Toll Financing (P3 or Public)	**Mn/DOT Financing Plan**
Debt Type	Toll Revenue Bonds or Toll Bank Loan	State Trunk Highway Bonds
Debt Interest Rate	6 percent – 8 percent	3 percent – 5 percent
Discussion Items	-Debt supported by tolls decreases amount of public GO Trunk Bonds or Mn/DOT funds -Toll-backed debt is more costly than GO Trunk Highway Bonds -Toll-backed debt is typically not guaranteed or supported by state funds	-Lowest cost debt option -Project can be funded with or without tolls -GO Trunk Highway Bonds capacity is limited, bonds could be used for other projects

An Availability Payment option was also analyzed, as shown in Table ES-3 below. Mn/DOT could make annual availability payments over 30 years to fund the costs of constructing and maintaining the bridge at a cost of $44 to $56 million for the base year, escalated thereafter.

Table ES-3: Illustrative Availability Payment Scenario

Illustrative Availability Payment Scenario	
Availability Payment Structure	
Term (number of payments)	30 yrs
Construction Cost	$642m
Construction Completion Milestone Pmt (YE 4)	$100m
Inflation Factor for Annual Payments	2.50%
O&M Forecast without Toll Operations Cost	Included
Financial Structure	
Debt Component	90%
Private Equity Component	10%
Private Equity IRR	11%
Blended Borrowing Rate (debt and equity)	
PABs Case: 5.0% Debt Cost	5.60%
Bank Loan Case: 6.0% Debt Cost	6.50%
Illustrative Results - Base Year Availability Payment	
PABs Case	**$44-49m**
Bank Loan Case	**$51-56m**

Note: Results are for illustration purposes only and are subject to change.
Availability Payments are dependent upon market conditions at time of financing.

Conclusions

The financial capacity analysis shows that using tolls on the St. Croix River Crossing could pay for nearly half of its capital costs, as well as all of its ongoing operations and maintenance costs.

Tolling the St, Croix River Crossing is operationally practical and can provide a significant new funding source. However, tolling is only feasible if Minnesota and Wisconsin join in getting specific federal and state legislation passed, and the 2006 Supplemental Environmental Impact Statement for the St. Croix River Crossing is re-evaluated to determine if additional environmental review is needed to address the tolling approach.

If tolling is the desired approach, then the Public Toll Financing options might be the more viable approach because of the large required public subsidy in addition to the toll financing amounts. However, the feasibility of a P3 option could improve if (1) a more in-depth business case and “Value for Money” analysis determines there is greater public benefit in a given P3 approach than the planned public approach, (2) there is strong industry interest in such an approach, and (3) adequate legislative authority is put in place to pursue such an approach.

The feasibility for value capture techniques to help pay for some of the costs of the bridge on the Minnesota side of the river is low even if new legislation were passed.

1. Introduction/Background

The St. Croix River Crossing Project will replace the functionally obsolete movable lift bridge crossing the St. Croix River at Stillwater, Minnesota. This replacement bridge is on new alignment between the City of Oak Park Heights, Minn. and the town of St. Joseph, Wis., south of the Stillwater Lift Bridge and includes related roadway improvements in Wisconsin and Minnesota. A mitigation package that offsets the impacts to the social, economic, and environmental effects is included with the project. The estimated project cost range is $580 - $698 million in 2015 dollars and includes construction, right-of-way, engineering and contingencies. For this study, an estimated cost of $642 million is used.

The Minnesota legislature in the 2010 session (Laws 2010 Chapter 351, Section 71) directed Mn/DOT to study innovative financing options for this project and the statute is listed below:

- Sec. 71. REPORT ON FINANCING OF BRIDGE CONSTRUCTION. "By January 15, 2011, the commissioner of transportation shall report to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation policy and finance on the feasibility of utilizing any potential value capture options or potential public-private partnerships, which may include charging tolls, for construction of a new bridge over the St. Croix River at or near Stillwater. The report must be submitted electronically."

This study explores legislative issues, the potential for toll financing, Public-Private Partnership (P3) approaches, and value capture options for the new St. Croix River Crossing project between Oak Park Heights and the town of St. Joseph.

Project costs and schedule are based on the Preferred Alternative defined in the project's Supplemental FEIS (June 2006), a 2013 start-of-construction date, and the river bridge opening to traffic in fall 2016. The evaluation of the financial feasibility of various financing strategies is made for the total bridge costs irrespective of the cost splits between the State of Minnesota and the State of Wisconsin.

2. Law Summary

This section summarizes existing Minnesota and Wisconsin laws and legislation related to tolling and federal laws that apply to tolling. It also summarizes the laws around P3s and value capture techniques.

Conflicts between financing proposals and these federal and state laws would need to be resolved prior to a financial proposal being implemented.

Federal Law Issues

H. R. 13502 (Public, No. 740, Chapter 194), enacted in 1929, authorizes the State of Minnesota and the State of Wisconsin to construct, maintain and operate a free highway bridge across the St. Croix River at or near Stillwater, Minnesota. Although the 1929 law was passed for the construction of the current Stillwater Bridge, it is believed that it would apply to a replacement bridge on a new alignment and would therefore need to be specifically repealed by Congress to allow tolling and P3 approaches.

Title 23 United States Code Section 129 allows federal participation in the following five types of tolling activities:[4]

- Initial construction (except on the interstate system) of toll highways, bridges, and tunnels, including the approaches to these facilities;
- Reconstructing, resurfacing, restoring and rehabilitating any existing toll facility;
- Reconstruction or replacement of free bridges or tunnels and conversion to toll facilities;
- Reconstruction of a free Federal-Aid highway (except on the interstate system) and conversion to a toll facility; and
- Preliminary studies to determine the feasibility of the above toll construction activities.

Two of the major constraints on P3s are limits to the federal tax exemption for private activity bonds and long-term leases and regulations on the use of Federal-Aid funds for tolling.[5] If Federal-Aid funds are used for construction of or improvements to a toll facility or the approach to a toll facility or if a state plans to reconstruct and convert a free highway, bridge or tunnel previously constructed with Federal-Aid funds to a toll facility, a toll agreement under Section 129(a)(3) must be executed. The toll agreement must require that all toll revenues are first used for any of the following: debt service, reasonable return on private investment, and operation and maintenance, including reconstructing, resurfacing, restoring, and rehabilitating work. The agreement may also include a provision regarding toll revenues in excess of those needed for the required uses outlined above. This provision would allow these excess revenues

[4] http://frwebgate.access.gpo.gov/cgi-bin/usc.cgi?ACTION=RETRIEVE&FILE=$$xa$$busc23.wais&start=766484&SIZE=3689&TYPE=PDF

[5] FHWA Office of Innovative Program Delivery: Public Private Partnership. http://www.fhwa.dot.gov/ipd/p3/faqs/index.htm.

to be used for highway and transit purposes authorized under Title 23 if the state certifies annually that the toll facility is being adequately maintained.

The 2006 Supplemental Environmental Impact Statement (SFEIS) did not include tolling or private financing options. The 2006 SFEIS would need to be re-evaluated if these funding sources are pursued to determine if additional environmental review is needed to address these financing mechanisms.

Minnesota Law Issues

Minnesota Statutes §§ 160.84 through 160.98 permit private developments of toll facilities.[6] A road authority may solicit or accept proposals from and enter into development agreements with private operators for developing, financing, designing, constructing, improving, rehabilitating, owning and operating toll facilities wholly or partly within the road authority's jurisdiction. Minnesota law provides a mechanism for tolling, but allows a county or municipality through which the toll facility will pass to veto the project very late in the process (Minnesota Statute 160.85). Minnesota law also restricts a road authority from leasing or otherwise relinquishing management of a highway to another party, which could prevent the department from entering into P3 agreements (Minnesota Statute 160.98).

Minnesota Statutes § 165.08 permits toll bridges connecting Minnesota and an adjoining nation or province thereof. With the approval of Congress, Minnesota and adjoining nation or province may form a joint and independent international authority or commission, "which may independently purchase, construct, reconstruct, maintain, improve, repair and operate the bridge or bridges."

Minnesota Statutes § 174.03, subd. 6a requires Mn/DOT, when considering any toll or P3 approach, to work with the Met Council, and regional railroad authorities in the department's metropolitan district, to compare the economics of these financing methods with the economics of non-highway alternatives for moving commuters. "The commissioner shall analyze the economics as they relate to both individuals and to the transportation system."

In addition to the above legislative issues, specific state legislation would be needed to allow electronic/video tolling for the St. Croix River Crossing.

Minnesota law allows several value capture techniques; however, they are not specifically developed for transportation projects or for use by state agencies. Value capture tools potentially applicable for transportation projects include tax increment financing and special assessments.[7] Local governments in Minnesota have authority to use a variety of value capture techniques such as tax increment financing, special assessments, negotiated exactions and joint development. State agencies like Mn/DOT

[6] https://www.revisor.mn.gov/statutes

[7] "Value Capture for Transportation Finance", Report to the Minnesota Legislature, University of Minnesota Center for Transportation Studies, June 2009.

have limited authority to engage in value capture. Neither local governments nor state agencies have the ability to utilize certain value capture techniques like development impact fees.

Wisconsin Law Issues

Wisconsin Statute 84.01(30) gives the Wisconsin Department of Transportation the authority to explore and engage in "Build, Lease and Transfer" and "Build, Operate and Transfer" transportation endeavors. The statute states the following:[8]

"The department may enter into build-operate-lease or transfer agreements with private entities for the construction of transportation projects, including any projects to be financed under s. 84.59 for transportation administrative facilities under s. 84.01 (28) and, for projects that are not purchased by the state upon their completion, for the maintenance and operation of such projects. A project under this subsection may be constructed on state-owned land. An agreement under this subsection may not be entered into unless the department determines that the agreement advances the public interest, and the private entity has prior experience in design, construction, site development and environmental impact analysis and, for a project that is not expected to be purchased by the state upon its completion, has the capability of maintaining and operating the facility upon completion of the project."

[8] http://www.lawserver.com/law/state/wisconsin/wi-laws/wisconsin_laws_84-01

3. Tolling Options

Toll Revenue Estimation

This analysis provides an estimate of the amount of gross revenue that would be generated by tolling the proposed St. Croix River Crossing.

Context

The Stillwater Crossing is one of four crossings over the St. Croix River on the east side of the Minneapolis-St. Paul metropolitan area.[9] These crossings are summarized in Table 1.

Table 1: Existing St. Croix River Crossing Summary

Crossing	Route	Distance from Stillwater	Number of Lanes	2008 AADT
Hudson, WI	I-94	7 miles south	8[10]	89,000
Stillwater, MN	State Route 36	n/a	2	18,400
Osceola, WI	State Route 243	22 miles north	2	6,400
Taylors Falls, MN	US-8	30 miles north	3 (2WB, 1 EB)	14,900

Stillwater is the second-busiest of the four crossings. The bridge consists of one lane in each direction, with the flow of traffic interrupted by the raising of the lift bridge on a set schedule. This constrains the volume of traffic that can cross during the peak hour to approximately 1,000 vehicles in the peak direction.

Traffic Volumes

In order to assess the gross revenue potential of the St. Croix River Crossing, it is necessary to estimate the volume of traffic that would likely use the new bridge. A travel demand model forecast for the year 2030 was performed by others as part of the Supplemental Final Environmental Impact Assessment. The forecasts for each crossing are summarized in Table 2.

[9] A fifth crossing exists about 16 miles south of the I-94 crossing, between Prescott, WI and Hastings, MN. However, HNTB's forecasts and analyses built upon data provided by SRF Consulting Group, Inc., in its document entitled *Travel Demand Forecasts – Technical Memorandum Supplement for the Preferred Alternative* (12 May 2005). Since this report did not include data from the Prescott-Hastings crossing, HNTB did not incorporate data from this crossing. In short, since no traffic data associated with this crossing was included as part of the Supplemental Final Environmental Impact Statement (SFEIS), the Prescott-Hastings crossing was not included in this analysis.

[10] The eight lanes consist of 3 travel lanes and 1 auxiliary lane in each direction.

Table 2: Traffic Growth Summary, St. Croix River Crossings

Crossing	Volume Trends			Share of Traffic Crossing the River	
	2008 Vol.	2030 Vol. (projected)	Annual percent Change	2008 (existing bridge)	2030 (new bridge)
Hudson (I-94)	89,000	120,200	1.4 percent	69.2 percent	60.5 percent
Stillwater (MN36)	18,400	50,100	4.7 percent	14.3 percent	25.2 percent
Osceola (MN243)	6,400	6,600	0.1 percent	5.0 percent	3.3 percent
Taylors Falls (US-8)	14,900	21,700	1.7 percent	11.6 percent	10.9 percent
Total	128,700	198,600	2.0 percent		

Sources:
- *2009 Traffic Volumes, municipalities of Chisago County, from Mn/DOT website*
- *2008-2009 Traffic Volumes - Street Series, St. Paul-Minneapolis Seven County Area, from Mn/DOT website*
- *Travel Demand Forecasts, St. Croix River Crossing Project, SRF Consulting Group, Inc., 17 June 2004*

It is important to note that the projections are not based on the St. Croix Bridge being tolled. Rather, these projections were developed before tolling was being considered as an option for the new bridge. Nevertheless, two important conclusions may be drawn from Table 2:

- First, total crossing traffic is expected to increase at a rate of approximately 2 percent per year through 2030.
- Second, the new St. Croix River Crossing will carry just over 25 percent of all crossing traffic—up from the current share of about 14 percent. This increase can be attributed to three factors: (1) added capacity, since the new bridge will be four lanes, (2) reduced travel time for through traffic, since the new bridge will bypass the slow-moving downtown area, and (3) eliminating truck length and overweight restrictions at the current crossing.

This analysis estimates the "toll-free" volumes on the Stillwater Crossing throughout the analysis period. The "toll-free" volumes on the Stillwater Crossing are summarized in Table 3. This summary assumes that the annual traffic growth rate continues at 2.0 percent for all future years (beyond 2030). It is important to note that the figures cited in Table 3 do not account for any potential capacity constraints that the proposed four-lane bridge will eventually face. These potential constraints are addressed later in the tolled traffic volume analysis.

Table 3: New St. Croix River Crossing Projected Volumes in the "Toll-Free" Condition

Year	Projected Crossing Volume	Year	Projected Crossing Volume
2010	19,140	2038	58,640
2011	19,520	2039	59,800
2012	19,910	2040	60,990
2013	20,310	2041	62,210
2014	20,710	2042	63,440
2015	21,120	2043	64,710
2016	21,540	2044	66,000
2017	38,770	2045	67,310
2018	39,540	2046	68,650
2019	40,320	2047	70,010
2020	41,130	2048	71,410
2021	41,950	2049	72,830
2022	42,780	2050	74,280
2023	43,630	2051	75,760
2024	44,500	2052	77,260
2025	45,390	2053	78,800
2026	46,290	2054	80,370
2027	47,210	2055	81,970
2028	48,150	2056	83,600
2029	49,110	2057	85,260
2030	50,080	2058	86,960
2031	51,080	2059	88,690
2032	52,100	2060	90,450
2033	53,130	2061	92,250
2034	54,190	2062	94,090
2035	55,270	2063	95,960
2036	56,370	2064	97,870
2037	57,490	2065	99,820

Assumptions:

- *The first full year of the new Stillwater Bridge's operation is 2017.*
- *The baseline volume of traffic is derived from the report entitled Travel Demand Forecasts, St. Croix River Crossing Project, SRF Consulting Group, Inc., 17 June 2004.*
- *Total crossing traffic (for the four bridges cited in Table 2) grows at a rate of 2.0 percent per year.*
- *Prior to 2017, the Stillwater Bridge carries 14.3 percent of total crossing traffic; thereafter, the share jumps to 25.2 percent, consistent with the aforementioned Travel Demand Forecasts.*

It should be noted that, prior to 2017, the volumes represent anticipated volumes on the existing bridge with its current capacity constraints and weight restrictions. The dramatic increase in traffic in 2017 represents the impact of the opening of the new bridge, which will attract a greater share of crossing traffic because of its higher capacity. The addition of a 2nd lane, the bypassing of downtown Stillwater, and the elimination of weight restrictions and periodic bridge lifts will combine to attract vehicles that currently use other crossings.

Scenarios

Two basic scenarios were analyzed:

- The first scenario was one-way tolling, in which tolls are collected in one direction only. This is a common practice for toll bridges. The Tobin Bridge in Boston, the Tacoma Narrows Bridge in Seattle, and virtually all of the Delaware River crossings employ one-way tolling, to name a few.
- The second scenario was two-way tolling. This is less common for bridges, but it can provide a means for charging a lower toll (albeit in both directions). Two-way tolling tends to produce slightly higher gross revenue, because the lower toll tends to cause less diversion. However, certain capital, operations and maintenance costs also tend to be slightly higher, since the agency must build and maintain more toll collection infrastructure and collect tolls from approximately twice as many transactions.

Traffic Composition

In order to translate traffic volumes into revenue, it is necessary to make some assumptions concerning the *composition* of daily traffic. The revenue analysis for the St. Croix River Crossing assumed the following:

- Traffic on the bridge is evenly split between the eastbound and westbound directions. This assumption is primarily relevant for the one-way tolling scenario. If tolls are only collected in one direction, then it would be prudent to apply the toll in the direction that serves the highest volume of traffic. However, there is no conclusive evidence that traffic at the St. Croix River Crossing is biased to either the eastbound or the westbound direction. Therefore, it is assumed that traffic is evenly split in each direction.
- Heavy trucks (i.e., five-axle tractor-trailers) comprise 5 percent of total traffic. Mn/DOT data suggests that, in 2004 and 2006, heavy trucks comprised 2.8 percent of Stillwater traffic, 7.9 percent of Osceola traffic, and 5.5 percent of Taylors Falls traffic. Once the new bridge is complete (assuming it will have no truck restrictions and provide added capacity and improved travel times), it is likely that some heavy trucks will shift from the Osceola and Taylors Falls crossings over to the St. Croix River Crossing. This, in turn, will likely raise the share of heavy trucks from its current share of 2.8 percent up toward 5 percent.[11] I-94 currently has 8.8 percent trucks, which is typical of inter-city portions of the interstate; little of that truck traffic is expected to use the new bridge.

[11] One reason that the Stillwater Crossing has the lowest percentage of trucks is because of existing restrictions to heavy vehicles. Currently, trucks with a height greater than 13 feet 2 inches or with a weight greater than 40 tons are prohibited on the bridge, and the length of the trucks is restricted in the city of Stillwater. Thus, semi trucks are effectively prohibited from using the crossing today.

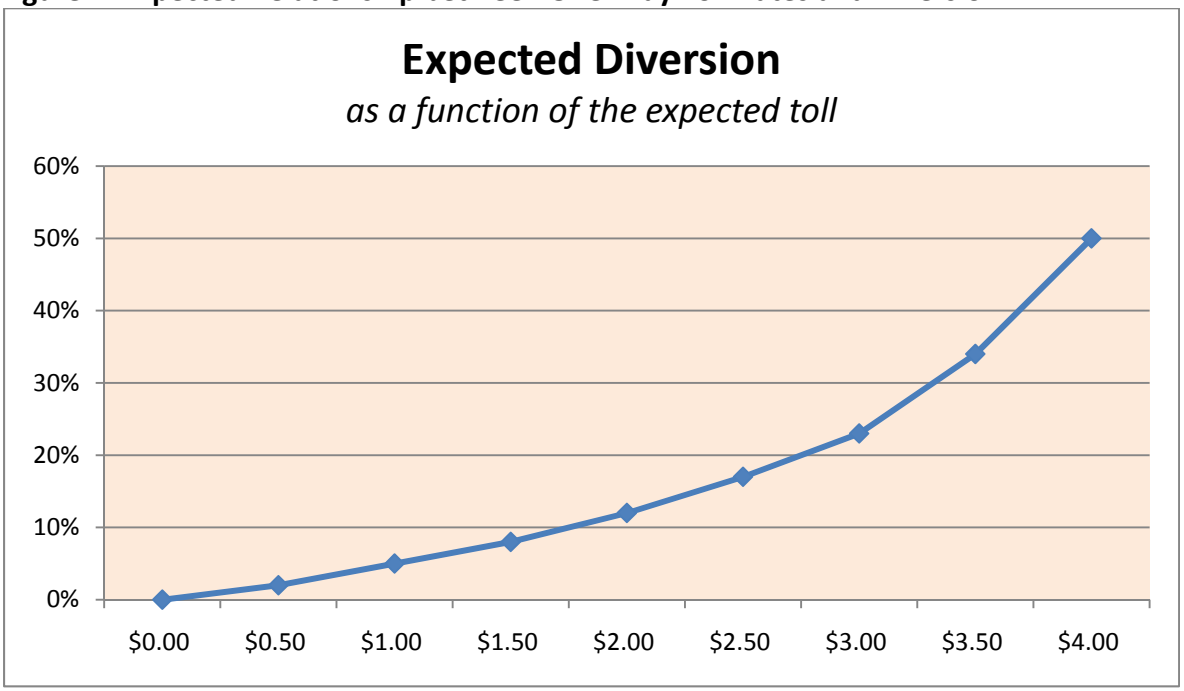
- The new St. Croix River Crossing is assumed to be an all-electronic tolling (AET) facility. For toll collection purposes, vehicles will belong to one of two groups—vehicles with a toll transponder (similar to the type of toll collection currently used by Mn/DOT for the MnPASS program) and vehicles without a transponder that will be identified with a license plate photograph (also known as "video tolling"). It is assumed that the share of vehicles opting to have a transponder will conservatively start at about 40 percent and will grow by 1 percent to 3 percent per year. The rate of growth will be higher in the early years and will taper off as time goes on. The assumption is similar to experiences of other agencies when they have introduced electronic toll collection for the first time to a region. However, there are examples where initial transponder penetrations could be significantly higher given certain demographics and marketing campaigns. Given the limitation of data collection and customer information for this study, and given that the lower transponder use will yield a potentially more conservative view of financial feasibility, the lower experience was chosen as the baseline. It is further assumed that transponder usage will reach a practical maximum of about 80 percent of all transactions. These assumptions are relevant in the final revenue calculations, since the rates charged to video patrons and the rate of revenue recovered from theses patrons will differ from those charged to patrons who utilize a transponder.
- The analysis assumes that there are no non-revenue transactions associated with the facility. In other words, all vehicle types using the facility will be assessed a toll. It is not uncommon for toll rate schedules and policies to be developed, as the project definition progresses, to potentially include toll discounts or exemptions for certain types of mass transit, high occupancy, public safety, emergency response or other types of vehicles. The current analysis assumes no non-revenue traffic.

Toll Rates and Diversion

Estimating the appropriate fare to charge at the St. Croix River Crossing was the next task. Because the St. Croix River Crossing has alternative free crossings to the north and south, virtually any toll charge will result in some level of diversion. The challenge is to charge a rate that is both reasonable and has the greatest likelihood of maximizing revenue.

Based on HNTB's experience with other toll facilities, a chart was developed to estimate diversion as a function of the toll rate. Figure 1 illustrates HNTB's estimates of diversion in response to various tolls that might be employed in a one-way tolling scenario.

Figure 1: Expected Relationship between One-Way Toll Rates and Diversion



Generally speaking, the rate of diversion depends on the following factors:

- Quality of alternative routes. If non-tolled alternative routes are easily accessed and uncongested, then the diversion rate will tend to be higher.
- Value of travel time. Commuters and work-related travelers tend to have a higher value of time, so bridges that serve a high proportion of these sorts of trips will tend to have lower rates of diversion.
- Trip type. If the bridge serves a high proportion of "discretionary" trips (e.g. shopping trips or recreational trips), it will tend to have a higher level of diversion. This is because such drivers don't *need* to make the crossing; many could accomplish their trip purpose without making the crossing at all. By contrast, commuting trips don't have the option to **not** make the crossing, and will therefore tend to have lower rates of diversion.
- Trip length. All else being equal, shorter trips are less likely to divert. This is because shifts to alternative routes would tend to have a significant impact on the overall trip length. For example, a trip whose ends lie within one mile of the bridge would be greatly lengthened by diversion to a bridge that lay a few miles away. As a result, the trip would not tend to divert. By contrast, long-distance through trips would tend to have a greater tendency to divert, since the diversion route would tend to have a lower relative impact on the overall length of the trip.

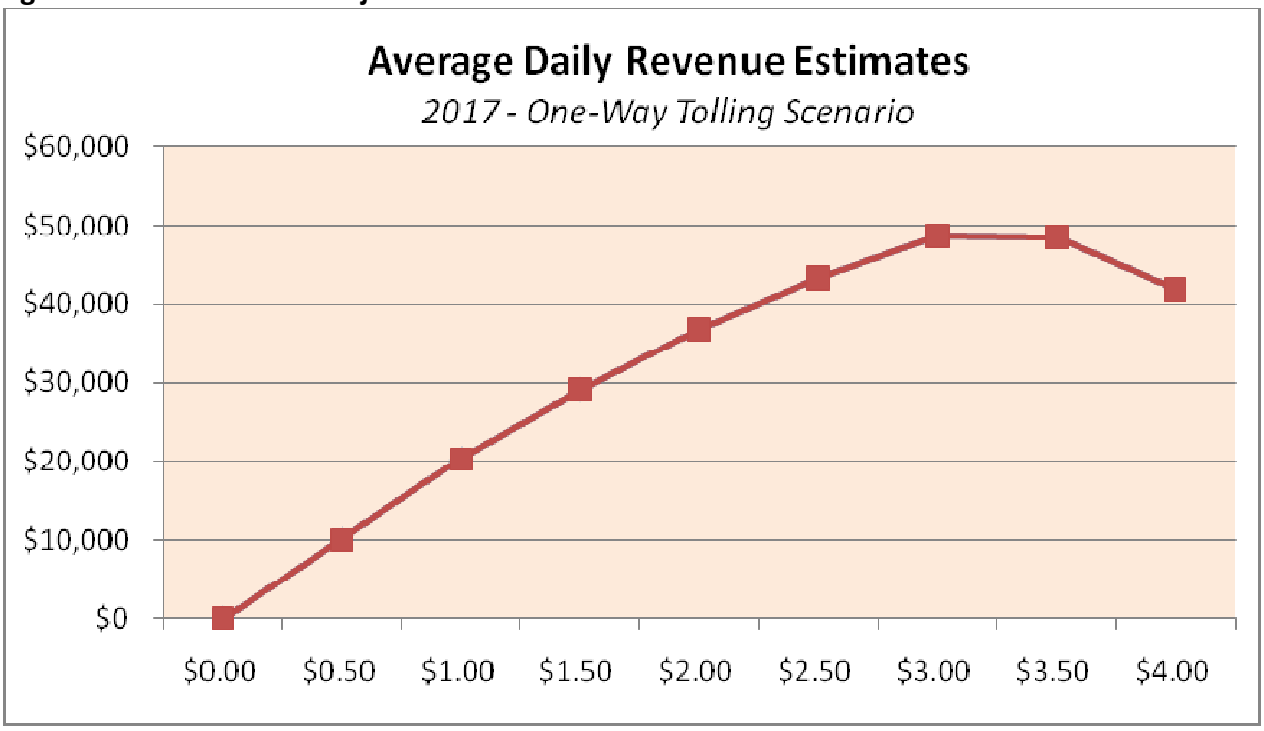
Figure 1 is reflective of HNTB's experience with similar bridges. For example, the Tobin Bridge in Boston has a $3.00 one-way toll, and the diversion rate is approximately 25 percent; this is consistent with the results forecasted by Figure 1.

However, it is also recognized that there can be a certain amount of uncertainty with respect to diversion. Therefore, as part of its risk analysis, HNTB considered the potential impact of a range of diversion rates. For one-way tolling, HNTB considered a diversion rate of between 13 percent and 33 percent, with an expected rate of 23 percent. For two-way tolling, HNTB considered a diversion rate of between 5 percent and 25 percent, with an expected rate of 15 percent. The diversion rate was lower for two-way tolling because the associated toll fare was also lower. In other words, lower toll fares tend to lead to lower rates of diversion.

However, since this study did not include a travel demand model or any bridge-specific demographic data, we must emphasize that these values are estimates. If more precise diversion estimates are required, then an origin-destination study would be in order. Another potential means of assessing diversion estimates would be to use the regional travel demand model that was used to support the SFEIS. However, an origin-destination study and a regional travel demand study are both beyond the scope of the St. Croix feasibility study conducted by HNTB. Diversion is a critical component of any revenue analysis. This is a high-level estimate; it is not a bonding-level computation.

Figure 2 illustrates how the various rates of diversion can impact the gross revenue that can be realized under a particular one-way tolling scenario. The graph reveals how the impact of diversion places a practical limit on the amount of revenue that may be realized at the St. Croix River Crossing. These revenue calculations are based on projected data for 2017.

Figure 2: 2017 Revenue Projections under Various Potential Toll Rates



As Figure 2 illustrates, a $3.00 toll appears to be the revenue-maximizing toll rate for one-way tolling. For higher toll rates, the impact of the higher toll rate is offset by the impact of traffic diverting away from the toll. In fact, under these assumptions, a toll of $2.50 would yield greater gross revenue than a toll of $4.00. Experience at other toll facilities seems to suggest that $3.00 is a reasonable toll for automobiles.

Table 4 summarizes bridge toll rates at other bridge facilities similar to the new St. Croix River Crossing. Each of these facilities must compete with adjacent crossings (within 10 miles) that are toll-free. It should be noted that all the bridges in this table (with one exception—WA-520 in Seattle) is a one-way toll. The toll on WA-520 is proposed to be a two-way toll, although the tolls have not yet been implemented.

Table 4: Toll Rate Summary at Comparable Bridges

Bridge	Agency	Est. AADT	Passenger Car Fare
Ben Franklin Bridge	Delaware River Port Authority	105,540	$4.00
Commodore Barry Bridge	Delaware River Port Authority	38,284	$4.00
Walt Whitman Bridge	Delaware River Port Authority	112,956	$4.00
Betsy Ross Bridge	Delaware River Port Authority	32,988	$4.00
Trenton-Morrisville – Route 1	Delaware River Joint Toll Bridge Comm.	50,700	$0.75
New Hope-Lambertville – Rte 202	Delaware River Joint Toll Bridge Comm.	11,800	$0.75
Interstate 78	Delaware River Joint Toll Bridge Comm.	56,700	$0.75
Easton-Phillipsburg – Route 22	Delaware River Joint Toll Bridge Comm.	38,300	$0.75
Portland-Columbia	Delaware River Joint Toll Bridge Comm.	7,400	$0.75
Delaware Water Gap – I-80	Delaware River Joint Toll Bridge Comm.	53,900	$0.75
Milford-Montague	Delaware River Joint Toll Bridge Comm.	7,700	$0.75
Memorial Bridge	Delaware River Bay Authority	96,000	$3.00
Tobin Bridge	MassDOT	70,000	$3.00 ($2.50 ETC)*
Peace Bridge	Buffalo and Fort Erie Public Bridge Auth.	16,150	$3.00 ($2.70 ETC)*
Lake Pontchartrain Causeway	Greater New Orleans Expressway Comm.	43,000	$3.00
Tacoma Narrows Bridge	Washington State DOT	80,000	$4.00 ($2.75 ETC)*
Newport Pell Bridge	Rhode Island Turnpike & Bridge Auth.	27,000	$4.00
Washington State Route 520 (WA-520) Floating Bridge	Washington State DOT (proposed rates only; facility not currently tolled)	115,000	$3.60 (peak)
			$1.60 (off-peak)

** ETC stands for "electronic toll collection". In other words, the rates labeled "ETC" represent rates charged to vehicles properly equipped with a valid transponder.*

In light of what is currently charged at other similar crossings, $3.00 seems to be a reasonable fare. At present, $4.00 seems to be the upper limit for most facilities.[12]

The decision concerning an appropriate passenger car fare must be supplemented by other assumptions pertaining to toll schedules to estimate total revenue. The assumptions employed in this revenue analysis include the following:

- Heavy truck fares are equal to four times the passenger car fare (4:1). Policies regarding the relationship between car fares and truck fares vary widely. The Tobin Bridge and the Tacoma Narrows Bridge both employ a ratio of 2.5:1. All of the Delaware River Port Authority facilities, as well as the Memorial Bridge, employ a ratio of approximately 7:1. The Delaware River Joint Toll Bridge Commission uses a still higher ratio of about 20:1. The ratio of 4:1 is a reasonable middle ground for the purpose of this analysis.
- Toll rates will increase at a rate of 2.5 percent per year.
- Transponder rates are assumed to be 10 percent lower than the video rate. A differential toll rate is common for all-electronic tolling facilities to cover the additional costs of handling video transactions as well as to promote the use of transponders. Note this differential is for planning purposes only; a final determination of recommended toll differentials would be the subject of a more detailed traffic and revenue study that lies beyond the scope of this effort.
- Video toll customers will be assessed fees for video billing. Up to three video bills are assumed to be sent to a customer for payment, with escalating fees to both cover the cost of the individual customer contact and to promote compliance on the first bill. Note these assumptions are purely planning assumptions to determine initial feasibility. The development of a more detailed fee schedule would be subject to future legislation and detailed analysis of toll operating concept options in conjunction with more detailed traffic and revenue analysis.
- The revenue model identified the volumes of video patrons (broken out by year). These volumes were used by the operations and maintenance (O&M) model to estimate: (a) the percentage of transponder users identified via video;[13] and (b) the percentage of video patrons who pay their video bill at each stage of the video billing process. This overall process yielded the total number of paid video transactions (as well as fees), which was then added back into the revenue model as part of gross revenue.
- Even though the proposed improvements that are part of the St. Croix River Crossing project extend to multiple interchanges beyond the limits of the bridge, only vehicles crossing the bridge will be tolled.

[12] The exceptions are the toll bridges in highly urbanized areas such as New York and San Francisco. In these locations, where tolls can reach up to $11, higher fares can be sustained by extremely high demand. In other words, high tolls can be charged in dense (and congested) urban settings because people are willing to pay them. This would likely not be the case for the future Stillwater Crossing, since the alternative crossings have sufficient capacity to handle traffic that might choose to divert around the toll.

[13] A small percentage of transponder users will be identified by video if the equipment fails to read the transponder, or if the patron forgets to properly mount his transponder.

- As noted earlier, two scenarios were considered: one in which a $3.00 toll was charged in one direction only, and a second in which a $1.50 toll was assessed to traffic in both directions. A diversion rate of 15.0 percent was used for the $1.50 toll rate, as compared to the diversion rate of 23.0 percent for the $3.00 one-way toll.

Bridge Capacity Constraints

As noted earlier in the report, the new St. Croix River Crossing will have two lanes in each direction. While this will be adequate for projected traffic levels over the next 20 to 30 years, it is possible that the facility could reach capacity within the 50-year horizon considered by this analysis absent active traffic management through tolling. Therefore, in order to forecast future traffic and revenue, it is necessary to make some assumptions regarding the capacity constraints that will be faced by the proposed bridge in the future. The assumptions incorporated into this analysis included the following:

- The peak directional volume supported by two lanes is approximately 3,750 vehicles per hour.[14]
- In the early years, peak-hour traffic (both directions combined) makes up 10 percent of daily traffic crossing the bridge. This share may gradually decrease to 8.5 percent over time, as the peak hour spreads into the hours adjacent to the peak hour.
- The bridge can carry a practical maximum of between 80,000 and 85,000 vehicles per day.[15]

Table 3 (presented earlier) showed the projected "toll-free" bridge crossing volumes, unconstrained by capacity. However, the combined effects of capacity constraints and the imposition of a toll will tend to reduce these projections over time. The anticipated effect of these factors is summarized in Table 5, which provides projected daily traffic volumes from 2017 through 2067. These "adjusted" volumes form the foundation of the revenue projections.

[14] This analysis did not consider the option of re-configuring the bridge during peak periods to devote three lanes to the peak direction and one lane to the off-peak direction. Such a configuration would also need to consider the ability of the roadway segments downstream to handle the additional volume of traffic in the peak direction.

[15] HNTB surveyed several 4-lane bridges (both tolled and non-tolled) throughout the country, focusing on dense urban areas where the capacity would be constrained. The maximum daily volumes tended to lie in the range of 65,000 to 90,000 vehicles per day.

Table 5: 50-Year Daily Traffic Projections for the New St. Croix River Crossing

Year	Projected Crossing Volume			Year	Projected Crossing Volume		
	Toll-Free, Unconstrained	2-Way Toll, Constrained	1-Way Toll, Constrained		Toll-Free, Unconstrained	2-Way Toll, Constrained	1-Way Toll, Constrained
2017	38,770	32,920	34,280	2043	64,710	54,940	57,210
2018	39,540	33,580	34,960	2044	66,000	56,040	58,350
2019	40,320	34,240	35,650	2045	67,310	57,160	59,510
2020	41,130	34,920	36,360	2046	68,650	58,300	60,690
2021	41,950	35,620	37,080	2047	70,010	59,440	61,900
2022	42,780	36,320	37,820	2048	71,410	60,640	63,130
2023	43,630	37,060	38,580	2049	72,830	61,840	64,390
2024	44,500	37,780	39,340	2050	74,280	63,080	65,670
2025	45,390	38,540	40,130	2051	75,760	64,320	67,076
2026	46,290	39,300	40,920	2052	77,260	65,600	68,095
2027	47,210	40,080	41,740	2053	78,800	66,920	69,159
2028	48,150	40,880	42,570	2054	80,370	68,240	70,236
2029	49,110	41,700	43,420	2055	81,970	69,600	71,339
2030	50,080	42,520	44,280	2056	83,600	70,980	72,477
2031	51,080	43,380	45,170	2057	85,260	72,400	73,641
2032	52,100	44,240	46,060	2058	86,960	73,840	74,831
2033	53,130	45,120	46,980	2059	88,690	75,491	76,059
2034	54,190	46,020	47,910	2060	90,450	75,988	77,316
2035	55,270	46,920	48,870	2061	92,250	76,492	78,600
2036	56,370	47,860	49,840	2062	94,090	77,002	79,924
2037	57,490	48,820	50,830	2063	95,960	77,519	81,278
2038	58,640	49,780	51,840	2064	97,870	78,044	82,508
2039	59,800	50,780	52,870	2065	99,820	78,575	83,102
2040	60,990	51,800	53,930	2066	101,810	79,114	83,705
2041	62,210	52,820	54,990	2067	103,830	79,660	84,317
2042	63,440	53,880	56,090				

Please note that Table 5 summarizes *total crossing* traffic, not *tolled* traffic. That is why the traffic volumes in the "1-Way Toll" column are slightly greater than the "2-Way Toll" column. In a 2-way tolling scenario, traffic diverts around the bridge in both directions, since tolls are assessed in both directions. In a 1-way tolling scenario, by contrast, there is no diversion in the untolled direction; therefore, the overall daily volumes tend to be slightly higher.

Revenue Analysis Results

Based on all the variables and assumptions noted in the preceding sections, a model was developed to forecast gross revenue for a 50-year period. The model was risk-based in that it accounted for potential variability in key assumptions. Specifically, the analysis accounted for potential variability in (a) the directional share of traffic, (b) the annual percentage of growth in traffic, (c) the overall share of crossing traffic served by the St. Croix River Crossing, (d) the percentage of heavy trucks, and (e) the rate of diversion.

The figures cited in Table 6 and Figure 3 represent 20th percentile revenue estimates, which is a commonly-accepted conservative estimate of revenue used to determine maximum bonding capacity. In other words, there is only a 20 percent chance that anticipated variations in the key variables noted in the preceding paragraph will yield a revenue estimate that is *lower* than the value depicted in Table 3. Or, stated another way, there is an 80 percent likelihood that the actual gross revenue will be greater than or equal to the figure in the table. Note that the values in the table represent escalated dollars (2.5 percent/yr.) which are expressed in thousands of dollars.

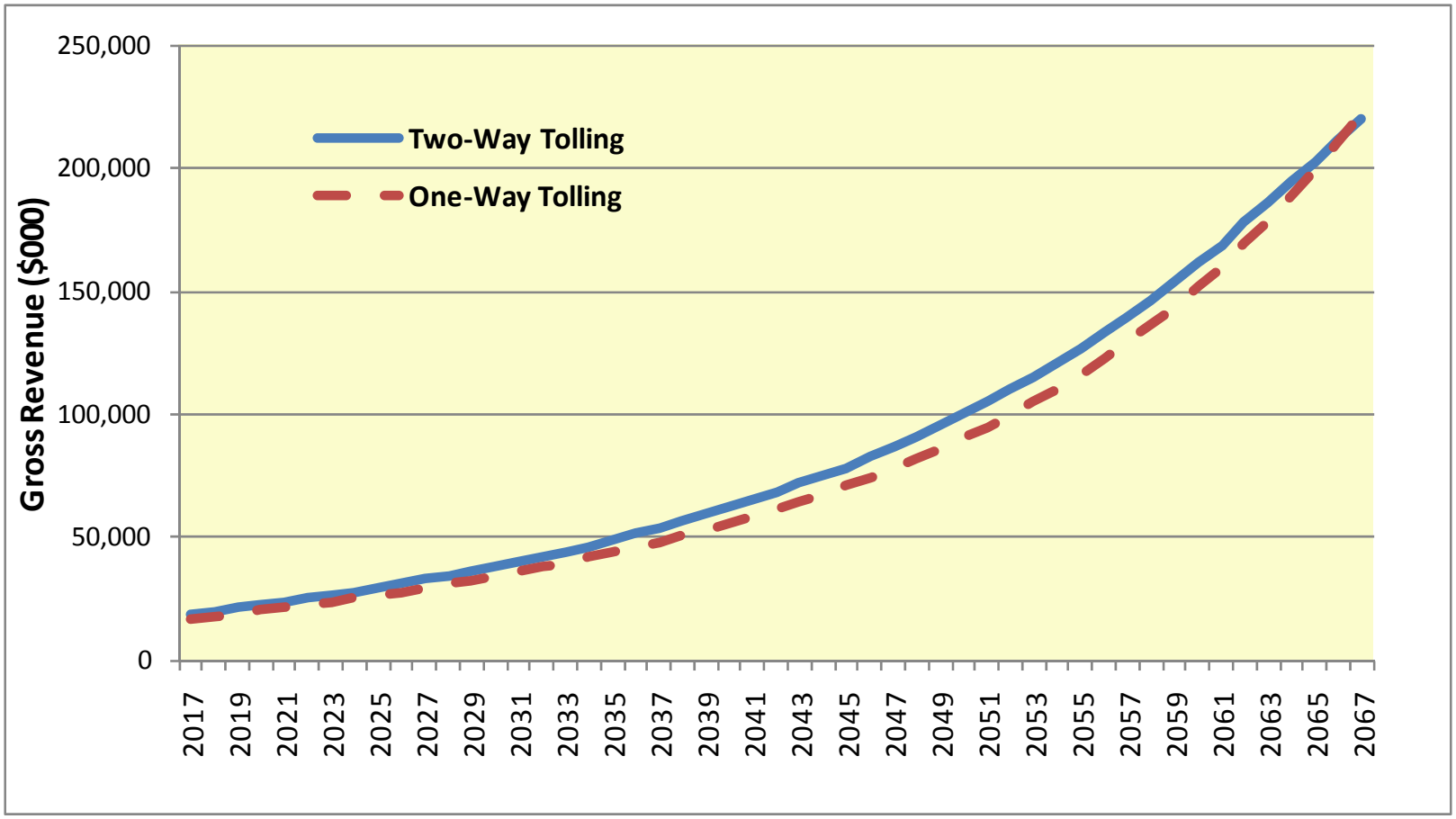
Table 6: 20th Percentile Annual Gross Revenue at the New St. Croix River Crossing
(Escalated $thousands)[16]

Year	Gross Revenue 2-Way Toll	Gross Revenue 1-Way Toll	Year	Gross Revenue 2-Way Toll	Gross Revenue 1-Way Toll
2017	19,049	17,086	2043	71,901	64,229
2018	20,093	18,030	2044	75,088	67,501
2019	21,163	19,001	2045	78,363	70,862
2020	22,276	20,244	2046	82,665	74,324
2021	23,986	21,293	2047	87,079	77,916
2022	25,179	22,624	2048	90,654	81,590
2023	26,412	23,733	2049	95,323	85,885
2024	27,686	25,145	2050	100,144	90,370
2025	29,609	26,309	2051	105,093	94,992
2026	30,942	27,798	2052	110,201	99,816
2027	32,971	29,332	2053	115,437	104,885
2028	34,376	30,895	2054	120,803	110,212
2029	36,478	32,482	2055	126,363	116,269
2030	37,944	34,098	2056	133,277	122,643
2031	40,135	36,073	2057	139,235	129,249
2032	41,658	37,775	2058	146,498	136,145
2033	43,971	39,507	2059	154,002	143,477
2034	46,346	41,637	2060	161,702	151,638
2035	48,776	43,820	2061	168,455	160,177
2036	51,287	45,715	2062	177,892	169,015
2037	53,864	48,048	2063	186,156	178,289
2038	56,521	50,431	2064	194,341	188,531
2039	59,237	52,890	2065	202,210	199,205
2040	62,072	55,778	2066	211,150	210,321
2041	64,956	58,393	2067	220,068	221,593
2042	67,934	61,472			

[16] To test the sensitivity of the analysis to the 20th percentile assumption an estimate of 40th percentile gross revenue was calculated as well.

- In the 2-way tolling scenario, gross revenue ranged from $19.9 million in 2017 to $227.2 million in 2067. On average, using the 40th percentile revenue for 2-way tolling was about **6 percent higher** than using the 20th percentile revenue.
- In the 1-way tolling scenario, gross revenue ranged from $18.0 million in 2017 to $235.5 million in 2067. On average, using the 40th percentile revenue for 1-way tolling was about **8 percent higher** than using the 20th percentile revenue.

Figure 3: 20th Percentile Annual Gross Revenue at the New St. Croix River Crossing
(Escalated $thousands)



As Table 6 and Figure 3 indicate, the two-way tolling scenario generates more revenue than the one-way tolling scenario over the analysis period. This is because fewer vehicles divert to alternative crossings under the two-way tolling scenario, because the toll is lower. However, in future years—that is, near the end of the 50-year study horizon—both scenarios are expected to generate similar amounts of annual gross revenue. This is because both scenarios eventually become constrained by the capacity of the bridge. Once that occurs, diversion ceases to be a factor with respect to revenue, and the relative advantage of two-way tolling disappears.

Summary

Based on all the variables and assumptions noted in the preceding sections, a model was developed to forecast gross revenue for a 50-year period for two scenarios: one-way tolling and two-way tolling. The model was risk-based in that it accounted for potential variability in key assumptions. Specifically, the analysis accounted for potential variability in (a) the directional share of traffic, (b) the annual percentage growth in traffic, (c) the overall share of crossing traffic served by the St. Croix River Crossing, (d) the percentage of heavy trucks, and (e) the rate of diversion.

This analysis estimates that in 50 years toll revenues grow from $17 to $19 million in 2017 to approximately $220 to $222 million of gross revenue in 2067, depending on one-way vs. two-way tolling (see Table 6 and Figure 3). These resulting revenues and the maintenance and operations costs (see Chapter 4) are then used in the financial capacity analysis of alternatives in Chapter 7.

Two-way tolling generates the most revenues. However, near the end of the 50-year study horizon, both the two-way and one-way tolling scenarios are expected to generate similar amounts of annual gross revenue. This is because both scenarios eventually become constrained by the capacity of the bridge. Once that occurs, diversion ceases to be a factor with respect to revenue, and the relative advantage of two-way tolling disappears.

4. Operations and Maintenance Costs

Operations and maintenance (O&M) costs were projected as part of the financial analysis to represent the ongoing expenditures to run the facility and keep the infrastructure in working order. For the purposes of this analysis, these costs included four general areas of O&M:

- General operations. These are costs typically associated with the general administration, operation, and overhead associated with a tolled facility.
- Toll operations. These are the costs associated with collecting revenue and enforcing toll violations where applicable.
- Routine maintenance. These are costs for regular activities to maintain the facility (such as litter pickup, snow removal, or railing repairs) that occur on a regular basis throughout a typical year of operations. Maintenance of toll equipment is also included.
- Major maintenance. These costs are for major maintenance repair or rehabilitation items that occur on a non-routine basis based on the life cycle requirements of a particular portion of infrastructure, such as joint replacement or deck wearing course replacement. In addition to infrastructure life cycle repair and replacements, toll system replacement is included.

Note that this model does not differentiate between who is responsible for operating and maintenance costs; it simply includes major maintenance as a cost that is incurred as part of the analysis. Responsibility would be defined in future agreements.

The O&M cost estimates have been developed based on data from Mn/DOT or industry information where appropriate. In some cases, where variables were not certain within the model or variability is likely, the analysis utilizes risk-based estimate techniques, whereby the range of variables are run through a series of iterations using FHWA-approved Monte Carlo simulation processes. These techniques are similar to the risk-based analysis required for projects involving federal assistance (such as TIFIA financing) for large projects. For the purposes of this estimate, the O&M costs that result in 80 percent certainty in the final values were utilized.

Industry practice generally utilizes the 70-80 percent certainty value, however lower values provide perspective on the sensitivity of the estimate and the difference associated with higher risk. Estimated costs based on the 60 percent certainty value were generally lower, but if used in the analysis present a 20 percent higher risk of costs exceeding the estimate.

Physical limits for estimating the operating and maintenance costs were assumed to include the river bridge only, from the joint connection between the bridge structure and the approach roadway pavement on the Minnesota side to the joint with the approach pavement on the Wisconsin side. The O&M does not include any approach roadways, including but not limited to the associated mainline roadways, frontage roads, interchange ramps, associated bridges, landscaping, drainage elements, or other roadside appurtenances.

The cost estimate includes assumptions regarding the toll collection system infrastructure, assuming a single all-electronic toll point located near or on the bridge (transponder and license plate/video tolling only) such that only movements crossing the bridge will be tolled.
The following are NOT included in the O&M activities and therefore NOT in the O&M cost estimate for the analysis.

- Routine maintenance of any infrastructure beyond the bridge limits noted
- Major maintenance of any infrastructure beyond the bridge limits noted
- Any ITS or security equipment O&M, including traffic management center staffing or equipment, roadside equipment such as cameras, traffic detection, threat detection or similar
- Law enforcement costs for patrols or other activities anywhere on the facility
- Safety patrols or motorist assistance patrols

General Global O&M Assumptions

- Project opens in fall 2016 (estimates start with 2017 as first whole year)
- 50-year projection
- Inflation rates
  - 4 percent inflation on major maintenance items (assume same as Mn/DOT construction inflation rate)
  - 2 percent inflation for labor related costs (assume rate closer to CPI for non-construction labor)
- All electronic tolling with integration into the current MnPASS transponder customer service operations
- Tolling will only involve the traffic that physically crosses the bridge. This could be a single toll point or multiple toll points, such that there is only one detection per crossing.
- Analysis is limited to two options:
  - One-way tolling
  - Two-way tolling

General Operations

General Operations include the following costs. Unless otherwise stated, costs are discussed in terms of 2010 dollars:

- General Administration and Management – While the initial scope of the project has not defined the details of administration and management staff required to operate the new facility, the cost estimate assumes the project will require additional professional management and administrative staff within Mn/DOT, assuming two full-time-equivalent staff. Staff could include part- or full-time facility management, finance,

public relations, legal, engineering, information technology or similar Mn/DOT personnel. This is presented as a placeholder until staffing is further defined for the project.

- Utility Costs – Electricity costs were included based on Mn/DOT data for the number of lights on the facility and the cost per year for electricity to run those lights.
- Insurance costs – Mn/DOT is currently self insured and detailed insurance requirements for the project were not part of the scope of this study. Typical insurances would involve any additional liability insurances, toll revenue disruption or other similar protections. At Mn/DOT's direction, no insurance costs were carried in this analysis.
- Professional Services – While the costs for third-party consultants or contractors related to the operation of the facility have not been fully defined, a placeholder amount for annual traffic and revenue work, engineering consultants, financial consultants, trustees, marketing, public relations, and similar services is included. The cost estimate includes a placeholder for $150,000 annually for marketing and $125,000 annually in other consulting services until a more detailed program definition is available.
- No cost is expected for public safety services since officers patrolling the roadway will also patrol the bridge.

Toll Operations

The cost of toll operations includes the cost of collecting tolls and enforcing violations where applicable. The project assumes all-electronic tolling whereby all tolls are collected either by a transponder mounted in the patron's vehicle (similar to the current MnPASS program) or via a video license plate toll. The latter is based on identification of the patron using a photo of the license plate on the vehicle that is matched to an address at the applicable department of motor vehicles. While this method is not currently employed by the MnPASS program, the general operation is common within the toll industry for either violation enforcement by agencies with traditional electronic toll collection or by agencies that have opened or converted to all-electronic tolling as a "video tolling" product.

The percentage of video toll operations costs of total toll collections operations costs depends on the percentage of users that decide to use video tolling. While no formal research was conducted on customer transitions to transponder usage, the assumptions include an increasing percentage of transponder users (decreasing percentage of video tolling) over time. From a transaction percentage perspective, in the initial opening year transponder use rate is estimated at about 55 percent of transactions, increasing to 80 percent in 15 years. From a cost perspective, this results in transponder based collection costs accounting for about 23 percent of the toll collection costs in the opening year, increasing to 45 percent of toll collection costs when the transponder usage rate reaches 80 percent. From another perspective, the average cost of handling a video transaction is about five times the cost of handling a transponder transaction. So the higher the transponder rate, the lower the projected toll operations costs.

The portion of toll operations that involves transponder-based toll collection assumes interoperability with the current Mn/DOT electronic toll collection program ("MnPASS") facilities and integration into the same operation as the current MnPASS customer service facility. The additional volume of valid transponder customers was projected based on transaction volumes from the traffic and revenue analysis converted to determine the number of additional MnPASS accounts. The cost to handle these additional accounts was based on the current MnPASS contract cost structure. The cost to handle these additional accounts is estimated at $350,000 to $450,000 annually (current dollars) in additional MnPASS service contract costs.

The MnPASS program was chosen as a readily available regional source of data, but it is also logical that a St. Croix Bridge system will be interoperable with the existing electronic toll collection program in the region.

Video customers were estimated based on the remainder of those transactions within the traffic and revenue analysis that would not be transponder-based. The cost to handle video customers was based on industry estimates, since there is no current video toll collection or violation notice experience in Minnesota. The process was modeled after a typical post-travel billing operation including:

- Image review of photographs taken to identify license plate number
    - Images either result in an acceptable image that can be used to identify the license plate number for owner lookup or the image may be rejected as unreadable. The latter is lost revenue at this point in the process. For the purpose of this analysis, the industry range of 10-20 percent (with a most likely value of 15 percent) for unreadable images was used.
- Department of motor vehicle lookups to determine registered owner in order to send them a bill
    - Lookups may generate sufficient information to send a bill to someone or may result in undeliverable bills or other factors associated with the quality of available data. The latter is lost revenue at this point in the process. This analysis assumes a range of 5-20 percent undeliverable mail (with a most likely value of 10 percent) based on industry experience but with higher potential on the higher end since no historical local information is available.
    - Since the location of the address can impact lookup costs (in-state versus out of state), and no information was available regarding these percentages, the modeling assumed 50-70 percent of the traffic would be "in-state". Note "in-state" simply refers to a consideration of those user addresses that would be more readily accessible (cheaper) for the operator to obtain. In practice, this could be a single state or multiple states if cross-jurisdictional agreements were in place.
- Given no tolling operational concepts have been yet developed for video tolling, the model assumed up to three levels of billing and payment processing with escalating fees

designed to potentially cover individual notice costs and promote earlier payment (first notice fee is less than the next)

  - First notice - $3 fee plus tolls (cover cost to produce and process notice)
  - Second notice - $6 fee plus tolls (cover cost to produce and process notice #1 and #2)
  - Third notice - $25 fee plus tolls (cover costs plus penalty).
  - Note there is no current legislation that sets fee and penalty structures, so these are planning level placeholders based on industry trends.

- Payment rates determine which tolls and fees are paid, which are then rolled into revenue forecasts (video bills paid = revenue)
  - Customer payment rate historical data was not available given the existing tolling in Minnesota does not include video based violation enforcement. Therefore, a range of industry payment rates using risk simulation were used for the model.
  - 1st invoice/notice assumed that 35-65 percent of the people noticed paid.
  - 2nd invoice/notice assumed 15-45 percent of the people noticed paid
  - 3rd invoice/notice assumed 10-30 percent of the people noticed paid

The overall result of the assumed combination of losses, including image quality (due to system, weather or patron), undeliverable mail and patrons not paying the bills is approximately 45 percent of the total video transactions not resulting in revenue. This underscores the importance of maximizing transponder penetration to minimize the impact of the losses associated with video on gross revenues, in addition to the considerations of the higher transaction processing costs.

Routine Maintenance

Regular maintenance activities for infrastructure were provided by Mn/DOT, covering preventative and routine bridge maintenance of approximately $75,000 per year and anti-icing at $320,000 per year (current dollars). A toll equipment maintenance estimate of $200,000 per year was based on industry data assuming a dedicated staff person to respond at industry-standard response times.

Major Maintenance

Costs for major life cycle repair and replacement items associated with major maintenance were based on a combination of Mn/DOT data and industry information. All costs reported below are presented in current dollars. The major maintenance items included in the cost estimate are:

- Special inspections every two years at $50,000 per inspection
- Bridge lighting replacement every 10 years at $200,000

- Toll system replacement every 10 years at a cost of $0.8 to $1.6 million assuming an in-kind replacement of components, keeping infrastructure and the global system design
- Replacement of the bridge deck wearing course ($2.9 million) and bridge joint replacement ($2.8 million) every 30 years
- Replacement of the extra-dosed bridge cables ($14.5 million) and bridge bearing replacement ($0.5 million) every 50 years
- Replacement of drainage components ($4 million) and rail repainting ($1.25 million) every 60 years

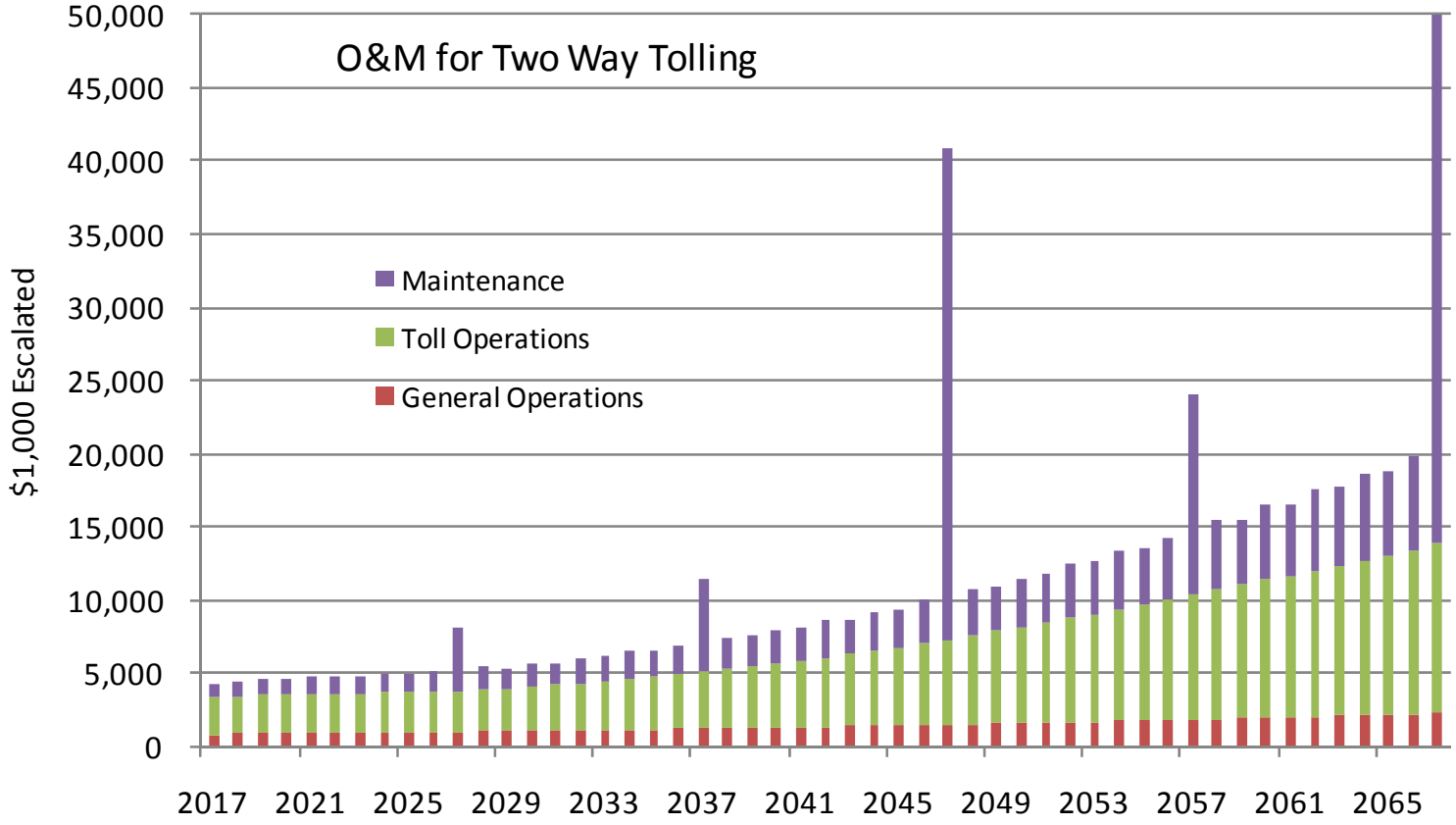
Major maintenance projections assume the costs for infrastructure repair or replacement will be realized at the intervals when the maintenance is needed. This results in significant "spikes" in the cost data at the time of these major maintenance projects. Once specific requirements are defined for concession options, the O&M cost responsibilities could be spread out based on constructability or financial planning needs.

Table 7 and Figure 4 show the summary of two-way tolling and one-way tolling operations and maintenance costs.

Table 7: Operations and Maintenance (O&M) Summary
(Escalated $1,000s)

	Two-Way Tolling Option				One-Way Tolling Option			
Year	General Operations	Toll Operations	Maintenance	Total	General Operations	Toll Operations	Maintenance	Total
2017	839	2,600	900	4,339	839	2,400	900	4,139
2018	855	2,600	1,000	4,455	855	2,400	1,000	4,255
2019	872	2,700	1,000	4,572	872	2,400	1,000	4,272
2020	890	2,700	1,100	4,690	890	2,400	1,100	4,390
2021	908	2,700	1,100	4,708	908	2,400	1,100	4,408
2022	926	2,700	1,200	4,826	926	2,400	1,200	4,526
2023	944	2,700	1,100	4,744	944	2,400	1,100	4,444
2024	963	2,700	1,300	4,963	963	2,400	1,300	4,663
2025	982	2,700	1,200	4,882	982	2,500	1,200	4,682
2026	1,002	2,800	1,400	5,202	1,002	2,500	1,400	4,902
2027	1,022	2,800	4,300	8,122	1,022	2,500	4,300	7,822
2028	1,043	2,900	1,500	5,443	1,043	2,600	1,500	5,143
2029	1,063	2,900	1,400	5,363	1,063	2,600	1,400	5,063
2030	1,085	3,000	1,600	5,685	1,085	2,700	1,600	5,385
2031	1,106	3,100	1,500	5,706	1,106	2,800	1,500	5,406
2032	1,129	3,200	1,700	6,029	1,129	2,900	1,700	5,729
2033	1,151	3,300	1,700	6,151	1,151	3,000	1,700	5,851
2034	1,174	3,400	1,900	6,474	1,174	3,100	1,900	6,174
2035	1,198	3,600	1,800	6,598	1,198	3,200	1,800	6,198
2036	1,222	3,700	2,000	6,922	1,222	3,300	2,000	6,522
2037	1,246	3,900	6,300	11,446	1,246	3,500	6,300	11,046
2038	1,271	4,000	2,200	7,471	1,271	3,600	2,200	7,071
2039	1,296	4,200	2,100	7,596	1,296	3,700	2,100	7,096
2040	1,322	4,400	2,300	8,022	1,322	3,900	2,300	7,522
2041	1,349	4,500	2,300	8,149	1,349	4,100	2,300	7,749
2042	1,376	4,700	2,500	8,576	1,376	4,200	2,500	8,076
2043	1,403	4,900	2,400	8,703	1,403	4,400	2,400	8,203
2044	1,431	5,100	2,700	9,231	1,431	4,600	2,700	8,731
2045	1,460	5,300	2,600	9,360	1,460	4,800	2,600	8,860
2046	1,489	5,600	2,900	9,989	1,489	5,000	2,900	9,389
2047	1,519	5,800	33,600	40,919	1,519	5,200	33,600	40,319
2048	1,549	6,000	3,200	10,749	1,549	5,400	3,200	10,149
2049	1,580	6,300	3,100	10,980	1,580	5,700	3,100	10,380
2050	1,612	6,500	3,400	11,512	1,612	5,900	3,400	10,912
2051	1,644	6,800	3,300	11,744	1,644	6,200	3,300	11,144
2052	1,677	7,100	3,700	12,477	1,677	6,500	3,700	11,877
2053	1,711	7,300	3,600	12,611	1,711	6,800	3,600	12,111
2054	1,745	7,600	4,000	13,345	1,745	7,100	4,000	12,845
2055	1,780	7,900	3,900	13,580	1,780	7,500	3,900	13,180
2056	1,815	8,200	4,300	14,315	1,815	7,800	4,300	13,915
2057	1,852	8,500	13,700	24,052	1,852	8,200	13,700	23,752
2058	1,889	8,800	4,700	15,389	1,889	8,500	4,700	15,089
2059	1,926	9,100	4,500	15,526	1,926	8,900	4,500	15,326
2060	1,965	9,400	5,100	16,465	1,965	9,200	5,100	16,265
2061	2,004	9,700	4,900	16,604	2,004	9,600	4,900	16,504
2062	2,044	10,000	5,500	17,544	2,044	9,900	5,500	17,444
2063	2,085	10,300	5,300	17,685	2,085	10,300	5,300	17,685
2064	2,127	10,600	5,900	18,627	2,127	10,700	5,900	18,727
2065	2,169	10,900	5,700	18,769	2,169	11,000	5,700	18,869
2066	2,213	11,200	6,400	19,813	2,213	11,400	6,400	20,013
2067	2,257	11,600	160,600	174,457	2,257	11,800	160,600	174,657

Figure 4: Forecast Operations & Maintenance Costs
($1,000s escalated)



Notes: This O&M chart represents a 2-way tolling option. Total O&M is approximately 5 percent lower for a 1-way tolling option (lower toll operations costs. The forecast reflects a sketch level analysis. Highest values represent more significant major maintenance costs required at these intervals and magnified by escalation. In 2067, the major maintenance cost is $160.6 million. See Table 7 for detailed annual costs.

Summary

This chapter analyzes, on a sketch level, the Maintenance and Operations costs for the St. Croix River Crossing. The cost categories include general operations, toll operations, routine maintenance and major maintenance. These costs are used in the financial capacity analysis of alternatives in Chapter 7.

In 50 years, the estimated annual maintenance and operations costs are estimated to be $22 million (see Table 7 and Figure 4). There are high cost years where significant major maintenance costs are required, such as replacing the cables or deck joints.

5. Public Private Partnerships (P3s)

Design-Build-Finance-Operate-Maintain Delivery Models

Public Private Partnerships (P3s) are contractual agreements between a public sector entity and a private sector entity that allow for increased private sector participation in public infrastructure projects. Design-Build-Finance-Operate-Maintain (DBFOM) delivery approaches allow public transportation owners the ability to accelerate and implement new projects while transferring many of the associated short-term and long-term risks to the private sector. The owner of a project will award a "concession" or long-term lease to the private entity to perform the required tasks of the project. The Concession Agreement defines the terms of the contract and explicitly states the roles and responsibilities of each party.

The advantages of a DBFOM include bringing new financing to the project and transferring risk from the owner to the Concessionaire. A major advantage of DBFOM delivery is the introduction of private equity into a transaction which can produce more upfront proceeds to fund the capital needs of a project. Additionally, private financing can eliminate the need for public debt and relieve the public of responsibility for underperforming project revenues. The design-build delivery component transfers construction and completion risk to the private sector and typically accomplishes cost and time savings. The operations and maintenance (O&M) responsibility in a concession transfers the long-term risk and cost of operating and maintaining the road in a state of good repair to the private sector.

DBFOM transactions can be structured in a variety of ways and can be tailored to meet the needs and objectives of the owner for a given project. Concessions can be executed for both tolled and non-tolled projects and the funding can be tied to tolls or other government sources. DBFOM transactions come in two main forms, defined by whether the private sector is assigned the revenue risk.

<u>Concession</u>

- Operates as a long-term lease in which the private sector is obligated to design, construct, finance, operate and maintain a toll facility over the life of the concession
- Private concessionaire bears the traffic demand and resulting toll revenue risk
- Tolls are collected and retained by the concessionaire as compensation for up front financing and risk assumption
- Can result in the concessionaire paying the public owner an upfront payment for the concession or may require a public subsidy to deliver the project depending on projections of traffic
- Also called Demand or Revenue-Risk Concession due to the traffic and revenue risk assumed by the concessionaire.

Availability Payment Transaction

- Public owner makes annual availability payments to concessionaire from a general source of government revenues based on the facility meeting the contractual operating and performance standards
- Facility can be tolled or non-tolled, and the private entity's compensation is not directly tied to the tolls on the facility
- If the facility is tolled, then the public owner would control the toll rates and keep all resulting toll revenue (public owner retains the demand and revenue risk)

Types of DBFOM Structures

Concession

The concession is the model that is most commonly associated with the term P3 since the first major concessions to garner headlines utilized this method. With this style of concession, the private entity agrees to develop, finance and maintain the project in exchange for the ability to collect and keep the associated toll revenues.

The concession transfers the maximum amount of risk to the private sector since the traffic demand and revenue risk (T&R) is borne by the concessionaire. If the value of the concession's forecasted cash flows are greater than the cost to develop the project, the concessionaire will pay the public owner an upfront payment (or "equity") for the right to operate the concession.

These concessions can be implemented for greenfield (no existing transportation facility) or brownfield (an existing facility) projects. For greenfield projects, the tolling revenue component funds construction for new facilities. For brownfields, the tolling revenue allows for an upfront payment ("monetization") of the value of the forecasted revenues for existing facilities.

These concessions are typically long-term contracts for 50 to 99 years. While these concessions can be for 35 years, the private sector prefers a minimum of 50 years to achieve tax and depreciation benefits of ownership status. The Concession Agreement will define the operating and performance standards for the road as well as the governing toll rate regime. It is typical for concessions to allow for annual toll rate increases, usually tied to a combination of a set floor (2 percent), the consumer price index (CPI), and the gross domestic product (GDP).

The goal of the private sector operator is to run the facility as a business and maximize revenue. The business mind set and desire to aggressively raise tolls to maximize the revenue potential is the major driver for unlocking the value potential of toll facilities. The inclusion of annual toll increases into the traffic and revenue forecast increases the revenue potential and the resulting value of the concession. On the other hand, public owned and operated toll facilities typically operate more on a cost recovery model and political considerations can temper agencies' ability to raise tolls and generate profits.

An equity component can allow a concession to produce more upfront funding than a traditional tax-exempt structure. Debt holders require extra protection or "coverage" for their investment and do not allow issuers to sell debt against every dollar of forecasted revenue. The cushion that this coverage requires is typically called "excess" or "surplus revenues" and flows back to the concessionaire or owner on an annual basis. The concessionaire values or monetizes (provides an upfront payment for) this riskiest portion of the Traffic and Revenue (T&R) forecast and provides that equity that traditional public debt cannot access.

In a concession, the private entity monetizes the excess portion of revenue that cannot support debt by providing an upfront equity payment to the public owner for the private entity's right to keep the excess revenues over the life of the concession. The private sector earns an Internal Rate of Return (IRR) of 10 to 16 percent (a typical return is 12 percent) for providing the up-front equity. Additionally, the private entity is more willing to take an aggressive view on the revenue forecast and in turn value the concession higher. While the typical returns of 12 percent seem excessive to many, the concessionaire is bearing the risk of the Traffic and Revenue (T&R) forecast being overstated.

Many concessions are structured with a revenue sharing provision so the public owner can retain some of the revenue if the facility performs above expectations. This structure is usually achieved by creating a revenue level above the T&R forecast and prescribing the percentage of revenues above that level that would be shared with the public owner. Another method is to share all revenues after the concessionaire has met a targeted Internal Rate of Return (IRR) figure, but this is more complicated to administer.

The table below outlines a few key benefits and considerations for Concessions.

Table 8: Concession Benefits and Considerations

Benefits	Considerations
• Maximizes risk transfer, including revenue risk, from public owner to private entity	• Public owner loses potential to retain any revenues that may exceed T&R projections
• Equity contribution by the Concessionaire delivers upfront proceeds to the public owner	• Control is governed by Concession Agreement for 35-99 years
• Allows concessionaire to bid aggressively on revenue forecast	• Concessionaire sets market based toll rates

<u>Availability Payment Transaction</u>

In an Availability Payment Transaction, the concessionaire does not have a claim to any project-related toll revenue but instead is paid an annual availability payment from separate governmental funds if the road is meeting the stated operational and performance standards. The concessionaire finances the cost to construct the facility and is paid annually by the government to repay the debt and operate and maintain the facility.

Since the concessionaire's compensation is not tied to toll revenues, the underlying facility does not have to be tolled. To fund this style of a concession, a department of transportation will usually pledge revenues from its Transportation Trust Fund. The source of funds could just as easily be an appropriation from a state's general fund or other revenue source.

Availability Payment Transactions can also function as a mechanism for public entities to achieve financing that is "off-balance-sheet" (when an entity cannot or does not wish to issue debt against current assets or revenues), although these payments would typically be treated as debt under Mn/DOT's debt policy.

Availability Payment Transactions allow projects to utilize DBFOM delivery even if they are not suited for tolling, due to such issues as mobility, politics, low traffic, or location. Projects that don't produce significant revenues or transit projects that operate with a deficit can benefit from an Availability Payment Transaction. Riskier construction (e.g., tunnels) or Operations and Maintenance (O&M) projects are also ideally suited for DBFOM delivery. Additionally, some projects are not designed for revenue maximization but rather to manage traffic flow. With an Availability Payment Transaction, the public owner can institute tolls on the facility, but choose rates that meet its objectives for traffic flow and speed rather than profit.

A Concession experiences concessionaire project revenue risk while an Availability Payment Transaction experiences government appropriation risk. The private sector is concerned about taking this risk on a long-term basis and looks to the public owner to put in place safeguards to help mitigate the potential that politics or the budgeting process would interfere with the annual appropriation.

The Florida Department of Transportation (FDOT) executed two Availability Payment Transactions in 2009. Its legislature passed a bill that prioritized these contractual payments after its own debt service but before any of its ongoing capital and maintenance program costs. California is utilizing an "upfront" or "continuous appropriation" method to ease private sector and investor concerns about the state's ability to make the annual availability payment.

The level of risk transfer to the private sector is reduced for an Availability Payment Transaction, since instead of relying on forecasted traffic and revenue forecasts for payment, the concessionaire is relying on a highly rated public entity to appropriate the fixed amount of money from its annual budget. The public owner has the revenue risk, since it would collect the tolls, not the private entity.

Partly because of the long-term appropriation risk to the private entity, the term for Availability Payment Transactions is typically 25 to 35 years. The cost of capital for Availability Payment Transactions are likely a little higher than if the public entity would bond for the projects themselves using their own credit, especially given the high cost of the equity component, but the transfer of risk to the contractor is a benefit received for the higher cost.

The table below outlines a few key benefits and considerations for Availability Payment Transactions.

Table 9: Availability Payment Transactions Considerations

Benefits	Considerations
• Risk transfer to private entity (cost, construction completion, O&M, but not revenue risk)	• Public revenue pledge to private entity, but more costly financing versus public issuing its own debt
• Allows for DBFOM delivery for projects with little or no revenue (public entity pays over time)	• Private entity's equity rate of return may be lower because the project revenue risk is on the public owner side

P3 Financing Mechanics

A concessionaire's financing package is comprised of debt and equity components. The financial goal of the concessionaire is to achieve the greatest amount of leverage (debt-to-equity ratio) possible and the lowest borrowing cost. The concessionaire will seek to maximize the amount of debt that the project can support and inject equity to reach the full value of the project. The equity component will vary based on the concessionaire's overall view of the project and its desired Internal Rate of Return (IRR), revenue forecast, and risk appetite.

Equity Component

Equity is typically required in DBFOM financings to help assure lenders that the developer remains committed to the project by having its own money invested and to provide a subordinate financing component below debt holders (lower priority claim to revenue). It is typical for the equity percentage to be between 20 to 30 percent of the total financing, although this ratio can be higher for greenfields where more risk is present or for very large transactions where the capacity of debt is limited (greater than $1 billion).

Investors will typically seek a 10 to 16 percent IRR on their equity investment, but this is subject to the risk of the project (traffic demand and construction) and the aggressiveness of the bidder. If a bidder is willing to take an aggressive or optimistic view on the revenue forecast, then the project will support a higher equity contribution and a larger contribution from the concessionaire. The equity component tends to be smaller for Availability Payment Transactions since traffic demand revenue risk is not present. Since the equity component is more expensive than debt, the overall cost of the borrowing will increase with the amount of equity. Investors will seek to extract their equity from a project as soon as possible through re-leveraging with debt.

Debt Component

The three main sources of debt for concessionaires are:

- The capital markets;
- Bank loans; and
- The federal Transportation Infrastructure Finance and Innovation Act (TIFIA) program.

The capital markets offer bond transactions for taxable debt or for tax-exempt debt through SAFETEA-LU's provision for private activity bonds (PABs). Capital markets debt typically must be rated Investment Grade to achieve a feasible borrowing cost. Bank loans are also a common form of debt in DBFOM projects and are usually offered by foreign banks. Bank loans do not require a rating, can be closed faster, and can contain more flexible provisions than bond transactions. However, bank loans are typically secured with a much shorter tenure than bond transactions, exposing the concessionaire to refinancing risk when the loan matures (durations typically range from 5-12 years).

The US DOT offers Transportation Infrastructure Finance and Innovation Act (TIFIA) loans on a competitive basis which can provide financing for up to 33 percent of the total development cost. TIFIA loans offer the lowest borrowing rate (set at the 30-year Treasury for State and Local Government Securities) and offer flexible repayment terms. The TIFIA program is currently under-funded and the availability of loans for future projects is uncertain. During the bid process, the concessionaire will analyze the cost component of each type of debt and choose the most economical at the time of financial closing. Mn/DOT currently has legislative authority to use TIFIA on a single-project pilot basis.

Comparison of P3s

Evaluation of past P3 projects can offer insight into the mechanics and rationale for different P3 structures. Since the profile, goals, and objectives of each project are unique, it is important to select the delivery method that provides the best value on a case-by-case basis. Twelve major transportation transactions have been executed in the past five years, including three in 2009. While the Chicago Skyway and Indiana Toll Road concessions were the impetus behind launching the U.S. P3 market, brownfield monetizations such as these have largely been replaced by greenfield project development. To provide perspective on the breadth and type of P3 transactions, Table 10 lists the major U.S. transportation P3s.

Table 10: Major US Transportation P3s

Financial Close	Project	State	Amt($m)	Term	Comment	Winner
Jan-05	Chicago Skyway	IL	2,415	99	Monetization[17]	Cintra/Macquarie
Jun-06	Pocahontas Pkwy	VA	820		Workout[18]	Transurban
Jun-06	Indiana Toll Road	IN	3,850	75	Monetization	Cintra/Macquarie
Nov-07	Northwest Pkwy	CO	600	99	Workout	Brisa
Dec-07	I-495 (Capital Beltway)	VA	1,010	80	Concession	Transurban/Fluor
Mar-08	SH-130 (5&6)	TX	1,380	50	Concession	Cintra/Zachry
Dec-08	Mid Currituck Bridge	NC	640	PDA[19]	Concession	ACS/Dragados
Mar-09	I-595	FL	1,760	35	Avail Pmt	ACS/Dragados
Oct-09	Port of Miami Tunnel	FL	760	30	Avail Pmt	Bouygues / Babcock&Brown
Nov-09	N. Tarrant Exprwy	TX	2,013	52	Concession	Cintra/Meridiam
Jun-10	I-635 (LBJ)	TX	2,700	52	Concession	Cintra/Meridiam
Jul-10	Eagle P3 Rail	CO	1,637	27	Avail Pmt	BalfourB/Fluor/ Macquarie

As the table above illustrates, Texas prefers the Concession model while Florida has chosen the Availability Payment Transaction model for its two recent P3s.

Concessions

TxDOT, I-635 LBJ Expressway and North Tarrant Expressway Projects

TxDOT utilizes Comprehensive Development Agreements (CDAs) to enter into P3 contracts for design-build and DBFOM projects. Both the $2.7 billion I-635 LBJ Expressway Project and the earlier $2 billion North Tarrant Expressway Project were structured very similarly as 52-year Demand Risk Concessions and transfer full cost, completion, O&M, and revenue risk to the private sector. The Cintra/Meridiam team won both of these DBFOM concessions with Cintra owning the majority stake, and Meridiam and the Dallas Police and Fire Pension System participating at lower percentages. While Canadian pension funds have invested directly into infrastructure assets for a long time, these projects are the first two instances of a U.S. public pension fund entering into an equity position.

The I-635 LBJ Expressway is a 17-mile project to improve I-35 and I-635 in Dallas. A multi-level highway, including several miles of depressed lanes, it offers drivers the ability to utilize the non-tolled or free general purpose lanes or to bypass congestion for the tolled high-speed

[17] Monetization means up-front payment or equity

[18] Workout describes concessions that replaced an underperforming asset and financing

[19] "PDA" is a Pre-Development Agreement concession where the private concessionaire works with the owner on pre-construction activities prior to signing/negotiating the long-term concession.

managed lanes. The managed lanes will be dynamically tolled and can be adjusted every five minutes to achieve average speeds of 50 mph with HOV2+ users receiving a discount. The initial toll rate will be capped at 75 cents/mile and will be adjusted with CPI.

Table 11: Example of a Concession P3 Funding Structure

TxDOT I-635 LBJ Funding Details ($m)	
Senior Debt (PABs)	615
TIFIA	850
Private Equity	665
Public Contribution	496
Total	2,626

The project was financed with tax-exempt Private Activity Bonds (PABs), a TIFIA loan, private equity, and a public contribution. The $615 million of senior debt PABs with a 30-year maturity was an important accomplishment for a BBB-rated credit in the tax-exempt debt markets.

The high-dollar project features difficult construction in a dense area and has considerable revenue risk due to the uniqueness of the HOV managed lanes. Managed lane projects are a relatively new concept and very few have been financed in the debt markets. The adjacent regional tolling authority, North Texas Turnpike Authority, had a first right of refusal to develop the project on its own but it declined mainly due to the risks associated with a managed lanes project. The concession approach for the I-635 LBJ Expressway transferred considerable construction and revenue risks to the private sector and delivered a $2.7 billion project (without counting the cost of O&M) to the region and only required $496 million of public funds. The concession agreement also allows TxDOT to share in revenues once the concessionaire achieves a certain IRR.

Availability Payment Transactions

FDOT, I-595

Florida proceeded with the first two large Availability Payment Transactions in 2009 for the $900 million Port of Miami Tunnel Project and the $1.8 billion I-595 Project. Both of these transactions utilize annual availability payments from FDOT as the sole security. The Florida legislature bolstered the credit strength of their annual availability payment pledge by prioritizing the contractual payments right after FDOT's own debt service obligations and before its ongoing capital and maintenance program. The legislative commitment of elevating the status and reliability of the payments was critical for investors and USDOT (TIFIA) to accept the political appropriation risk.

The I-595 Project in central Broward County consists of reconstructing and widening the I-595 mainline along with the associated frontage roads and ramps, with a total project length of 10.5 miles. The bidding team of ACS Infrastructure Development won the 35-year Availability Payment Transaction. The $1.7 billion financial package consisted of a $780 million commercial bank loan from 12 banks, $678 million TIFIA loan and $210 million in equity. The concessionaire

will not receive any availability payments until construction is complete and is subject to annual deductions if certain maintenance performance methods are not achieved.

The I-595 Project will have tolls; however, FDOT chose to use the Availability Payment Transaction method to deliver the project so it could retain control of toll rates and traffic flow. FDOT could have chosen to transfer the revenue risk of the project to the private sector through a traditional concession but wanted to operate and control the corridor to manage traffic through-flow with the toll levels versus maximizing revenue. By retaining the traffic demand risk, FDOT will keep all toll revenues and the resulting revenue upside reward or downside risk.

Table 12: Example of an Availability Payment P3 Funding Structure

FDOT I-595 Project Funding Details ($m)	
Senior Debt (Bank Loan)	780
TIFIA	678
Private Equity	208
Total	1,666
FDOT makes annual availability payments of $66m	

The concessionaire originally planned to use tax-exempt Private Activity Bonds for the debt portion, but the financial markets at the time could not support the size of the offering. While commercial bank loans typically have a higher interest rate, they can be executed quickly and can contain flexible terms. The interest rate on the commercial bank loan will begin to step up in year five and must be refinanced before year ten.

Summary

Public Private Partnerships (P3s) are contractual agreements between a public sector entity and a private sector entity that allows for increased private sector participation in public infrastructure projects. Design-Build-Finance-Operate-Maintain (DBFOM) delivery approaches allow public transportation owners the ability to accelerate and implement new projects while transferring many of the associated short-term and long-term risks to the private sector.

A major advantage of DBFOM delivery is the introduction of private equity into a transaction which can produce more upfront proceeds to fund the capital needs of a project. Additionally, private financing can eliminate the need for public debt

This analysis compares two types of P3s: the Concession and the Availability Payment Transaction. The following is a brief description of each.

<u>Concession</u>

- Operates as a long-term lease in which the private sector is obligated to design, construct, finance, operate and maintain a toll facility over the life of the concession

- Private concessionaire bears the traffic demand and resulting toll revenue risk
- Tolls are collected and retained by the concessionaire as compensation for up front financing and risk assumption
- Can result in the concessionaire paying the public owner an upfront payment for the concession or may require a public subsidy to deliver the project depending on projections of traffic
- Also called Demand or Revenue-Risk Concession due to the traffic and revenue risk

Availability Payment Transaction

- Public owner makes annual availability payments to concessionaire from a general source of government revenues based on the facility meeting the contractual operating and performance standards
- Facility can be tolled or non-tolled, and the private entity's compensation is not directly tied to tolls on the facility
- If the facility is tolled, the public owner would control the toll rates and keeps all resulting toll revenue (public owner retains the demand and revenue risk)

This analysis compares the advantages and considerations for each of these types of P3s (see Tables 8 and 9). It also gives examples of both types of P3s that have been implemented in the United States. The financing capacity analysis in Section 7 provides a more in-depth analysis of the feasibility of P3 approaches for the St. Croix River Crossing.

P3s can be a valuable project delivery tool, but their applicability must be evaluated on a case-by-case basis. The financial capacity of the project and its owner, along with the project type and risk profile, are key factors in selecting the optimal project delivery method. P3s have been successfully used in the U.S. and throughout the world to accomplish specific goals of the public owner.

6. Value Capture

For this report, the value capture analysis is focused on the Minnesota side of the St. Croix Bridge only.

Value capture is an emerging tool used in infrastructure funding and finance. The concept of value capture is simple. Access points to new transportation infrastructure have long been known to create land value premiums for property that directly and indirectly benefit from this access. The creation of a new interchange, a new highway, or a new transit station, for example, create private land development opportunities by immediately improved access to local, regional, or national markets. Local governments have long used their own tools to capture this value including tax increment financing, business districts, or special fees. These revenues can be used for a range of investments, including infrastructure improvements to support private development and redevelopment.

The use of value capture techniques by state and regional agencies to fund infrastructure programs is becoming more prevalent. For example, in the construction of the Southwest Parkway in Fort Worth, Texas, the City of Fort Worth created a 450-acre tax increment finance district capturing the value of new access created by the corridor and providing $125 million for infrastructure financing. In the Atlanta region, the public transportation agency MARTA is participating in the implementation of a Tax Allocation District (TAD) on the 22-mile BeltLine commuter rail project. In the State of Georgia, a TAD is the statutory mechanism used to implement Tax Increment Finance Districts (TIFs). This 6,500-acre TAD creates a “beltline” around the City of Atlanta. A portion of the funds generated by the TAD are projected to generate $1.7 billion for infrastructure financing. The cost of the BeltLine rail project is estimated to be $2.8 billion.

Mn/DOT and the University of Minnesota, Center of Transportation Studies, have studied alternative program delivery options and their applicability to Minnesota projects. These options attempt to capture the benefits accruing to travelers or land owners from the increased accessibility that new transportation infrastructure provides.

An analysis prepared for the Minnesota Legislature by the University of Minnesota, Center for Transportation Studies, “Value Capture for Transportation Finance” (June 2009), presents alternative value capture policies for transportation infrastructure. These policies were used to evaluate whether the St. Croix River Crossing project is a good candidate for alternative value capture approaches to support project financing. The evaluation focused on the Minnesota approach to the St. Croix River Crossing and determined that this project is not a good application for the value capture techniques. The reasons for this conclusion are discussed below.

The Minnesota side of the project largely represents reconstruction of the existing roadway and bridge. Major cross streets and intersection configurations (Oakgreen/Greeley Avenue and Osgood Avenue) remain at-grade. Further, within the study area, the corridor is already developed as a retail and commercial service corridor. While several vacant parcels exist, and

there are some apparent opportunities for redevelopment, the value capture potential from these sites is negligible in relation to the financing needs of the project. It is noteworthy that a portion of the corridor is already encumbered by a tax increment finance district established and administered by the City of Stillwater.

A brief assessment was made of the applicability of eight value capture policies discussed as part of the Center for Transportation Studies work on the St. Croix River Crossing project. Portions of "Value Capture for Transportation Finance" report to the Minnesota Legislature, (University of Minnesota, Center for Transportation Studies, June 2009) defining these policies are reproduced below followed by a brief assessment of potential applicability to the St. Croix River Crossing.

Value Capture Tools

Tax Increment Financing (TIF)

"Tax increment financing uses taxes levied on the increment in property value within a development to finance development-related costs. Tax increment financing is most commonly used by local governments to promote housing, economic development, and redevelopment in established neighborhoods. Tax increment financing has been used, however, in some instances to finance transportation projects. The paucity of evidence on the effectiveness of TIF districts for transportation purposes makes it difficult to evaluate the efficiency of this tool. Evidence from Chicago suggests that, in certain cases, the increment in property value that can be captured from a transportation improvement may be large, though this case involved some unique circumstances (e.g., a heavy rail system in a very dense, central city area). While TIF districts may promote benefit equity, they may raise some unique issues related to geographic equity, as some overlapping jurisdictions (e.g., school districts) often do not share in the benefit from a TIF district. TIF districts may be limited to specific projects and one-time capital costs. TIF districts may be politically feasible, as they are perceived to promote projects that "pay their own way." To adopt tax increment financing for transportation purposes in Minnesota, the authorizing statute (469.175) would need to be amended to add the Minnesota Department of Transportation (Mn/DOT) and Metro Transit (or its parent agency, the Metropolitan Council) to the list of authorized users.".

Assessment - This form of financing is authorized in Minnesota for municipalities, but does not have much potential for use on the Minnesota portion of the St. Croix River Crossing project. A portion of the study corridor on the Minnesota side is already encumbered by a TIF district in the City of Stillwater. TIF is widely used for public infrastructure projects, but Mn/DOT does not have TIF authority.

Special Assessments

"Special assessments impose charges on property owners near a new or improved transportation facility based on geographic proximity or some other measure of special benefit. Various methods have been used to determine which properties receive special benefit and how to allocate charges among these beneficiaries. Some of these methods include measurement of distance from an improved facility, property frontage adjacent to an improved

facility, and property acreage. Special assessments generally promote economic efficiency and equity along several dimensions. However, given the location-specific nature of the mechanism, the amount of revenue generated in each instance is relatively small and limited in use to initial capital costs. Political feasibility may be an issue with special assessments, as they are highly visible to affected property owners. In Minnesota, special assessment districts are currently limited to local units of government and are not authorized for application to interstate highways. Allowing the establishment of special assessment districts for transportation purposes would require amendment of state statutes to allow state and regional agencies as authorized users, and to allow special assessments to be applied to interstate highways and other public transportation facilities."

Assessment - Special assessment districts, or benefit districts could be a viable finance tool for application in the St. Croix River Bridge area. However, current enabling legislation would require engaging in an intergovernmental arrangement with local taxing bodies such as the City of Stillwater, the City of Oak Park Heights, and Washington County for the creation and management of a benefit district. In this arrangement, Mn/DOT would be the beneficiary of local tax proceeds. To that end, local governments must be motivated by the improvements to participate voluntarily. As noted above, the second option would be to grant Mn/DOT authority for the creation of special assessment districts. Special assessment or benefit districts are already widely used in the twin cities area. The following web link to the City of Minneapolis' web site demonstrates the tool is used for a variety of projects including streets and related improvements, utilities and facilities (see http://www.ci.minneapolis.mn.us/special-assessments/improvements.asp).

Development Impact Fees

"Development impact fees are one-time charges collected by local governments from developers for the purpose of financing new infrastructure and services associated with new development. They are similar to negotiated exactions in that they are charged primarily to new development to help recover growth-related, public service costs, but differ in that impact fees can be levied for off-site services, such as local roads, schools, or parks. The efficiency of impact fees can be established to the extent that they pass along the marginal costs of land development, including the provision of transportation infrastructure, to the primary beneficiaries. Impact fees promote benefit equity, but may have other undesirable equity effects if developers cannot recover the costs associated with impact fees and are forced to abandon low- and moderate-income segments of the housing market. Impact fees are not a primary source of revenue for transportation in most jurisdictions, but can help finance the share of transportation budgets attributable to new development. They are also aided by the fact that they are politically and administratively feasible. For development impact fees to be adopted more widely in Minnesota, specific, state-level legislation would need to be passed authorizing their use. The fees authorized by this legislation would need to ensure a nexus between the charges and legitimate state interest, and also ensure a degree of connection between the charges imposed on a specific development and the impact of that development."

Assessment - Development impact fees could be used, but have the greatest potential for revenue generation where significant new real estate development has been planned. Given the fact that the corridor and community area on the Minnesota side of the St. Croix River is largely developed, the potential for significant fees is limited even if legislative authority existed.

Negotiated Exactions

"Negotiated exactions are functionally similar to development impact fees, with the exceptions that they are not determined through a formal, formulaic process and are typically not applied to off-site infrastructure provision. Exactions can take the form of in-kind contributions to local road networks, parks, or other public goods as a condition of development approval, or can be requested in the form of in-lieu fees. Exactions generally promote economic efficiency and social equity. In most cases, negotiated exactions should be seen as a supplemental source of revenue, rather than a large-scale replacement for more traditional sources of revenue. Negotiated exactions are generally politically feasible, as they are seen as a way to make new residents "pay their own way."

Assessment - The prospects for negotiated exactions are stronger where there is new access and where investment opportunities would likely draw investor/developer interest. Limited potential is seen on the Minnesota side of the crossing given that little change in the current access configuration of the corridor will result from the project and the adjacent area is already largely developed.

Joint Development (JD)

"Joint development, as typically applied in discussions of value capture, refers to the spatially coincidental development of a transportation facility (e.g., a public transit station) and adjacent private real estate development, where a private sector partner either provides the facility or makes a financial contribution to offset its costs. The term "joint development" (JD) could also be used to refer to joint timing of development or ownership of transportation infrastructure, though for the purposes of this report, the above definition is used to refer to various forms of cost-sharing or revenue-sharing arrangements. JD arrangements generally promote efficiency, as the voluntary nature of the transaction ensures that the expected benefits of the private sector partner exceed the cost (or share of costs) of the transportation improvement that he or she anticipates. This characteristic also promotes benefit equity among participants. Since the nature of JD arrangements is often location-specific, the tax base is rather narrow and the amount of revenue generated is relatively small. Joint developments are often politically feasible, due to their narrow impact, but entail a higher degree of administrative complexity."

Assessment - The potential for cost-sharing on this project appears small on the Minnesota side of the crossing since the corridor is substantially developed and investors/developers already anticipate the benefits from the current design will come without cost to them. The Twin Cities has had experience with joint development, but to date it has been focused around transit supportive land use opportunities as part of the growing transit system in the region. Plans for the downtown Minneapolis multi-modal transit station call for the use of joint development techniques leveraging developer investments in the station (See

www.ci.minneapolis.mn.us/planning/docs/Multi-Model.pdf). These principles easily transfer to roadway transportation projects where there is potential developer interest.

Land Value Tax (LVT)

"Rather than being assigned to a specific project, land value taxes more generally capture the value created by the provision of public goods, including the accessibility afforded by transportation networks. A tax on land would be preferred to a tax on buildings, as the former would result in less economic distortion due the fixed supply of land. A pure tax on land is possible, though rarely used. While land value taxes are desirable from the standpoint of economic efficiency and sustainability, they would most likely be slightly regressive in terms of ability-to-pay. Further, land value taxes may prove politically challenging due to high visibility and potential unpopularity."

Assessment - The use of this tool is unlikely for the St. Croix Bridge. The use of land value taxes is uncommon, and Minnesota does not currently offer legislative authority to implement this approach.

Transportation Utility Fees (TUF)

"Transportation utility fees derive from the notion that transportation networks can be treated like a utility, similar to other local services such as water and wastewater treatment, which are financed primarily from user charges. Transportation utility fees are assessed on characteristics thought to be more closely related to transportation demand than property taxes, which currently account for a large share of local transportation revenues. Utility fees have the potential to improve efficiency by shifting the cost burden from residential to commercial and industrial properties, which tend to consume more transportation services than their relative tax contributions would imply. In principle, transportation utility fees could help promote equity, but only if a link can be established between the various characteristics that form the basis of utility fees and the value of the benefits received from consumption of transportation services, a link that in the past has not been strongly established. The revenue from transportation utility fees would be relatively stable, as the demand for travel is not terribly sensitive to cyclical economic trends. Transportation utility fees are politically feasible, as shifting the cost burden to non-residential properties would most likely be popular among existing residents of a jurisdiction. Enforcement of utility fees may prove difficult, as it would be hard to deny transportation services to a delinquent property owner."

Assessment - The use of this tool is unlikely for the St. Croix Bridge. Minnesota does not currently offer legislative authority to implement this approach.

Air Rights

"Air rights are a form of value capture that involves the establishment of development rights above (or in some cases below) a transportation facility that generates an increment in land value. Air rights agreements promote efficiency to the extent that the increment in land value generated by the facility exceeds the cost of its development. The sale of air rights may also promote benefit equity, since the costs of a transportation improvement can be allocated more proportionally among non-user beneficiaries. Similar to joint development, air rights

agreements tend to provide a narrow tax base and a relatively small amount of revenue, though they can provide some or all of the initial capital costs of a specific project. The narrow scope of impact of air rights projects indicates that they should be politically feasible, though they share some of the administrative complexities associated with joint development arrangements."

Assessment - This tool is most useful in areas of intense development where land values are very high and justifies the high cost of developing the space over or under a highway or transit facility. The land values in the area of the St. Croix River Crossing Project make use of this tool unlikely.

Summary

The proposed St. Croix River Crossing does not offer significant real estate value capture opportunities on the Minnesota side of the crossing largely due to the fact that: 1) proposed improvements are within an existing travel corridor alignment with no new access points or major system reconfiguration; and 2) the land areas surrounding the corridor to which this bridge will benefit are largely developed.

While local conditions and circumstances in any transportation project will provide variable opportunities, in general, Minnesota could generate a greater share of revenue from real estate based value capture techniques in the following circumstances:

- Reconstruction of an existing urban or rural corridor could produce significant new real estate value capture opportunities provided the reconstruction offers new access opportunities to the facility in locations where there is real estate reinvestment interest.
- The development of new access points in largely undeveloped areas can provide significant new value capture opportunities particularly where real estate markets are strong. Mn/DOT would have the greatest flexibility in the design of the facility to serve both travel/access needs and development opportunities in vacant land situations.
- Successful value capture assumes proximity to growing and sustained real estate markets that will support private investment. Urban corridors, with more concentrated and intensive development and with more predictable real estate markets would tend to offer the greatest return from these financing techniques.

Among those tools likely to be used in Minnesota, tax increment financing would be expected to be utilized in existing developed areas as a redevelopment finance tool. The other tools including special assessments, development impact fees, negotiated exactions and joint development could work with the circumstances listed above and with enabling legislation.

7. Financial Capacity

A financial feasibility analysis is frequently performed to help evaluate the viability of a project and the optimum delivery mechanism. A preliminary traffic and revenue study was performed to identify the revenue potential of tolling for the St. Croix Bridge and a corresponding forecast of the operations and maintenance (O&M) costs for the facility was developed to evaluate the ongoing costs for the project. With the revenue and cost components of the project identified, a financial valuation study was completed to ascertain the potential upfront financing capacity for the projected cash flows. A preliminary feasibility percentage is derived by dividing the amount of financing capacity by the capital cost of the project. This percentage dictates the degree to which the project is self-supporting or needs a public subsidy to fully fund the costs of construction.

The analysis identifies the upfront financing capacity for the project under a 50-year DBFOM Concession and performs a Public Sector Comparator to evaluate the upfront financing potential for comparable traditional public toll financing. The P3 financing capacity utilizes senior debt, TIFIA, and private equity, while the public sector model utilizes tax-exempt debt and TIFIA.

Mn/DOT could also choose to finance the project using its traditional debt method of General Obligation State Trunk Highway Bonds. This report did not quantify that bonding approach but instead focused on an apples-to-apples comparison of toll financings. Project toll financings, whether public or private, are structured quite differently from GO Trunk Highway Bonds. For instance, Minnesota issued GO Trunk Highway Bonds in August of 2010 with a final debt maturity of 20 years and achieved an impressive 20-year interest yield of 4.00 percent. Toll project bonds on the other hand are frequently issued with terms of 30 to 40 years with interest yields of 6.00 to 8.00 percent. Currently Mn/DOT has identified Chapter 152 bond funds and other state and federal funding as the source for funding its share of the St. Croix River Crossing.

Capital Costs

Mn/DOT provided capital cost estimates for the project in current-year dollars along with a forecasted expenditure curve. This study escalated the capital costs to their expected year of expenditure utilizing an inflation forecast provided by Mn/DOT. The table below displays escalated capital costs of the project.

Table 13: Escalated Capital Costs

Year	Assumed Escalation rate	Total Mitigation	Bridges & Approaches	Landscaping	Total Escalated Costs
2011	0 percent	$2,500,000	$0		$2,500,000
2012	2 percent	$367,202	$0		$367,202
2013	4 percent	$7,250,000	$24,404,964		$31,654,964
2014	5 percent	$1,200,000	$115,726,045		$116,926,045
2015	5 percent	$1,898,670	$248,372,501		$250,271,171
2016	4 percent	$2,122,594	$216,094,250		$218,216,844
2017	4 percent	$11,615,999	$0	$10,284,570	$21,900,569
Total		**$26,954,465**	**$604,597,760**	**$10,284,570**	**$641,836,795**

Note: Bridge and Approach costs include engineering and right-of-way

P3 and Public Toll Financing Approaches

The table below outlines the assumptions for the P3 and Public Toll Financing approaches that were analyzed in addition to displaying Mn/DOT's traditional debt approach.

Table 14: Summary of Financing Assumptions

Summary of Financing Assumptions			
	P3 Toll Financing	**Public Toll Financing**	**Mn/DOT GO Trunk Highway Bonds**
Term of Analysis	50 yrs	50 yrs	50 yrs
Debt Length	40 yrs	40 yrs	20 yrs
Senior Debt	PABs*/Bank Loan	Toll revenue bonds	GO Bonds
Federal Loan	35-yr TIFIA	35-yr TIFIA	N/A
Minimum Sr. Debt Coverage	2.00x	2.00x	N/A
Minimum TIFIA Coverage (ratio of revenues to bonds)	1.35x	1.20x	N/A
Private Equity	12 percent IRR	N/A	N/A

** PABs (Private Activity Bonds*

Our preliminary analysis evaluated the potential financing capacity for tolling that relies on collecting tolls in only one direction (one-way) as well as toll collection in both directions (two-way). For the Public Sector Comparator, the financing capacity was evaluated for both a "Net Revenue" Pledge[20] as well as for a "Gross Revenue" Pledge.

The Net Revenue Pledge assumes that O&M is "netted out" or subtracted from the toll revenues to determine financing capacity while the Gross Revenue Pledge assumes that every dollar of toll revenue collected can be pledged to debt holders and that O & M will be publicly funded from other revenue sources. In order to utilize a Gross Revenue Pledge, the state or DOT would have to contractually obligate themselves to pay for or guarantee the O&M expense so bondholders would be assured that the road will be maintained to an acceptable level. The financing capacity for a Gross Revenue Pledge is higher than a Net Revenue Pledge since more revenues are available for repaying debt.

[20] The Pledge defines the revenues for debt repayment and the priority for the use of the revenues.

Preliminary Results

The following Table 15 shows the preliminary results of a comparison of a P3 Toll Concession, a Public Net Revenue Pledge and a Public Gross Revenue Pledge. A comparison of toll funding versus the current Mn/DOT funding plan for this project is shown in Table 16.

Table 15: Preliminary Toll Financing Results

($millions)	P3 Toll Concession		Public Net Revenue Pledge		Public Gross Revenue Pledge	
	One-Way	Two-Way	One-Way	Two-Way	One-Way	Two-Way
Net Financing Capacity	265 – 315	300 - 350	225 - 275	265 - 315	300 - 350	340 - 390
Project Capital Cost	642	642	642	642	642	642
Percentage Feasible	45%	51%	39%	45%	51%	57%
NPV of Excess Revs (5%)	0	0	315	340	380	415

Note: Results are for illustration purposes only and are subject to change. Financing capacity is dependent upon market conditions at time of financing

Table 15 was calculated as follows:

- Net Financing Capacity represents the total debt and private equity proceeds less all applicable financing costs. It represents the total amount of proceeds that can be applied to the development costs of the project.
- Percentage Feasible was calculated based on the Net Financing Capacity Midpoint divided by the Project Capital Costs.
- The Net Present Value (NPV) of all revenues after the payment of debt service and O&M (just debt service in the Gross Revenue Pledge) was calculated using a 5 percent discount rate

Summary of Results:

- All scenarios are approximately 40 to 60 percent financially feasible, meaning that project revenues can support 40 to 60 percent of the project's upfront construction costs
- The P3 Concession produces more upfront proceeds than the Public Net Revenue Pledge since the private equity monetizes the full revenue stream
- The Public Gross Revenue Pledge produces the most upfront proceeds of all scenarios since all of the toll revenue is pledged to debt. Mn/DOT or another state or local agency would have to guarantee or pay the project's O&M commitment.

- The Public Revenue Pledge scenarios have annual excess revenues after the payment of debt service to use for other approved projects. The Net Present Value of these excess revenues is displayed on the last line of the table to illustrate the value of these dollars over the life of the project term in today's dollars. The P3 Concession does not have any excess dollars since the upfront equity invested by the concessionaire was based on retaining these revenues after debt service.

The financial capacity presented above will ultimately be determined at the time of financing based on the availability of debt products, prevailing market interest rates and investor appetite. The analysis incorporates a USDOT TIFIA loan; however, the availability of the loan will be impacted by the program's funded status and any provisions of the new federal transportation reauthorization bill. If TIFIA is unavailable, it is possible that a new federal program or subordinate lien debt could replace it in the financing plan.

Discussion of Scenarios

P3 Concession

Since the concessionaire collects and retains all project revenues, it will develop a Traffic and Revenue report that it will utilize to develop its bid. The concessionaire's willingness to take an aggressive view of the traffic and revenue potential of the project will determine the amount of equity it is willing to invest. The financial structure will consist of maximizing the amount of debt that it can generate from the capital markets, bank loans and/or TIFIA and injecting the amount of equity that it thinks the project can support while still meeting its desired rate of return. The ultimate bid price will be determined by the concessionaire's view of the capital costs, O&M costs, revenue and risk in the project.

Both Concession scenario and the Availability Payment Transaction scenario require about a 50 percent public subsidy based on the assumptions utilized, meaning that debt and private equity combined are only sufficient to finance one-half of the project costs. Greenfield Concessions typically require a public subsidy to achieve full feasibility and financial close (when the project is financed and bonds sold). However, the public subsidy is usually around 20 percent or less of total project cost. While the presence of the private equity in the Concession does reduce the amount of the public subsidy required to deliver the project, perception questions could arise over subsidizing half of the project costs while the private sector contributed less equity than the public and controls the revenue. Concessions are typically utilized for projects with a higher percentage funded by the Concessionaire.

Public Toll Financing

The Public Sector Comparator is designed to provide Mn/DOT with a comparison of the amount of debt capacity that could be generated if Mn/DOT wanted to finance the project on its own using toll revenue bonds. This type of financing would be a stand-alone project financing and neither Minnesota's full-faith-and-credit nor would GO Trunk Highway Funds be pledged to the repayment of bonds. Similar to the debt that a P3 would utilize, toll revenue bonds for a new

facility are typically rated in the BBB category (lowest level of investment grade debt) and have interest rates higher than Mn/DOT's traditional debt options, which are supported by taxes.

Mn/DOT and WisDOT could fund their portion of the cost of the project using their state bonding authority and achieve the lowest cost for the debt. If Mn/DOT decided to toll the facility, it could utilize the toll revenues to offset the Trunk Highway revenues that are pledged to repay the debt. Additionally, the DOT's could issue as many Toll Revenue Bonds as the project could support and use their state bonding authority as a gap-filler to finance the total upfront cost of the bridge. One benefit of this approach is that it would reduce the amount of state bonds issued and preserve state bonding capacity for other projects since the toll revenue bonds would fund half of the project's costs.

Mn/DOT's Current Funding Plan

Mn/DOT is currently considering a plan to fund its share of the St. Croix Bridge project with $200 million of GO Trunk Highway bonds and a combination of state and federal revenues. The Trunk Highway bonds are the lowest cost debt option and would require the least amount of public funds to repay the debt service payments over the life of the bonds. Furthermore, applying pay-as-you-go state and federal funds during the construction period to help fund the bridge will reduce the amount of debt along with its requisite interest payments. Table 16 outlines the key discussion points for a toll funding strategy and for Mn/DOT's current financing plan. This chart only compares the financing components of the project. The Mn/DOT plan also includes state and federal funds.

Table 16: Illustrative Toll Funding versus the Current Mn/DOT Financing Plan Scenario

Toll Financing Comparison		
	Toll Financing (P3 or Public)	**Mn/DOT Financing Plan**
Debt Type	Toll Revenue Bonds or Toll Bank Loan	State Trunk Highway Bonds
Debt Interest Rate	6 percent to 8 percent	3 percent to 5 percent
Discussion Items	Debt supported by tolls decreases amount of public GO Trunk Bonds or Mn/DOT funds Toll-backed debt is more costly than GO Trunk Highway Bonds Toll-backed debt is typically not guaranteed or supported by state funds	Lowest cost debt option Project can be funded with or without tolls GO Trunk Highway Bonds capacity is limited, bonds could be used for other projects

P3 Availability Payment Transaction

A P3 Availability Payment Transaction is an option for delivery of the St. Croix Bridge if DBFOM delivery is desired. Availability Payment Transactions are well-suited for projects that cannot

support themselves with their own revenue or where public control is more valued. For an Availability Payment Transaction, Mn/DOT would enter into a contract with a private sector entity and pledge to make annual payments from a statewide source of revenues (most likely Trunk Highway revenues). Mn/DOT could choose to toll the bridge and would keep all revenues or operate the bridge as a free facility. The private entity would not have any control over toll rates or collect any toll revenues and consequently does not hold any project traffic or revenue risk.

Unlike for a Concession or Public Toll Revenue Bonds, the credit (revenue pledge) for the financing is tied to Mn/DOT's pledge of funds. Since Mn/DOT would be a highly rated entity, the borrowing costs should be lower than financing tied to forecasted toll revenues. The private sector borrowing cost would likely be a little higher than if Mn/DOT would bond against existing revenue sources, since the private sector is one step removed from the appropriation process (the private sector borrowing is perceived to have higher risk by lenders). Additionally, potentially 10 percent of the project cost would be funded as private equity at a rate of return of 10-12 percent. Availability Payment Transactions can accelerate project delivery, transfer risk and potentially work as off-balance sheet debt (although some states choose to recognize these contractual payments as debt) but might have a slightly higher financing cost.

To illustrate the potential annual amount of an availability payment required to fund the bridge, a hypothetical Availability Payment Transaction was structured based on the assumptions in the following table. The scenario calculates the base year amount of an availability payment that a private entity would need to fully fund the project based on receiving 30 annual payments growing with inflation and a one-time milestone payment of $100 million at construction completion. Two scenarios are presented to show the sensitivity of the payments based on the debt interest rate. The preliminary analysis below estimates that an annual availability payment between $44 and $56 million would be required to fund the bridge.

Table 17: Illustrative Availability Payment Scenario

Illustrative Availability Payment Scenario	
Availability Payment Structure	
Term (number of payments)	30 yrs
Construction Cost	$642m
Construction Completion Milestone Pmt (YE 4)	$100m
Inflation Factor for Annual Payments	2.50%
O&M Forecast without Toll Operations Cost	Included
Financial Structure	
Debt Component	90%
Private Equity Component	10%
Private Equity IRR	11%
Blended Borrowing Rate (debt and equity)	
PABs Case: 5.0% Debt Cost	5.60%
Bank Loan Case: 6.0% Debt Cost	6.50%
Illustrative Results - Base Year Availability Payment	
PABs Case	**$44-49m**
Bank Loan Case	**$51-56m**

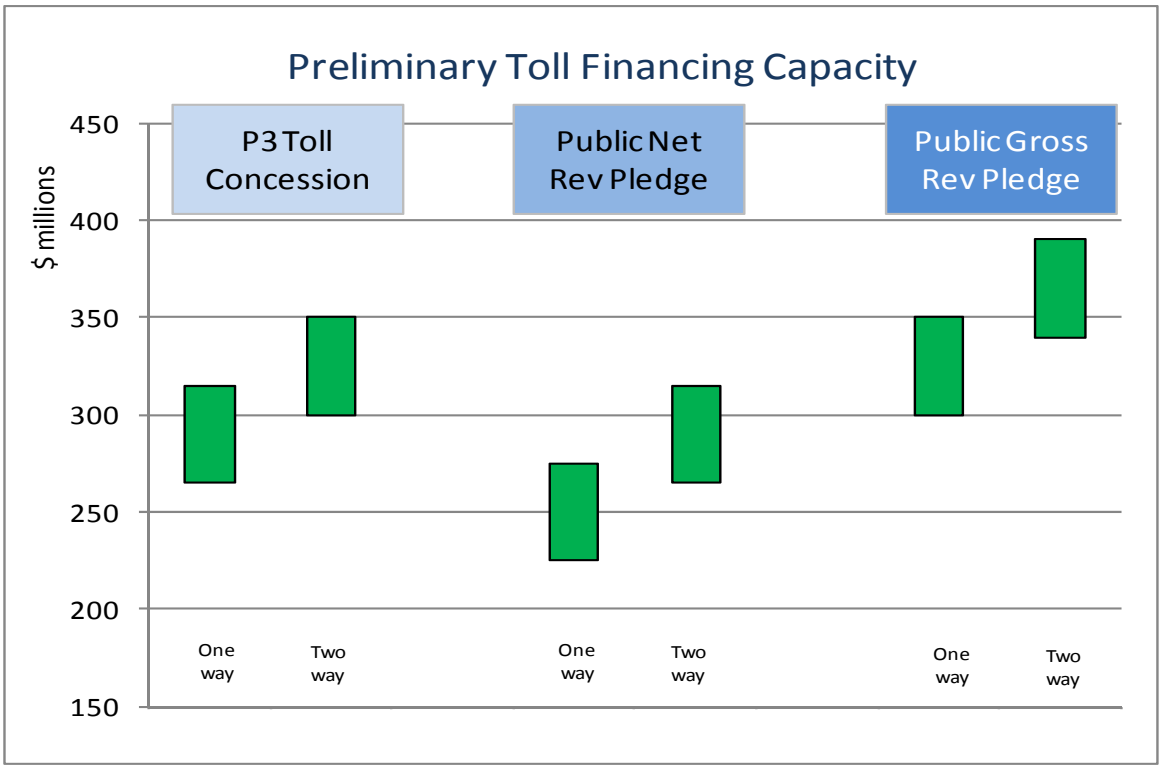
Note: Results are for illustration purposes only and are subject to change.
Availability Payments are dependent upon market conditions at the time of financing

Summary

The comparison of the financing of a P3 Toll Concession versus a public toll financing (Public Gross and Net Pledges (with and without O&M costs)), as shown in Table 15 and Figure 5 below, shows:

- The project revenues can support 40-60 percent, or $265 - $390 million, of the project's upfront construction costs
- A P3 Concession produces more upfront proceeds, estimated at $265 - $350 million, than the Public Net Revenue Pledge, estimated at $225 - $315 million, since the private equity monetizes the full revenue stream
- The Public Gross Revenue Pledge produces the most upfront proceeds, estimated at $300 - $390 million, of all scenarios since all of the toll revenue is pledged to debt. Mn/DOT or another state or local agency would have to guarantee or pay the project's O&M commitment.
- The Public Revenue Pledge scenarios have excess revenues of $315 - $415 million in net present values over 50 years after the payment of debt service to use for other approved projects. The P3 Concession does not have any excess revenues since the upfront equity was invested to retain these revenues after debt service.

Figure 5: Preliminary Toll Financing Results



The P3 toll funding plan was then compared against the current Mn/DOT funding plan for this project as shown in Table 16. The results are that the current Mn/DOT funding plan is the lowest cost debt option, but its debt capacity is more limited than the P3 option.
Finally, an Availability Payment option was analyzed, as shown in Table 17. An annual availability payment is estimated to be between $44 and $56 million to fund the Bridge.

If tolling is the desired approach, then the Public Toll Financing options might be the more viable approach because of the large required public subsidy in addition to the toll financing amounts. However, the feasibility of a P3 option could improve if (1) a more in-depth business case and "Value for Money" analysis determines there is greater public benefit in a given P3 approach than the planned public approach, (2) there is strong industry interest in such an approach, and (3) adequate legislative authority is put in place to pursue such an approach.

8. Summary

The financial capacity analysis shows that using tolls on the St. Croix River Crossing could pay for nearly half of its capital costs, as well as all of its ongoing operations and maintenance costs.

Tolling the St. Croix River Crossing is technically and financially feasible. However, tolling is only feasible if Minnesota and Wisconsin join in getting specific federal and state legislation passed, and the 2006 Supplemental Environmental Impact Statement for the St. Croix River Crossing is re-evaluated to determine if additional environmental review is needed to address the tolling approach.

If tolling is the desired approach, then the Public Toll Financing options might be the more viable approach because of the large required public subsidy in addition to the toll financing amounts. However, the feasibility of a P3 option could improve if (1) a more in-depth business case and "Value for Money" analysis determines there is greater public benefit in a given P3 approach than the planned public approach, (2) there is strong industry interest in such an approach, and (3) adequate legislative authority is put in place to pursue such an approach.

The feasibility for value capture techniques to help pay for some of the costs of the bridge on the Minnesota side of the river is low even if new legislation were passed.

Appendix A – Acronyms/Terms

Acronym/Term	Definition
AET	All-electronic tolling
Annual Gross Revenue	The annual amount of revenue generated by tolls
Annual Net Revenue	The annual amount of revenue generated by tolls after deducting the Operations and Maintenance Costs
Availability Payment Transaction	In an Availability Payment Transaction, the concessionaire does not have a claim to any project-related toll revenue but instead is paid an annual availability payment from separate governmental funds if the road is meeting the stated operational and performance standards. The concessionaire finances the cost to construct the facility and is paid annually by the government to repay the debt and operate and maintain the facility.
Brownfield	An existing transportation facility
CABs	Capital Appreciation Bonds
CIBs	Current Interest Bonds
Concession	The Concession is the model that is most commonly associated with the term P3. With this P3 model, the private entity agrees to develop, finance, and maintain the project in exchange for the ability to collect and keep the associated toll revenues.
CPI	Consumer price index
DBFOM	Design-Build-Finance-Operate-Maintain
Debt for concessionaires	The three main sources of debt for concessionaires are: • The capital markets; • Bank loans; and • The federal Transportation Infrastructure Finance and Innovation Act (TIFIA) program.
Equity	Private equity is the upfront contribution in addition to debt financing that the concessionaire uses to finance the project. Equity is typically required in DBFOM financings to help assure lenders that the developer remains committed to the project by having its own money invested and to provide a subordinate financing component below debt holders (lower priority claim to revenue).
ETC	Electronic toll collection
Financial Close	When the P3 agreement is completed and project is financed (debt or equity secured).
GDP	Gross domestic product

Acronym/Term	Definition
GO Trunk Highway Bonds	General Obligation State Trunk Highway Bonds issued by Mn/DOT
Greenfield	No existing transportation facility
Internal Rate of Return (IRR)	The private sector earns an Internal Rate of Return (IRR) of 10 to 16 percent (a typical return is 12 percent) for providing the up-front equity. The percentage rate of return that an investor makes on their investment
Monetization	The upfront proceeds provided by the concessionaire representing the value of the forecasted cash flows of the net toll revenues for the project. In a P3, debt and private equity are the monetization tools.
Net Financing Capacity	Represents the total debt and private equity proceeds less all applicable financing costs. It represents the total amount of proceeds that can be applied to the development costs of the project.
Net Present Value (NPV)	The method of discounting future streams of income using an expected rate of return to evaluate the current value of expected earnings. It calculates future value in today's dollars.
O&M	Operations and Maintenance
P3s	Public Private Partnerships are contractual agreements between a public sector entity and a private sector entity that allow for increased private sector participation in public infrastructure projects.
PABs	Private Activity Bonds
PDA	A Pre-Development Agreement concession where the private concessionaire works with the owner on pre-construction activities prior to signing/negotiating the long-term concession.
Revenue Pledge	The Pledge defines the revenues for debt repayment and the priority for the use of the revenues. The Net Revenue Pledge assumes that O&M is “netted out” or subtracted from the toll revenues to determine financing capacity while the Gross Revenue Pledge assumes that every dollar of toll revenue collected can be pledged to debt holders and that O & M will be publicly funded from other revenue sources.
TIFIA program	A competitive federal loan program called the Transportation Infrastructure Finance and Innovation Act.
Toll Transponder	An electronic device in a vehicle that is read by electronic equipment as the vehicle passes under the tolling equipment (on a gantry across the bridge/highway). This is similar to the type of toll collection currently used by

Acronym/Term	Definition
	Mn/DOT for the MnPASS program.
T&R	Traffic and Revenue
Value capture	Is an emerging tool used in infrastructure funding and financing. Access points to new transportation infrastructure have long been known to create land value premiums for property that directly and indirectly benefit from this access. The creation of a new interchange, a new highway, or a new transit station, for example, create private land development opportunities by immediately improved access to local, regional, or national markets. Local governments have long used their own tools to capture this value including tax increment financing, business districts, or special fees. These revenues can be used for a range of investments, including infrastructure improvements to support private development and redevelopment.
Video Tolling	Vehicles without a transponder that will be identified with a license plate photograph (also known as “video tolling”)
Workout	Describes concessions that replaced an underperforming asset and financing