DEPARTMENT OF TRANSPORTATION

Minnesota Tolling Study Report

Modern Tolling Practices and Policy Considerations

January 2018

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Legislative Request

This report is issued to comply with Laws of Minnesota 2017, 1st Spec. Sess., Chapter 3, Section 137 (a) and (c).

Sec. 137 – Report by Commissioner of Transportation on MnPASS Lanes and Tolling

(a) On or before January 2, 2018, the commissioner of transportation must report to the chairs and ranking minority members of the senate and house of representatives committees and divisions with jurisdiction over transportation policy and finance concerning MnPASS lanes and tolling to reduce congestion and raise revenue.

(c) At a minimum, the report must, with respect to tolling:

(1) summarize current state and federal laws that affect the use of tolling in this state;

(2) identify any federal pilot projects for which this state is eligible to participate;

(3) discuss the feasibility and cost of expanding use of tolling, the possibility of private investment in toll roads, and projected costs and cost recovery in establishing, operating, and maintaining toll roads;

(4) review tolling models and technology options;

(5) summarize the experience of other states that have widely implemented tolling;

(6) identify and evaluate the feasibility of toll implementation for specific corridors;

(7) project the likely range of revenues that could be generated by wider implementation of tolling and identify the percentage of revenues that are projected to be paid by nonresidents of the state;

(8) discuss options for use of tolling revenue and measures to ensure compliance with laws governing operation of toll roads and use of revenues;

(9) recommend and discuss possible ways to reduce cost to Minnesotans, such as tax deductions or credits, or types of discounts; and

(10) provide recommendations for needed statutory or rule changes that would facilitate wider implementation of tolling and achieve maximum revenues for the state and equity for its residents.

The cost of preparing this report was approximately $175,000.

Executive Summary

Overview

The 2017 legislature required the commissioner of transportation to report about the use of tolling in Minnesota to reduce congestion and raise revenue. The legislation required the report to include the following evaluation and analysis:

1. summarize current state and federal laws that affect the use of tolling
2. identify any federal pilot projects for which this state is eligible to participate
3. discuss the feasibility and cost of expanding use of tolling, the possibility of private investment in toll roads, and projected costs and cost recovery
4. review tolling models and technology options
5. summarize the experience of other states that have widely implemented tolling
6. identify and evaluate the feasibility of toll implementation for specific corridors
7. project the likely range of revenues that could be generated by wider implementation of tolling and revenues projected to be paid by nonresidents
8. discuss options for use of tolling revenue and measures to ensure compliance with laws governing toll roads
9. recommend and discuss possible ways to reduce cost to Minnesotans, such as tax deductions or credits, or types of discounts
10. provide recommendations for needed statutory or rule changes that would facilitate wider implementation of tolling and achieve maximum revenues for the state and equity for its residents

Because of the complex subject matter and the short timeline, the Minnesota Department of Transportation hired consultants to perform the study. This report is organized into three sections to address all of the topics identified in the legislation.

1. **Modern Tolling Practices** – presents an overview of toll industry trends, organizational structures and operational practices
2. **Policy and Legal Considerations** – presents an overview of federal programs, summarizes pertinent federal and state laws, discusses policy considerations and various interests, and shows statutory language from other jurisdictions that use tolling
3. **Traffic and Revenue Analysis** – presents the framework and planning-level analysis of the potential toll revenue and costs of implementing tolling on a variety of rural and urban corridors in Minnesota

While the sections of this report analyze three distinct areas of tolling, any implementation of tolling requires a balanced approach that aligns the goals and objectives of the project with the needs of the users and the transportation network. Toll technology has made significant strides in reducing the cost of toll collection and congestion, but effective and efficient toll collection can only be achieved if the business rules and legal framework are aligned with industry best practices.

The results of the feasibility analysis are a high-level revenue assessment based on numerous assumptions and a more detailed study would be required before any decision is made to implement a specific toll project.

Modern Tolling Practices

Toll technology advancements significantly altered the tolling landscape, expanded the types of toll facilities being operated and improved customer experience. As a project owner begins to analyze the type of toll facility that will serve its goals and objectives, several factors need to be considered to finalize the policy decisions related to implementation and operation of a toll facility. Those factors include physical roadway constraints, traffic congestion, roadway user mix, project costs, complementary facilities and local mobility options. New toll facilities using all-electronic tolling are being implemented in several places across the country to add new roadway capacity, manage congestion and provide a sustainable revenue source for asset lifecycle costs.

Policy and Legal Considerations

Any expansion of tolling in Minnesota would require careful consideration of the multiple policy and legal aspects to expand tolling practices. This section provides information for Minnesota to use to address those considerations if tolling is implemented. The analysis is divided into five parts, (1) summary of existing federal toll programs, (2) examination of considerations related to the National Environmental Policy Act, (3) overview of existing Minnesota tolling authority, (4) policy considerations and (5) statutory examples from other states.

The first section describes existing federal toll programs and laws that affect and impact the implementation of tolling. Since the creation of the federal tolling program in 1958, most of the prohibitions against tolling of federal highways were removed. Interstate tolling restrictions were removed for new capacity construction, bridge/tunnel rehabilitation and reconstruction and conversion of high-occupancy vehicle lanes. While restrictions remain on the tolling of existing interstate capacity, the Value Pricing Program allows tolling to manage congestion and the Interstate System Reconstruction and Rehabilitation Pilot Program allows tolls to be implemented on three reconstructed interstate facilities.

The National Environmental Policy Act establishes a framework to protect the environment. Although it may not seem related to tolling, the law requires efforts to address social, economic and environmental issues when adding tolling to new or existing general-purpose lanes of interstates and freeways.

Minnesota has existing authority to develop build-transfer-operate toll facilities and priced high occupancy vehicle and dynamic shoulder lanes. However, certain portions of Minnesota law include language that prohibits the tolling of existing general-purpose lanes or creates uncertainty about how the law would apply to general purpose tolling. This section identifies and evaluates the major policy considerations that may be addressed in the future to clarify and update laws involving tolling authority. Several policy considerations are discussed in detail, including use of revenue, project selection, toll rate setting, toll collection/video billing, enforcement of non-payment and privacy and data retention.

Lastly, this section presents examples of how other states addressed policy decisions through legislation.

Feasibility

The approach to feasibility was developed by focusing on how tolling may benefit Minnesota by generating transportation revenue and reducing congestion. Although Minnesota has existing toll facilities as part of the MnPASS network, MnPASS is a congestion management program. These assets are focused on reducing congestion - not producing revenue to fund its operation, maintenance or expansion. The legislature required evaluation of tolling as a transportation funding source, so this study is focused on the feasibility of projects that generate revenue by converting existing general-purpose lanes of the studied corridors to toll lanes.

This approach explores a type of tolling that currently does not exist in Minnesota, is not duplicative of existing programs and provides an understanding of the potential funding that could be generated. This report is not a tolling plan for Minnesota, but rather an analysis of tolling and its implications.

The analysis investigates, at a high-level, the feasibility of converting existing highways to toll highways to generate revenue and to support asset life-cycle costs. The corridors evaluated for the study represent typical corridors and provide indicative traffic and revenue estimates. An objective process was used to select representative corridors of various types (urban/rural interstates and urban/rural freeways) through a screening analysis. The analysis, along with other considerations, provides high-level information for decision-makers on whether to advance more detailed studies of toll viability on specific corridors.

Corridors in this study (see **Figure 1** and **Figure 2**) were analyzed using a range of toll rates to provide an example of potential revenue and traffic diversion that may occur with the implementation of tolling. **Figure 1** depicts the corridors on a statewide map and **Figure 2** presents a detailed corridor map with corridor type and limits analyzed using a range of toll rates. The toll rates used and the resulting gross revenue forecasts are presented below:

- High toll rate: 10 cents per mile
- Medium toll rate: 7 cents per mile
- Low toll rate: 4 cents per mile

Figure 1 : Statewide Corridor Map

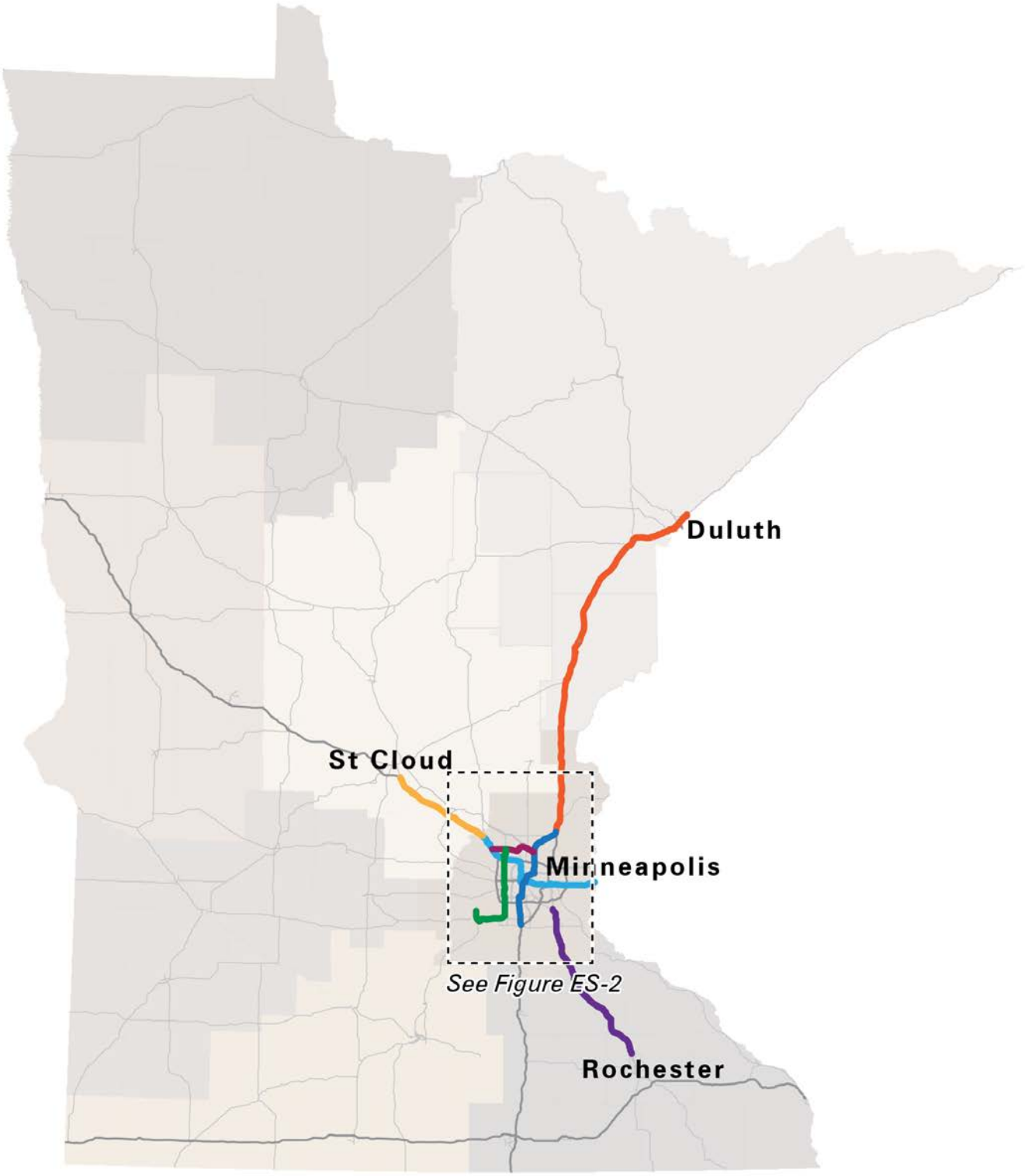
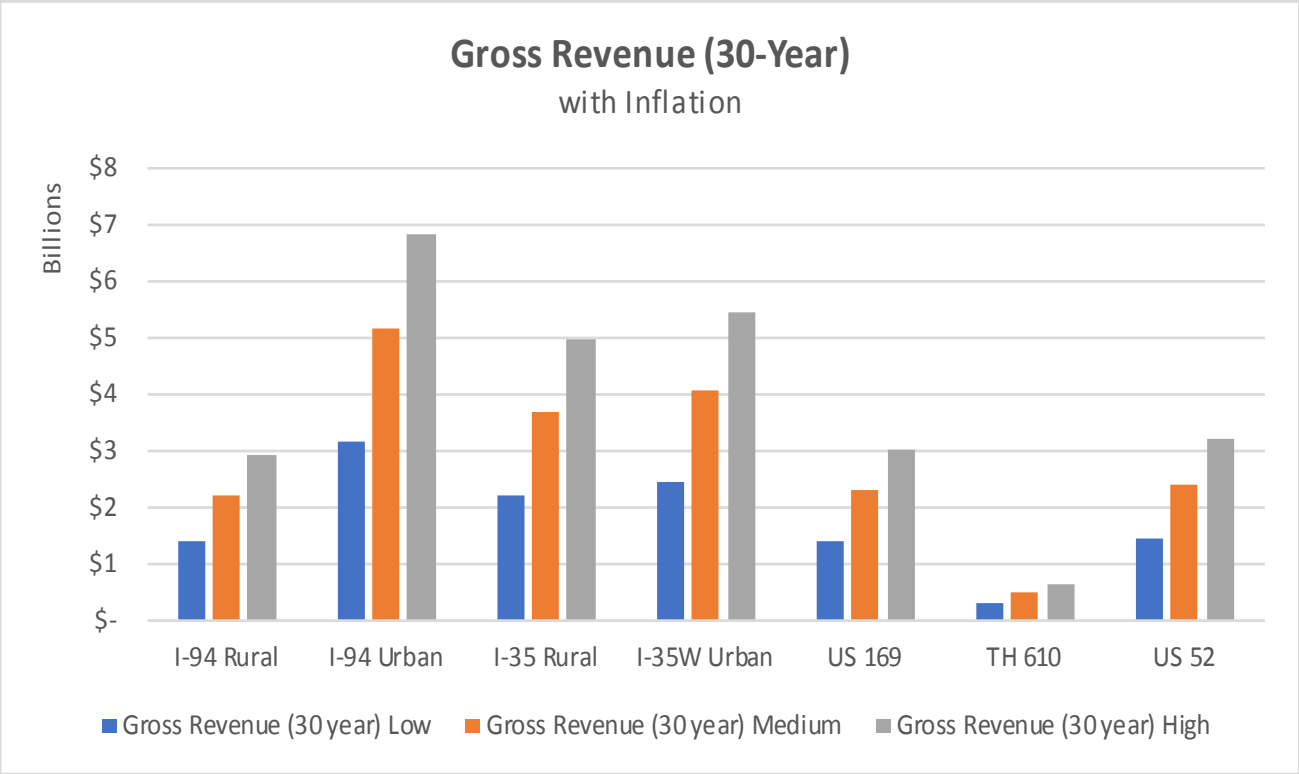


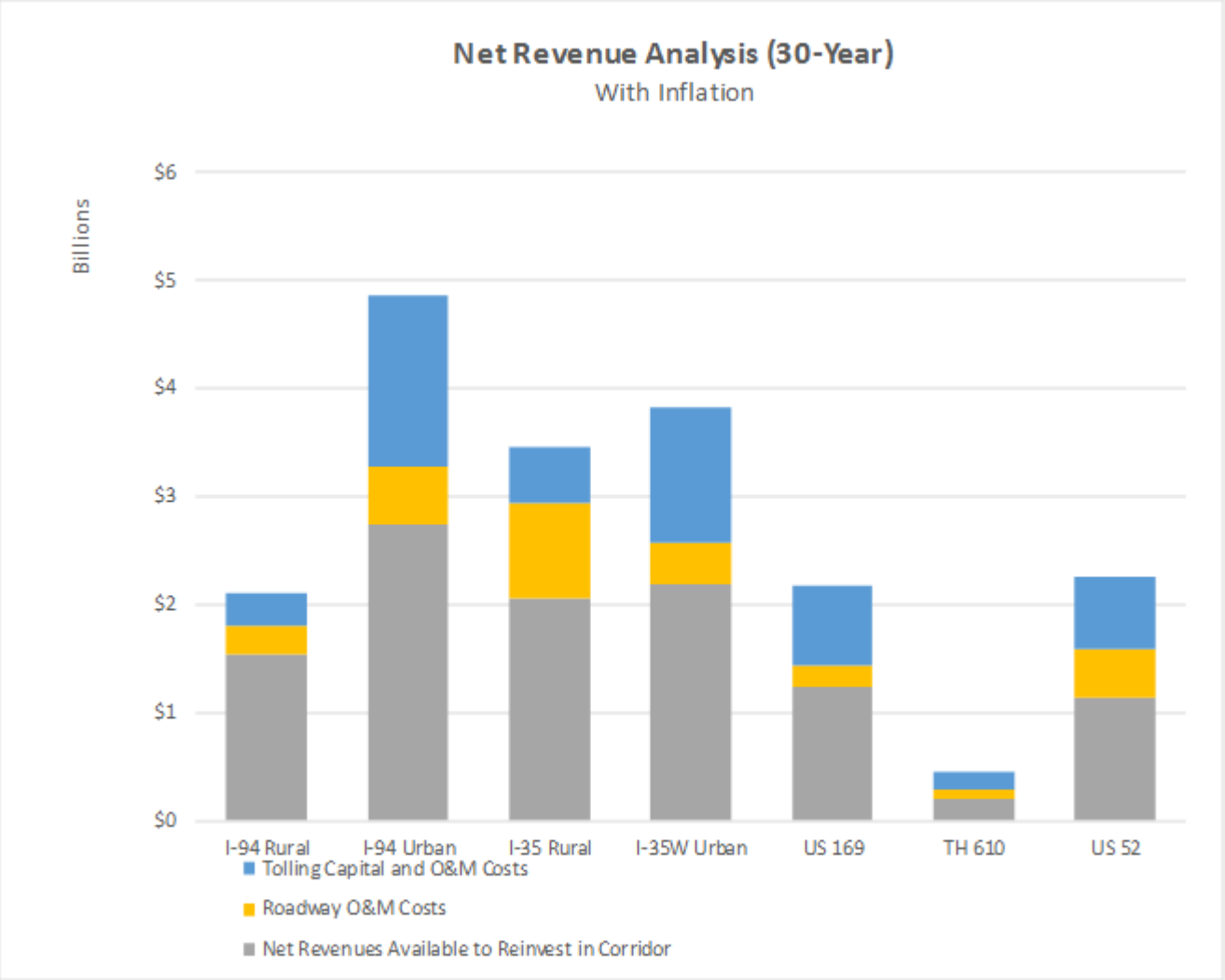
Figure 2: Detailed Corridor Map

Figure 3: Gross Revenue Graph with Inflation



The study identified the upfront capital costs to implement tolling and the ongoing costs to process toll transactions, upgrade tolling equipment and maintain the roadway. The following graph illustrates the cost and revenue summary for each corridor in current dollars based on the study's medium toll rate (7 cents/mile).

Figure 4: Net Revenue Analysis (7 cents/mile)



Many factors will influence the toll revenue potential of a corridor and the impacts on the local transportation network. The revenue numbers produced in this analysis do not represent a detailed study and further refinement is necessary if broader tolling is advanced in Minnesota.

A toll rate growth factor of 1.75 percent per year is embedded within the revenue forecast. Operations and maintenance costs were assumed to grow at 3.0 percent per year based on MnDOT's historical inflation estimate for O&M. Net revenues available to reinvest in each corridor for major maintenance (primarily reconstruction) are also negatively affected by inflation. Historically, MnDOT construction costs have inflated at an average rate of about 4.5 percent per year. The compounding of this inflation erodes purchasing power by 70 percent in year 30.

Modern Tolling Practices

Toll technology advancements significantly altered the tolling landscape, expanded the types of toll facilities being operated and improved the customer experience. Advancements in electronic toll collection eliminates the requirement that a customer stop to pay a toll, and enables variable and dynamic pricing strategies to manage congestion. New toll facilities rarely allow cash payment in the lane, often use variable or dynamic pricing and charge tolls at discrete locations rather than calculating tolls based on total miles driven. The following is a summary of modern tolling practices and includes options for toll system configuration, methods of toll collection, project and system case studies, and other major tolling concepts and trends.

Toll Facility Configuration

Toll facilities are operated across the country by a variety of entities including state transportation departments, regional and statewide tolling authorities, regional transportation authorities, local governments and private entities. As a project owner begins to analyze the type of toll facility that will serve its goals and objectives, several factors such as physical roadway constraints, traffic congestion, roadway user mix, project costs, complementary facilities and local mobility options are considered. **Table 1** below presents common toll facility development considerations and operational policies that are generally evaluated when establishing a toll facility's configuration.

Table 1: Toll Facility Development and Operation

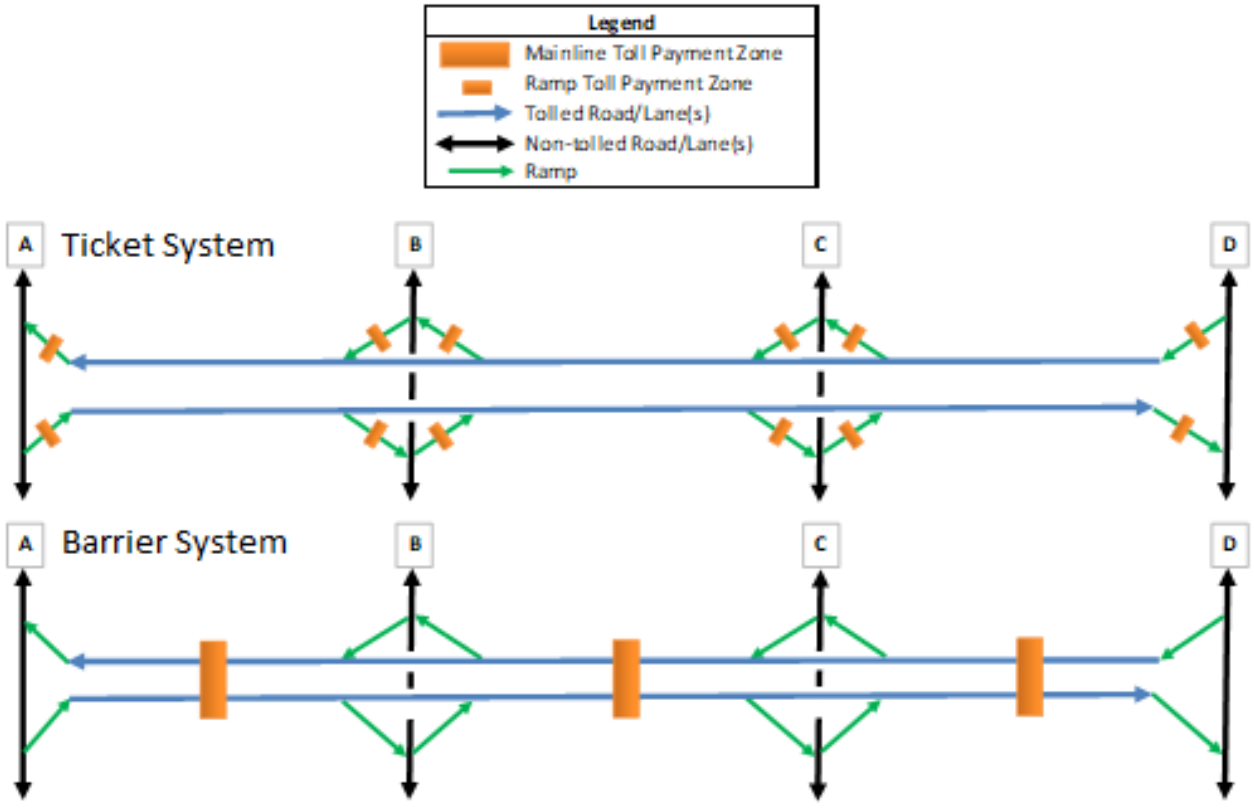
Toll Facility Development Considerations and Operational Policies	
Toll Facility Characteristics	Toll Facility Types and Descriptions
Facility Operation Type	Ticket System
• Ticket System • Closed Barrier System • Open Barrier System	• Users are charged based on the distance traveled • Must identify users at every entry/exit point • Requires tolling equipment at every entry/exit point • Generated minimal transactions
Pricing	Barrier System
• Static • Variable • Dynamic • HOV Discount • Frequent Use Discount	• Users are charged a toll for each segment traveled • Toll zones are located on the mainline and ramps • Identification and equipment is only needed at toll zone locations • Open systems allow free movements and closed systems do not • Zones can be optimized for goals (revenue, diversion, free movement, costs) • Some shorter trips will pay a higher cents/mile than full trips across a segment • Generated a transaction for every toll zone (excluding trip building)

Toll Facility Development Considerations and Operational Policies	
Toll Facility Characteristics	Toll Facility Types and Descriptions
Eligibility	Managed Express Lane Characteristics on a Closed or Open Barrier System
• Vehicle Type • Transponder Only • Transponder and Video	• Access: continuous or zonal-barriers, pylons or striping • Eligibility: vehicle type, HOV, transponder/video • Pricing: variable/dynamic, throughput vs. revenue, HOV discount
Toll Collection Type	
• All-Electronic Tolling • Allow Cash in Line	

The configuration of a toll facility is primarily dictated by the availability of tolling locations, pricing strategies and policies. A toll facility can operate as a ticket system, a closed barrier system or an open barrier system. See **Figure 5** below for a depiction of a ticket and barrier system.

On a ticket system, each vehicle is charged a toll amount based on the distance the vehicle travels and toll payment zones are located at or near each entrance and exit point. This allows each vehicle to be appropriately charged based on trip length. This also eliminates all non-tolled trips (i.e., no "free movements") on the facility.

Figure 5: Ticket and Barrier Configurations



On a barrier system, each vehicle is typically charged a toll amount for each segment traveled. Toll payment zones are usually located on the mainline travel lanes. This allows each vehicle to be appropriately charged based on its trip; however, if the trip includes multiple segments, multiple corresponding toll transactions are created. If a barrier system allows some free movements where a vehicle does not cross a barrier, then it is an open barrier system because not all movements are tolled. The barrier locations can be optimized to capture critical movements by including a combination of mainline and ramp toll payment zones in a manner that balances the costs of installation, operations and maintenance against toll revenue. The mainline toll payment zones typically include placement of overhead gantry structures across all lanes and shoulders.

Toll Collection Options

Electronic Toll Collection

The introduction of electronic toll collection has helped eliminate congestion and delays on toll roads by collecting tolls without the need for manned tollbooths or automated toll payment machines (i.e., coin machines). ETC also reduces the cost of collecting tolls. The system uses a transponder in the driver's vehicle, a reader at the tolling point that identifies the transponder, and a back-office system that calculates the toll and deducts it from the driver's account. The back-office is a term generally used to describe the systems and portion of the tolling process that takes place away from the actual toll collection point, including servers and databases containing customer account information.

ETC facilities require a customer service center. These facilities typically include a walk-in area where face-to-face customer interactions take place, a phone bank and management, administration areas and processing areas. These facilities process toll transactions and manage customer accounts. Toll customers can use these centers to ask questions, receive or exchange transponders, pay fines or add money to their accounts. Back-office and customer service centers can be operated directly by the tolling authority or by a private company under contract with the tolling authority.

ETC systems improve traffic flow by reducing the dependency on cash collection. However, early ETC facilities required drivers to slow down in the payment zone to verify payment and for safety reasons. ETC facilities have varying speed limits depending on when and where ETC was implemented. The speed limits range from 5 to 20 miles per hour, and traffic queues occur frequently, especially where gates are used for enforcement. ETC also does not completely eliminate cash as a method of payment, as not all users of the toll facility have a transponder associated with a valid account.

Open Road Tolling

Advances in technology make open road tolling possible. This system uses the same basic process as ETC but allows the customer to travel at highway speeds through the tolling point in dedicated lanes. Cash lanes are available for vehicles without a toll transponder. Vehicles passing through the toll lanes without a transponder are charged a violation. Most ORT facilities have systems that take photographs of a vehicle's license plate to enforce violations.

All-electronic Tolling

All-electronic tolling is a method of collecting tolls using transponders and license plate images without the option of the vehicle stopping to pay the toll with cash. AET uses the same technology and processes as open road tolling but eliminates in-lane cash collection. Customers without a valid transponder are assessed a toll through a license plate photograph, commonly referred to as “video billing” or “pay by plate.”

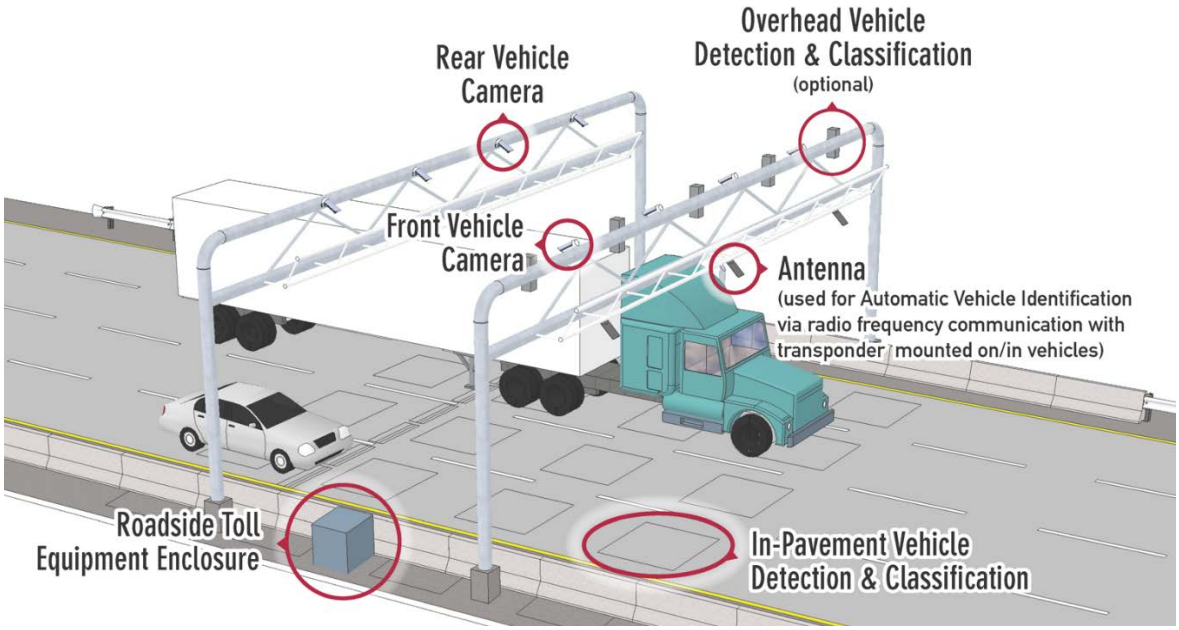
Video billing uses photographic images of a vehicle’s license plate to identify the registered owner of the vehicle. When a motor vehicle passes through a tolling location and a transponder is not read, a photograph of the license plate is captured and the registered owner is invoiced for the toll.

AET provides significant improvement in traffic, safety, air quality and toll collection costs. Free-flowing traffic reduces congestion at tolling locations and increases throughput. Eliminating vehicular weaving and stopping at the tolling locations reduces traffic incidents and increases safety. Air quality also improves with the reduction in vehicle idle time. Cost savings are realized through lower transaction processing costs, lower capital and maintenance costs associated with toll plazas and lower labor expenses.

Tolling Technology

Advances in toll technology enabled the industry to shift from toll booths to electronic tolling. As tolling technology advances, increased functionality make detecting, classifying and recording vehicles (including image capture and processing) faster and more accurate. This makes the collection of tolls easier and more efficient. Toll authorities today use devices such as cameras, antennae, readers and loops that feed information to computers running sophisticated software and algorithms to detect, classify and record vehicles. **Figure 6** identifies the various toll equipment components and how they are placed in travel lanes to facilitate vehicle identification.

Figure 6: Toll Collection Equipment



Enforcement and Reciprocity

Reciprocity refers to agreements with other states to enforce tolls on citizens of the other states. Toll evasion laws were traditionally enforced in the same manner as any other traffic violation. With gated toll systems, evading a toll meant crashing through a gate. This was a rare occurrence and enforcement was effective using traditional policing methods. With the increasing use of AET, operators are developing new technology, policies and processes to collect payments from toll violators. The point at which a user is considered a violator depends on the policies and business rules established by the agency, the laws established by the legislature or the actions of the courts. Pursuing violators creates equity and fairness by ensuring all users of the facility pay the toll. Effective enforcement also reduces overall system revenue loss.

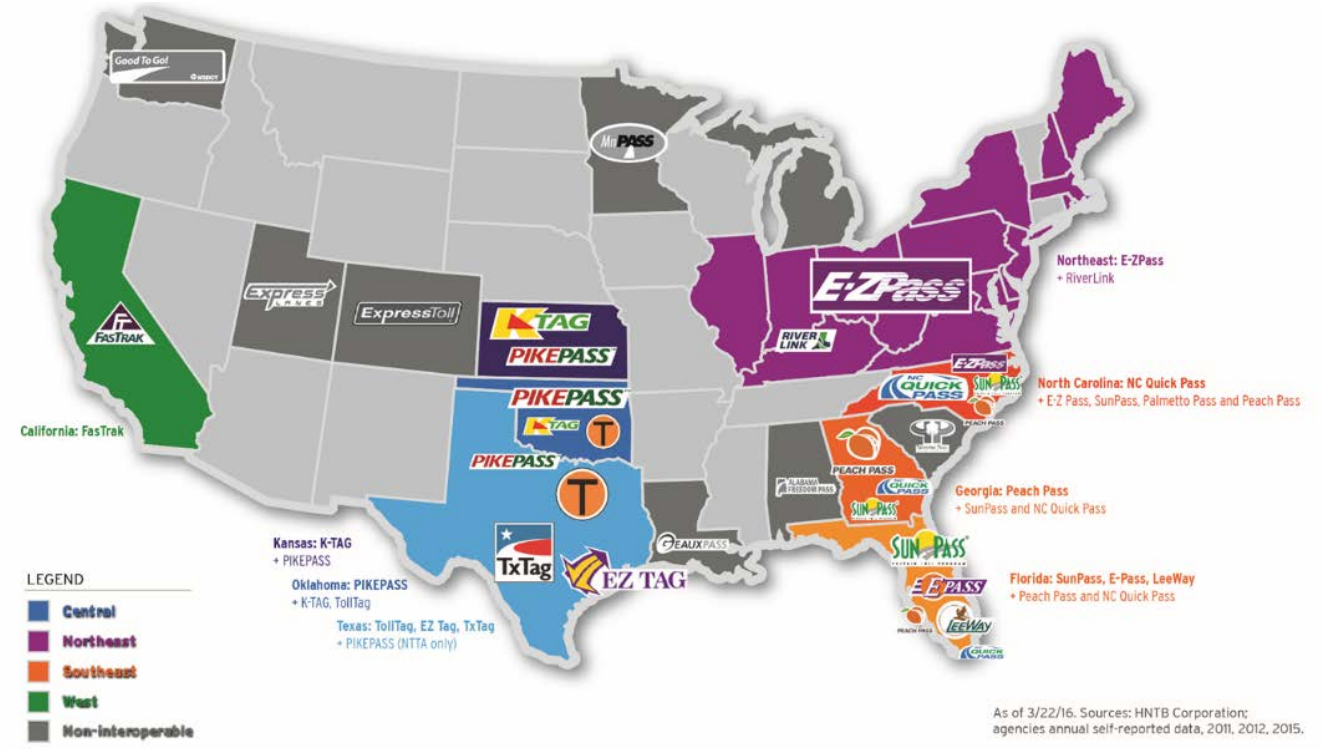
Most agencies have adopted a civil or quasi-civil process for enforcing toll violations similar to those for parking violations. Imposing typical enforcement remedies on toll violators such as vehicle registration blocks, suspension of driving privileges, vehicle impoundment and vehicle forfeiture is difficult across state lines. Collaboration among multiple entities and across state lines is needed to improve revenue collection when using an ETC system. An example of multistate coordination lies within the Interstate 95 region where the states of Maine, New Hampshire and Massachusetts have entered into agreements for reciprocal enforcement of out-of-state vehicle toll violations.

Interoperability

National toll interoperability means that a driver with a transponder and registered toll account can travel on any toll road in the United States and seamlessly pay the tolls. The map in **Figure 7** shows the regional nature of toll interoperability progress in the U.S. Currently there are seven primary tolling protocols in use across the country that roughly approximate distinct geographic regions.

There have been increasing calls from both within and outside the tolling industry to transition away from the regional model to a single, national interoperable tolling model. When Congress passed the MAP-21 Surface Transportation Act, language was included mandating that tolling authorities become interoperable by October 2016. While interoperability is in progress in many regions, it is not yet complete nationwide. The states with similar colors have statewide and regionally interoperable systems. However, national interoperability is still in progress. States that are shaded grey are not interoperable with other toll systems.

Figure 7: National Interoperability Map



Two primary obstacles must be overcome to meet the federally mandated interoperability requirement. The first is the technological investment required to make the seven current protocols communicate effectively with one another. From a technology standpoint, there are several combinations of transponders and multiprotocol readers that would allow for national interoperability. The challenge is that toll agencies have invested millions of dollars in their current protocols, and millions more will be needed before national interoperability is achieved.

The second challenge is ensuring that toll agencies have business rules that are compatible with one another. Currently, each agency or regional collection of agencies has business rules that spell out vehicle classification, define “high-occupancy,” and dictate how and when toll monies will be transferred among themselves. For true national interoperability can be achieved, all toll agencies would have to adopt changes to their individual rules.

Priced Managed Lanes

Managed lanes on a highway facility use strategies to control access points, vehicle eligibility (using type or occupancy requirements) and congestion pricing. Priced managed lanes use congestion pricing and offer drivers the option to pay a toll for using a less congested lane. Since these lanes are often adjacent to general purpose lanes that are congested, they are typically referred to as express lanes. The pricing of managed lanes frequently includes a discount, or even free passage, for a high occupancy vehicles. In this case, they are typically referred to as high-occupancy toll lanes, or simply HOT lanes. The concept of priced managed lanes is emerging as a way to address gridlock in urban regions across the country. The congestion pricing used with these types of lanes helps control the number of vehicles in a given lane and offers customers a more reliable trip time.

MnPASS is the name of Minnesota's system of HOT lanes. MnPASS lanes charge solo motorists during peak travel times while transit, motorcycles and vehicles with two or more occupants may drive in the lanes for free. Solo motorists must have a MnPASS account and tag. Outside of peak travel times, the lanes typically operate as regular, general purpose lanes that are open to all traffic.

P3 Delivery Models for Toll Projects

As available funding for transportation projects diminishes, states and the federal government have turned to the private sector for assistance in implementing and financing roadway and transit projects through public-private partnerships. P3s take on many different combinations of private sector involvement in the delivery of transportation projects. Many states use a design-build procurement to transfer risks and accelerate project schedules, generally reducing construction timeframes and project costs. Some states have taken design-build one step further by introducing project financing. Design-build-finance models include a role for the private sector to provide financing for the project, with the private sector waiting for a lump sum payment from the state upon completion of the project or according to a pre-determined payout term.

Another option is for the private sector to provide long-term financing along with project lifecycle responsibilities for operations and maintenance through design-build-finance-operate-maintain P3s. A toll concession DBFOM transfers toll revenue risk to the private sector. The private sector retains all toll revenues as payment for financing the construction and performing operations and maintenance responsibilities. An availability payment DBFOM is structured where the public owner makes annual contractual payments to the private sector to repay the construction financing and operations and maintenance responsibilities over a 10 to 35-year timeframe. An availability payment project can have a tolling component to offset all or a portion of the annual payments but it is not required. For an availability payment transaction, the public owner retains control over toll rate setting and all toll revenues.

All of these models are used for the development of toll roads. Toll roads can provide a revenue stream not only to support repayment of bonds, but also to pay back the private sector's equity contributions for the project. These concession models provide for design-build-finance and operation and maintenance of the road during the life of the agreement. Under this scenario the toll road is still publicly owned but the private sector has greater involvement and control over asset maintenance, operations and setting of toll rates.

While public-private partnerships will not be the solution to all infrastructure needs, P3s may help advance regionally significant projects.

Impact of Automated Vehicles

Advances in automated vehicles and connected vehicles will impact toll development and operation. In limited areas AVs and CVs are currently operating in the United States. Autonomous vehicles have a self-driving mechanism. Connected vehicles are able to send and receive signals to and from other vehicles and technology on the roadway. While there are only a limited number of AVs and CVs commercially available at this time, industry experts anticipate this will change and these vehicles will increasingly become a larger part of the

automotive fleet. These vehicles may enhance mobility and can increase safety for motorists and pedestrians on the road system.

The possible impacts of AVs and CVs is the subject of great debate. Many experts contend that as AVs and CVs become more prevalent, the total number of vehicle miles traveled in the United States will increase as drivers find using an AV or CV is more pleasant than driving since the vehicle will do some, or all of the work. Others strongly disagree with this view and contend that new technologies will reduce the number of vehicle miles traveled.

Personal ownership of vehicles is also likely to be impacted as some contend commercial fleets and self-driving pods of vehicles will play a larger role in transporting people and goods. Under this scenario, ownership of vehicles becomes more centralized and it is reasonable to expect that fleet owners will demand greater improvements in vehicle fuel efficiency, putting further downward pressure on traditional motor fuel tax revenues.

In the tolling industry, technological advancements are making collection of tolls more efficient and increasing the feasibility of tolling as a viable and sustainable source of transportation funding. The same is true in the realm of AVs and CVs, where technological improvements, combined with ride sharing technologies, make a future of large commercial fleets dominating individual car ownership more and more likely.

Since AV/CV technology is advancing so rapidly, it will be difficult for policy makers and regulators to keep pace. It is important, however, for tolling and transportation officials to monitor these technological advancements and consider how it will impact operations in the future. Since tolling and AV/CV are both technology driven, the ability to capture revenue for transportation purposes via user fees should be compatible.

Case Studies

Tolling has expanded gradually since the first U.S. toll road, the Philadelphia and Lancaster Turnpike, opened in 1792. The gradual expansion has included implementation of tolling by turnpike authorities, port authorities, regional mobility authorities, state DOTs, municipalities and other government agencies. This resulted in differing statutory frameworks, governance structures, administration, development and implementation of toll facilities and systems. The different reactions to advances in technology and changing financial climates also contributed to this diversity.

Despite this diversity, the basic concepts are generally consistent. These basic concepts include a grant of authority to toll, definition of the tolled system, a clearly established governance structure, requirements on how toll rates are set, authorization of bonding or other system finance, requirements for contracting, effective enforcement of toll payment, limitations on the use of data collected during an electronic toll transaction and criteria for data retention.

This section includes case studies of six tolling authorities: Washington State Department of Transportation, Florida's Turnpike Enterprise, Illinois State Toll Highway Authority, North Tarrant Express Mobility Partners, Central Texas Regional Mobility Authority and Harris County Toll Road Authority.

Washington State Department of Transportation

Description/Statistics

Washington State DOT has collected tolls since 2007. They currently operate tolling facilities on approximately 40 centerline miles of roadways and bridges, collecting $36 million in revenue on 141 million transactions. Washington primarily uses tolling as a means to manage congestion and enhance mobility, although tolling does generate revenue for future infrastructure improvements. WSDOT uses a variety of toll rates to manage congestion including time of day pricing and dynamic pricing. WSDOT currently operates four toll facilities: the SR 520 Bridge, the Tacoma Narrows Bridge, the SR 167 HOT lanes and the I-405 express toll lanes. Drivers who want to use WSDOT tolled facilities open a prepaid Good To Go! account to receive the lowest toll rates, or they elect to be invoiced by mail and pay a higher rate. Drivers on the Tacoma Narrows Bridge still have the option to pay their toll with cash.

Governance

Toll highways and bridges in the State of Washington are currently operated by the WSDOT Toll Division, rather than a separate regional or statewide toll authority. Therefore, toll operations fall under the purview of the Secretary of Transportation, who is appointed by the governor and confirmed by the state legislature. The Toll Division was established in 2009 to operate recently opened and planned toll facilities. Previously, starting as far back as the mid-20th century, 14 toll bridges were built and financed by the Washington Toll Bridge Authority, and later operated by the Highways Department, a predecessor to modern-day WSDOT.

While WSDOT operates the toll facilities, the Washington State Legislature determines which facilities are authorized for tolling. The toll rates charged to motorists are set by the Washington State Transportation Commission. The seven appointed members of the WSTC serve staggered six-year terms and are selected by the governor, while the Secretary of Transportation and a representative from the governor's office serve as ex-officio members. The WSTC also prepares the state's 20-Year Transportation Plan and sets the fares for Washington State Ferries.

Financing

- Issues toll revenue bonds with additional state general obligation and motor fuel tax pledge
- Secured a federal TIFIA loan

Legislation

- Legislative authority includes a mandate that the Department of Transportation consider toll implementation options that eliminate tollbooths and provide for interoperability with other systems. Wash. Rev. Code 47.56.030(1)(d)
- Legislative or voter approval is required on a project specific basis. Wash. Rev. Code 47.56.031
- The toll violation process is established by administrative rule and fees are tied to the facility where the violation occurred. Wash. Rev. Code 47.56.795(6)

Features

- Tolled an existing bridge while a new bridge was under construction
- Used tolling to finance new SR520 bridge (opened with AET in 2011)
- Transitioned to a statewide customer service center

- Implemented a managed lane system in the Seattle area (I-405 Express Toll Lanes opened with AET in 2015)

Florida Turnpike Enterprise

Description/ Statistics

Florida has numerous toll authorities. Florida's Turnpike Enterprise is the oldest and largest toll authority in the state. Recently Florida moved to consolidate back-office operations for all toll transactions in the state to a single back-office. The effort is meant to drive costs down by capturing economies of scale discounts on over one billion transactions annually.

The FTE dates back to 1953, although it underwent a series of organizational and administrative changes since then. The FTE collects tolls on approximately 480 miles of roadway and bridges generating $866 million in revenues on 768 million transactions. The FTE operates several facilities that collect tolls by AET, although some facilities still allow cash collection.

Governance

The FTE operates as a separate business unit of the Florida Department of Transportation. It was created in 1953 as the Florida State Turnpike Authority. Under the FSTA, the state's first toll road, the Sunshine State Parkway (now part of Florida's Turnpike), was built and opened in 1957. The FSTA was incorporated into the newly-formed FDOT in 1969, with operations of various segments of the turnpike managed by the individual districts within FDOT. In 1988, the Office of Florida's Turnpike was created to oversee renovations and improvements to the turnpike. The FTE was established in its current form in 2002, when the Florida Office of Toll Operations, formerly a separate state agency, was folded into the FTE. The FTE is led by an executive director/CEO who is selected by the Secretary of FDOT.

Legislation

- Toll rates are established through the administrative rulemaking process which requires public hearings. Flor. Stat. 338.231
- When bonds are repaid, the turnpike system remains subject to sufficient tolls to pay the cost of the maintenance, repair, improvement and operation of the system and the construction of new turnpike projects. Flor. Stat. 338.232
- Employees of the FTE are exempt from certain public employee requirements. The director must have proven financial experience. Flor. Stat 338.2216
- The FTE has all the powers of the Department of Transportation. Powers specifically granted to the authority are supplemental to the powers of the department. The authority's powers supersede those of the department in the event of a conflict. Flor. Stat. 338.2216

Features

- Started using ETC in 1999 (SunPass)
- AET implementation on the Homestead Extension of Florida's Turnpike, Sawgrass Expressway and Veterans Expressway
- Statewide interoperability

- Regional interoperability with Georgia and North Carolina
- Express lanes on Interstate 95 and Interstate 595
- Express lanes on a toll facility (Homestead Extension of Florida's Turnpike, or HEFT, and Veterans Expressway)

Illinois State Toll Highway Authority

Description/ Statistics

The Illinois State Toll Highway Authority opened its first toll road in 1958. ISHTA operates a mature network of 286 miles of centerline roadway, collecting $969 million in annual toll revenues on approximately 838 million transactions. ISHTA uses a mix of cash lanes and open road tolling, with a differential toll rate that rewards customers using the prepaid I-Pass account and transponder.

Like many U.S. turnpike authorities established during the 1950's and 60's, the original 187-mile ISTHA system was planned to become a toll-free system once bonds were repaid. To provide for operation, maintenance, renewal and rehabilitation, and to ensure available funding exists for needed future expansion, tolls have remained in place. This approach allows ISHTA to provide motorists the traveling experience to which they have become accustomed. It also allows ISTHA to remain financially independent from the Illinois Department of Transportation.

Governance

The Illinois State Toll Highway Commission was established in 1953, five years before the opening of the first sections of the Tri-State and East-West Tollways. ISTHA replaced the commission in 1969. ISTHA is a revenue bond-financed administrative agency of the State of Illinois. It is governed by an 11-member board of directors. The governor and the Secretary of Transportation serve as ex officio members. The chair and eight other directors are appointed by the governor with advice and consent of the Illinois Senate and serve staggered four-year terms. No more than five of the directors appointed by the governor may be from one political party. The board of directors hires an executive director for ISTHA, which does not require legislative approval.

Legislation

- ISTHA may exercise all the powers under the Public-Private Partnerships for Il. Code 605 10/11.1
- Governor approval is required before commencement of any engineering and traffic study or studies to determine the feasibility of constructing additional toll highways. An advisory committee must be created for each county in which additional toll highways are being planned. Il. Code 605 10/14
- The governor must appoint an inspector general for toll highways. Il. Code 605 10/8.5
- In 2011, the law required ISTHA to develop and maintain a privacy policy to protect information collected through electronic toll transactions. Information identified in the privacy policy is exempt from disclosure through the state's public records laws. Il. Code 605 10/19.1

Features and Projects

- ISTHA has completed four years ($4.2 billion) of a 15-year $12 billion capital improvement program (Move Illinois Program)
- I-90 Widening and Reconstruction
    - 62 miles

    - Traditional design-bid-build

- Elgin O'Hare Western Bypass
    - 15 miles of new six-lane tolled roadway
    - Traditional design-bid-build

- ISTHA is working to develop legislation for authority to use construction manager/general contractor or design-build.
- The first priced managed lanes in the Chicago region are in the planning and development on I-55 and I-290.

Texas Department of Transportation - North Tarrant Express Mobility Partners

North Tarrant Express is a consortium of private and public interests responsible for the financing, development and construction of a range of design/build and P3 projects in Texas. The consortium includes CINTRA U.S. (private sector transportation infrastructure developer and U.S. arm of Cintra, a subsidiary of Madrid-based Ferrovial), North Tarrant Infrastructure, LLC (a joint venture of Ferrovial Agromania US Corp and Webber LLC), Meridien Infrastructure (public-private partnership investor/developer of public facilities), and the Dallas Police and Fire Pension System.

Development of the North Tarrant Express 35W includes 10 miles of reconstructed main lanes, expanded and improved frontage roads and construction of four managed (TEXpress) lanes along the I-35 West corridor from downtown Fort Worth/I-30 to US 287. NTE 35W is a public-private partnership with the Texas Department of Transportation through a comprehensive development agreement. NTE Partners is responsible for the design, construction, financing, operation and maintenance of the project from I-30 through the I-820 interchange, which reached substantial completion in 2017. TxDOT was responsible for the financing and construction of the northern segment from the I-820 interchange to US 287, which reached substantial completion in December 2016. The 35W NTE project from US 287 to Eagle Parkway is the next segment of the NTE regional system to move forward in project development. TxDOT originally anticipated authorizing NTE Mobility Partners to begin development of the next segment of 35W NTE in September 2017. To date, financing and development agreements continue to be negotiated and work has not been authorized to proceed.

The NTE 35W project is one piece of the overall NTE system which includes the development and implementation of 13 miles of managed lanes on I-820 and State Highway 121/US 183 Airport Freeway. The 35W managed lanes piece is designed to seamlessly connect to I-820, and Airport Freeway TEXpress lanes opened in 2014 nine months ahead of schedule. Project cost for the I-820 and SH 121/US 183 Airport Freeway NTE project was $2.1 billion; 35W NTE project cost is $1.6 billion.

Governance

The entire project from I-30 to US 287 is owned by TxDOT, and is operated and maintained by NTE Mobility Partners through the 52-year lease arrangement. Toll rates are set by NTE and are governed by internal rate of return provisions. As is required by law, the toll rate setting methodology is laid out in the comprehensive development agreement.

Financing

The Texas funding contribution was nearly $800 million and included TxDOT's state highway fund and $135 million in Proposition 14 funding, voter-approved bonds backed by the state highway fund (i.e., future gas tax revenues). Funding tools used in the I-820 and SH 121/US 183 improvements also included private activity bond financing and a Transportation Infrastructure Finance and Innovation Act loan. The Dallas Police and Fire Pension System is the first such pension system in the U.S. to invest in the building and maintenance of a major toll road project like the NTE.

Legislation

Comprehensive development agreements were authorized in the State of Texas in 2003 and are governed primarily by the provisions of Texas Transportation Code, Chapters 228 and 371. Chapter 228 defines which projects may be developed through a CDA, and Chapter 371 describes certain required terms for CDAs and processes that must be followed. Since that time, TxDOT has entered into CDAs with over a dozen groups, ranging from full concession CDAs (such as NTE) that allows the roadway to be operated as a tolling business to simple design-build CDAs. CDA authority is granted by the Texas Legislature on a project specific basis. Only projects specifically identified by the legislature can be advanced with a CDA. During the past several legislative sessions, the authority for projects previously authorized but not advanced by the agency were renewed by the legislature. However, the 2017 legislature did not renew CDA authority for these projects. As a result, CDAs may not be used for any project after August 2017 without further action from the legislature.

Features

For the I-820 and Airport Freeway segments of NTE, more than 100 companies from North Texas and other parts of the state worked on the project, including 90 disadvantaged business enterprises. Many are now working on the 35W element.

Central Texas Regional Mobility Authority

Description/Statistics

The Central Texas Regional Mobility Authority was created by Williamson and Travis counties and approved by the Texas Department of Transportation in 2002 (the first Regional Mobility Authority approved in Texas). The CTRMA currently operates the following four toll facilities in Central Texas:

- US 290 – 6-mile toll road from US 183 to SH 130 in Travis County
- MoPac Express Lane – 11-mile managed lane between Parmer Lane and Cesar Chavez Street in Travis County (northbound lane from Ranch to Market Road 2222 to Parmer Lane currently open; remainder of the project opened in 2017)
- US 183A – 11-mile toll road from existing US 183 at RM 620 through Cedar Park and Leander to existing US 183 in Williamson County
- SH 71 – 4-mile toll road from Presidential Blvd to SH 130 in Travis County

With the exception of one direct connector bridge financed in cooperation with TxDOT, the CTRMA develops toll road/managed lane facilities in Travis and Williamson counties in the central Texas area and relies on a combination of financing mechanisms in partnership with the state, federal government, regional planning organization and local entities.

Governance

CTRMA is overseen by a seven-member board of directors, which provides policy direction and approves project priorities. Three members from each county are appointed by the respective Commissioner Courts and the chairman is appointed by the governor. Day-to-day operations are managed by CTRMA staff and private sector contractors with specialized expertise providing support for specific individual projects.

Financing

Financing for CTRMA is typically accomplished through the use of revenue-backed bonds, with the enhancements of toll equity loan/grant funding from TxDOT, grants from the regional planning organization and/or local entity cost participation, based on the specific project. For example, the MoPac Express Lane project from Cesar Chavez Street to Parmer Lane received grant funding from the Capital Area Metropolitan Planning Organization and TxDOT. In return, the CTRMA set up a regional infrastructure fund and over the next 25 years will deposit $230 million into the fund. Funds can then be allocated to other transportation projects in the region. For the US 183 South Expressway, financing was accomplished through a combination of revenue bonds, TIFIA loan and TxDOT toll equity grant. For the SH 45 SW toll road, Travis County voters approved a bond measure to purchase right-of-way in 1997. Hays and Travis counties contributed $20 million for design and construction of the project, TxDOT provided a toll equity grant and the CTRMA received a loan from the state highway fund to complete project funding.

Legislation

Created in 2001, the powers of RMAs were significantly expanded in 2003. Since that time, TxDOT approved the creation of nine RMAs. The powers of RMAs outweigh the powers of TxDOT to develop, finance, own, operate and maintain a variety of tolled or non-tolled projects, ranging from roadways to ports, utilities, transit facilities and airports. RMAs are governed by the provisions of Texas Transportation Code, Chapter 370, Regional Mobility Authorities.

Features

- CTRMA has several projects in development, including:
    - US 183 South Expressway
    - US 183 North Expressway
    - SH 45 Southwest
    - US 290/SH 130 Direct Connectors)
    - Oak Hill Parkway
    - MoPac South

With the opening of the SH 45 Southwest toll road, toll tag interoperability will be in place with several states, including Kansas, Oklahoma, Louisiana, Georgia, North Carolina and Florida. This is part of an overall effort to have all-electronic toll tags in the southeast and west interoperable by 2018.

Texas - Harris County Toll Road Authority

Description/Statistics

The Harris County Toll Road Authority was created in 1983 by the Harris County Commissioners Court. Voters approved up to $900 million in bonds to construct, operate and maintain toll roads in the greater Harris County

metropolitan area. The initial system included the Hardy Toll Road, a 21-mile reliever route to I-45 with a spur to the George Bush Intercontinental Airport and the Sam Houston Tollway, which is now an 88-mile nearly completely tolled loop or beltway system in the Houston metropolitan area. The HCTRA system includes the following:

- Katy Freeway Managed Lanes – 12 miles of managed lanes in the center of the reconstructed I-10 from I-610/West Loop to SH 6
- Tomball Tollway – Six-mile toll road from Spring Cypress Road to northern end of the Tomball Bypass; SH 249 serves as free frontage roads for the Tollway
- Westpark Tollway – 20-mile toll road from Uptown Houston to Grand Parkway (SH 99); the nation's first all-electronic toll road; Fort Bend County Toll Road Authority operates the western-most six miles of the facility
- Fort Bend Parkway Extension - 7.5-mile toll road from north of the Sam Houston Tollway to SH 6; toll road is jointly operated with Fort Bend County Toll Road Authority
- Two tolled direct connectors at SH 242 and I-45 – HCTRA collects the tolls for these ramps that are owned by the Montgomery County Toll Road Authority

Governance

HCTRA is overseen by the Harris County Commissioners Court, which provides budgetary control and oversight, policy direction and approves project priorities. HCTRA staff manage day-to-day operations. HCTRA is one element of the Harris County Public Infrastructure Department that also includes the Harris County Engineering Department and Harris County Flood Control District.

Financing

HCTRA is a county enterprise fund that relies on toll revenues to fund the costs of operations, debt service and future projects. Harris County prepares and adopts an annual budget for the authority that serves as the financial plan. Voters approved a one-fourth cent pledge of property tax when the $900 million in bonds were approved; however, that funding mechanism was never implemented but serves as a strong aid during the revenue bond financing process. HCTRA partnered with Montgomery County Toll Road Authority in development and toll collection, including operation of the direct connectors at SH 242 and I-45 and Phase II of the Tomball Tollway to Spring Cypress Road in Montgomery County, a project developed through a construction, operation and maintenance agreement with TxDOT.

HCTRA operates on a system financing basis in the development and funding of projects, but has county support for any liens. Gross toll revenues are first pledged to debt repayment and the county bears any risk of insufficient revenue to cover project operations and maintenance expenses. For secondary debt, the county is obliged to cover any insufficient revenue to make all other debt service payments. Harris County's direct support and equity interest in the toll road system allows HCTRA to distribute surplus revenues to county road projects. After the debts are paid, project expenses are satisfied and reserve accounts are covered; any surplus revenues are transferred to the surplus fund. Surplus revenues are used for county projects including roads, parks and other improvements. Transfers in recent years have been about $120 million to fund non-toll roads or other projects.

Legislation

The Harris County Commissioner Court created HCTRA using Chapter 284 of Texas Code. Chapter 284 authorizes certain counties (and local government corporations), based on population or location with regard to the Gulf of Mexico or Mexico, to develop, finance, construct, operate, maintain or pool a project (causeway, bridge, tunnel, turnpike, highway, ferry or any combination of those facilities, and a turnpike project or system). Chapter 284 also authorizes certain counties and local government corporations to enter into CDAs with private entities to design, develop, finance, construct, maintain, repair, operate, extend or expand a proposed or existing project in the county in the manner applicable to TxDOT under regional tollway authority or CDA provisions.

Features

HCTRA has several projects in development, including:

- Hardy Toll Road Downtown Connector – from I-610 North Loop to Downtown
- Hardy Toll Road Interchange at Beltway 8
- Sam Houston Tollway Southeast Widening – from SH 288 to I-45 South
- Sam Houston Tollway East Widening – from I-45 South to SH 225
- Sam Houston Tollway (Ship Channel Bridge) Widening – from SH 225 to I10 across Ship Channel Bridge
- US 290 – I-610 to SH 99 (being developed by others)
- Tomball Tollway Phase II – SH 249 north of Farm to Market Road 2920 to Harris County Line

Policy and Legal Considerations

Any expansion of tolling in Minnesota would require careful consideration of multiple policy and legal issues. This section provides information to address those issues if tolling is chosen to generate revenue for the transportation system. The analysis is divided into five parts, (1) summary of existing federal toll programs, (2) examination of considerations related to the National Environmental Policy Act, (3) overview of existing Minnesota tolling authority, (4) policy considerations and (5) statutory examples from other states.

Federal Tolling Programs under 23 U.S.C. 129

Since the creation of the federal tolling program in 1958, most of the prohibitions against tolling of federal highways were removed. Interstate tolling restrictions were removed for new capacity construction, bridge/tunnel rehabilitation and reconstruction and conversion of high-occupancy vehicle lanes. While restrictions remain on the tolling of interstate highways, those restrictions continue to be relaxed. Recent federal highway acts, including TEA-21 (1998), SAFETEA-LU (2005), MAP-21 (2012) and FAST (2015), eased restrictions in general and allowed specific pilot and demonstration projects for interstate tolling.

Some of the changes to the federal tolling program for interstates include the ability to convert high-occupancy vehicle lanes to high-occupancy toll lanes and the ability to toll existing bridges and tunnels that were reconstructed. The Interstate System Reconstruction and Rehabilitation Pilot Program was created by TEA-21 and allows tolls to be implemented on three reconstructed interstate facilities. The states that originally applied for and received the three available slots had their provisional approval revoked by FHWA due to the changes contained in the FAST Act requiring states to demonstrate progress towards implementation. On Oct. 20, 2017, USDOT issued a Federal Register notice to solicit applications for up to three slots in the pilot program (applications are due on Feb. 20, 2018). As a result of these and other changes, the number of state departments of transportation that have tolling operations is expected to expand in the coming decades as conventional funding sources diminishes.

NEPA and MEPA

The National Environmental Policy Act (42 U.S.C. §4321 et seq. (1969)) establishes a framework to protect the environment. Although it may not seem related to tolling, in fact the law requires efforts to address social, economic and environmental issues when adding tolling to new or existing general-purpose lanes of interstates and freeways. NEPA has requirements to protect the environment during project development and during the decision-making phase.

Transportation and environmental planners use NEPA to evaluate impacts of their programs and projects including commitments to avoid or mitigate adverse impacts. Social, economic and environmental concerns are assessed and addressed through compliance with NEPA during project development, preliminary and final engineering, design and construction. There are many environmental laws, regulations and polices considered under the NEPA process satisfied by MnDOT as it delivers its federally funded program of projects. Addressing NEPA requirements related to tolling existing general-purpose lanes of interstates and freeways will require

additional efforts to address social, economic and environmental issues which may not be implicated in traditional non-tolled projects.

When a transportation project significantly affects the quality of the human environment, NEPA requires preparation of a document called an Environmental Impact Statement. The EIS includes information on the purpose and need for the project and an evaluation of alternative options that could avoid or lessen the environmental impact, including the option of not building at all. Courts consistently give deference to agency decisions when projects or programs are challenged during the environmental review phase. This increases the importance of high-quality documentation in developing the EIS.

The requirement to comply with NEPA is triggered by any project that uses federal funds or is a project on the interstate or national highway system. Projects outside these categories are subject to Minnesota environmental requirements set forth in Minn. Stat. Ch. 116D.

Including Toll Projects in Transportation Planning

During a tolling project's development, a purpose and need statement, along with goals and objectives, can be developed during the transportation planning process. The purpose and need statement and the goals and objectives then guide the alternatives analysis required by NEPA. Quality transportation planning defines and narrows the scope of "all reasonable alternatives" to be considered. Transportation agencies may define a project's purpose and need and the range of alternatives based on the objectives described in an approved regional transportation plan, and in certain circumstances, may be able to rely on socioeconomic projections created by the metropolitan planning organization to form the basis of both the action and no-action alternatives (See *Protecting Arizona's Resources and Children v. Federal Highway Administration,* No. CV-15-00893 (D. Ariz. Aug. 19, 2016).

Including tolling projects in transportation plans enables decisions on a range of alternatives that can advance into the NEPA phase for detailed analysis. Socioeconomic data and forecasting conducted by the metropolitan planning organization may also be used to demonstrate a project's potential impacts to social conditions and communities. Toll projects often face additional scrutiny for effects to community cohesion and environmental justice and this data will be the basis for technical analysis.

Environmental Justice Requirements

Executive Order 12898, signed in 1994 by President Clinton, instructs federal agencies to address the environmental effects of agency actions on minority populations and low-income populations. An evolving area of analysis related to tolling involves compliance with this executive order. Environmental justice communities are certain racial and ethnic minority groups and low-income individuals that have historically borne disproportionately more adverse impacts from federal projects than the general population as a whole. To help address this inequity, Executive Order 12898 mandates that federal agencies evaluate the adverse impacts that will result from projects and the distribution of those negative impacts among the impacted population. If the adverse impacts of the project are anticipated to fall disproportionately on environmental justice communities, the federal agency must evaluate and recommend strategies to minimize and mitigate those disproportionally high adverse impacts.

For transportation projects, the US DOT requires that federal projects incorporate the mandates of Executive Order 12898, NEPA and Title VI of the Civil Rights Act of 1964. As projects undergo the normal environmental review process for air quality impacts, noise impacts, water impacts and various other environmental factors, an analysis is also performed on the impacts of tolling if tolling is part of the project's plan of finance. The tolling impact analysis typically focuses on how the cost of a trip changes with the imposition of a toll. Some users may elect to pay the toll, while other users may elect to avoid the toll even if that results in extra travel time in order to take a non-tolled alternative.

Determining Environmental Justice Impacts

With toll projects, the disclosure of potential benefits and burdens is important for addressing Executive Order 12898. Toll equipment locations determine the possible on and off decisions (i.e. entry and exit points), which could cause traffic diversions and off-system indirect impacts. Decision makers may need to examine alternative toll access locations due to, among other considerations, the results of traffic diversion, travel demand model analysis and public outreach. Alternatives analysis may take the form of testing scenarios for different toll locations or access points. Toll diversion may have indirect impacts on local and state roads and it will be necessary to understand and disclose potential impacts. Tolling projects add a social element that often requires additional analysis and consideration of the issues raised by the public.

Developers of transportation projects can comply with Executive Order 12898 by disclosing potential project impacts prior to opening a toll project to traffic and during the ongoing monitoring of the toll project. While individual socioeconomic characteristics of each user are unknown, a corridor trip profile can be established. A comparison of trips from different census block groups can determine if there is a statistically significant difference between trips from groups of a certain income classification or predominant racial makeup. This allows analysis to be conducted between trips from low income and non-low income and minority and non-minority areas. Understanding the socioeconomic profile from the travel demand model is one way to determine if disproportionately high and adverse impacts are borne by environmental justice communities.

It is also important to understand traffic diversion due to tolling. Potential increases in vehicles in low-income and minority areas may affect safety and air quality due to these changes in travel patterns and may require the development of mitigation strategies. Performing technical analysis and public outreach to specific areas within the travel shed that are predominantly low income and/or minority communities helps inform decision makers. The information gathered offers opportunities to avoid negative impacts or develop alternatives to mitigate those impacts. Toll policy, toll rates and tolled trips are important to understand within this framework to create more informed preliminary design decisions. In addition, data collected before opening a toll project to traffic and during operation can establish the basis for programs to mitigate disproportionately high and adverse impacts from tolling if these are demonstrated to occur.

Mitigating Environmental Justice Impacts

Mitigation strategies may be necessary to offset negative project impacts. Additionally, public outreach may result in the need to adjust the project's design or to develop mitigation plans to address particular impacts resources. There are several strategies available for mitigating the potential environmental justice impacts of tolling. One commonly used strategy in an all-electronic tolling environment is to enhance outreach to the environmental justice community to educate individuals on the benefits of, and encourage the use of,

transponder technology. This has the potential to increase usage by explaining how the system operates, where to register for a transponder and what the potential benefits are. This may reduce the overall toll burden by allowing customers to take advantage of the lowest possible toll rates. A second common strategy includes accepting cash at customer service center or retail partner locations as a toll account replenishment option, which removes a significant participation barrier for unbanked and underbanked members of the environmental justice community. Other strategies include marketing campaigns and roadway signage in environmental justice areas that inform travelers about non-tolled alternatives.

Innovative programs such as linking toll and transit trips and providing credits to customers to travel at different times of the day are also being explored by different tolling entities. As FHWA has focused more attention on environmental justice concerns in recent years, some agencies have considered programs to provide free or reduced cost tolls to qualified individuals. Initiating such a program requires careful consideration and planning around how to define qualified individuals, how to accurately and efficiently administer the program, what the overall impact to revenue would be and how the program would be viewed in terms of overall fairness and equity.

Maintaining Environmental Justice Commitments During Project Delivery

Award for construction is a major milestone for toll projects. A detailed and realistic project schedule needs to be developed and monitored for progress continuously. Agencies must demonstrate that environmental commitments are satisfied throughout construction. Environmental commitments may take the form of mitigation or ongoing monitoring of potential issues identified during the NEPA and preliminary engineering phase. For example, tolling locations or access points and toll policy and potential mitigation strategies need to be cohesive. Environmental commitments made in the preliminary engineering phase are requirements to be satisfied during the final design and construction phases.

It is necessary to fully vet issues early to ensure commitments are achievable and capable of being implemented. With tolling projects, there may be particular commitments as a result of public outreach that must be embedded into the project implementation. It is important to be able to honor these decisions and mitigation plans. Federal and state policies are evolving related to toll projects. A proper decision framework and analysis is crucial to minimize the adverse impact of tolling on environmental justice communities, to achieve NEPA approval and for project implementation.

Overview of Minnesota Tolling Authority

Minnesota has existing authority to develop build-transfer-operate toll facilities, high occupancy toll lanes and dynamic shoulder lanes. This authority is set forth in Minn. Stat. 160.84 through 160.98.

TOLL FACILITIES
160.84. Definitions
160.845. Restrictions on toll facility
160.85. Authority for toll facility
160.86. Toll facility development agreement; requirements
160.87. Toll facility cost recovery
160.88. Public toll facilities

160.89. Toll facility revenue bonds
160.90. Law enforcement on toll facilities
160.91. Joint authority over toll facility
160.92. Toll facility replacement projects

HIGH–OCCUPANCY VEHICLE AND DYNAMIC SHOULDER LANES
160.93. User fees; high-occupancy vehicle and dynamic shoulder lanes
160.98. Prohibition on road and bridge privatization

When considering the conversion of existing non-tolled facilities to toll facilities, it is important to consider what changes may be necessary to existing law. Although existing law provides sufficient authority to successfully operate the MnPASS network and provide for the establishment of privately developed toll infrastructure, it does not allow for the conversion of general-purpose lanes to toll lanes.

Minn. Stat. 160.845 prohibits the use of existing highways for toll projects with some limited exceptions. It is unclear how the requirement in Minn. Stat. 160.92, related to management of MnDOT's six-year work plan, would apply to conversion projects and would need further analysis. Minnesota's existing statutory tolling framework does not generally address all of the regulatory considerations that must be contemplated by a modern tolling authority.

Under Minn. Stat. 160.93, subd. 4, it is a petty misdemeanor to operate a single-occupant vehicle in a designated high-occupancy vehicle or dynamic shoulder lane without paying the required fee. The statute also provides that the enforcement mechanism for violations is the system of enforcement for petty misdemeanor traffic offenses described in Minn. Stat. Ch. 169. Although Minnesota law provides clear direction for MnPASS and BTO revenue, it does not provide direction for revenue generated through the tolling of general purpose lanes.

The next section discusses areas where Minnesota law may be generally incompatible with tolling of general purpose lanes, and identifies and evaluates the major policy considerations involving tolling authority.

Policy Considerations

Use of Revenue

Tolling of interstates and other freeways is increasingly being evaluated as a transportation funding option. However, state and federal law can impact decisions related to developing a tolled interstate or freeway system. One of the primary ways that tolling is legally challenged relates to how toll revenue is used.

In the U.S., revenue generated by toll facilities is generally used to fund the costs of the facility. These costs include debt service, capital and maintenance costs and the costs of other associated activities such as administrative costs, traffic patrol and enforcement, toll collection, intelligent traffic systems operation and any other cost that could be considered necessary and proper for the administration of a toll facility. Funds are not generally diverted to other facilities or uses in significant amounts.

In many states, tolling revenue is restricted by statute as to where and how it can be used. The North Carolina Turnpike Authority and Washington Department of Transportation have clear requirements for use of revenue limiting the use to the place where the toll was collected.

However, in some instances, funds are taken from the toll system to fund other regional transportation programs or projects. For example, the Pennsylvania Turnpike makes annual transfers for state DOT and transit purposes. The Ohio Turnpike used two bond referendums to fund certain projects with a connection to the turnpike and the Harris County Toll Road Authority makes small annual transfers for local roads. In Washington State, a new bridge can be constructed within two miles of an existing bridge and both can be tolled and operated as one toll facility.

In certain circumstances, using toll revenue off system can result in legal challenges. For example, in 2015 a lawsuit was filed against the Ohio Turnpike and Infrastructure Commission related to toll increases that took effect in January 2014 to fund infrastructure projects for the Ohio Department of Transportation located off the turnpike. This case was based on state laws related to improper taxation. The Elizabeth River Crossing P3 project in Virginia had delays because of litigation challenging the use of toll revenue from an existing tunnel to reduce the toll rate on a new tunnel. That suit was also based on Virginia laws related to improper taxation.

Challenges to tolling arrangements can also arise from alleged violations of federal law including the Dormant Commerce Clause. In *Evansville-Vanderburgh Airport Auth. Dist. v. Delta Airlines, Inc.*, (405 U.S. 707, 715-17 (1972). The U.S. Supreme Court adopted a three-part test to determine whether state tolling practices violate the Dormant Commerce Clause. Under this test, a toll will be upheld as valid as long as it is reasonable. A toll is reasonable if it (1) is based on some fair approximation of use of the facilities, (2) is not excessive in relation to the benefits conferred, and (3) does not discriminate against interstate commerce. The Dormant Commerce Clause was recently used as the basis for a lawsuit alleging that diversion of toll revenue from the New York Thruway to fund operation and maintenance of the New York canal system was unconstitutional.

When making decisions related to the use of toll generated revenue, consideration of the limitations of both state and federal law is warranted. The most conservative and legally defensible approach to using toll generated revenue is to follow the lead of other tolling agencies and use toll revenue to fund financing, construction, operation and maintenance of the facility or system where the revenue is collected. In Minnesota, this may include clearly defining what the system is and restricting that revenue to the system similar to the way that MnPASS revenue is restricted to use on the various corridors.

This could include using tolls to fund specific projects, groups of projects, corridors or the entire system of interstates and freeways in Minnesota. Many toll authorities use toll revenue to fund auxiliary services that are reasonably related to the operation of the toll facility and for the most part this use has not been challenged.

Project Selection

Moving forward with toll conversion projects requires establishing a clear and transparent process explaining how decisions are made, how projects are selected and the phases towards full implementation. Since public outreach is a crucial element of the NEPA process, clarifying the process to receive public comment is prudent when considering the development of a tolled interstate system. Many transportation departments write project selection processes that include a number of criteria to be considered when evaluating projects for

construction. Many of these processes provide for public hearings. Some toll projects may impact local networks and so clarifying the roles local governments and metropolitan planning organizations have in the selection and phasing of toll projects may be prudent.

Rate Setting

The method by which toll rates are set varies from jurisdiction to jurisdiction. Generally, when tolling is administered by a department of transportation, toll rates are set by the department. When tolling is administered by a turnpike commission or some other type of board, toll rates are set by the commission or board. Some agencies are required to have public hearings and provide an opportunity for public input in the setting of toll rates. Although public involvement may be desirable, it can reduce flexibility in setting toll rates. This reduced flexibility can impact financing costs if toll financing is a component of a tolling program.

The setting of toll rates can also be the basis of legal challenges. This is especially true in the areas of discounted toll rates and differential toll rates. If the intent or the effect of these various toll rates is to benefit in-state users more than out-of-state users, they may be subject to challenge under the Dormant Commerce Clause or potentially the Privileges and Immunities Clause of the U.S. Constitution.

In developing regulations related to rate setting, allowing for as much flexibility in the setting of toll rates as is legally allowable is generally preferred. Precluding tolls based on geographic region, vehicle classification or direction of travel in enabling legislation is not recommended. Including exclusions from variable and dynamic tolls based on congestion or travel time, or preventing the ability to give discounts based on frequency of use is also not recommended. Providing discounted rates based on frequency of use is generally accepted and has withstood legal challenge. This type of discount can be used to mitigate environmental justice issues and provide relief to frequent users of the facility.

Other options to mitigate the impact of tolling includes providing a subscription based toll where unlimited travel on the facility is allowed in exchange for a flat monthly fee. The West Virginia Turnpike is currently considering allowing EZ Pass users to take advantage of this type of service. Allowing residents to deduct non-business-related toll payments from state income taxes is also frequently discussed as an option to mitigate the impact of tolls on residents of a state. This would require more significant changes to state law and may be difficult and costly to administer. From a technology perspective, toll system back office operators have the functionality to accommodate a wide range of account based discount programs. If a discount or other program is implemented to mitigate the cost to residents of Minnesota, the program should be carefully evaluated to ensure that it is legally sound.

Toll Collection / Video Billing

Several policy decisions need to be made to implement the types of tolling discussed in this study. Many of the decisions are unique to the use of all-electronic toll collection and some apply to tolling generally. One assumption used for the study is that converting existing interstates and freeways to tolled facilities requires the use of AET. This assumption is based on a variety of factors including safety, right of way constraints and FHWA requirements.

AET is the method of collecting tolls using transponders and/or license plate images without the option of the vehicle stopping to pay the toll with cash. To operate an AET facility, establishing procedures for processing both transponder transactions and image-based transactions is most efficient. These processes vary nationally depending on the needs of the specific agency. They are generally established by administrative rule or set forth in enabling legislation. These components are discussed in the sections below.

Video Billing – Registered owner responsible for toll

The video billing process takes an image of a vehicle's license plate. The image is used to identify the registered owner of the vehicle for billing. Language in statute or administrative rule making the registered owner the responsible party for the payment of tolls is essential for an efficient video billing process. This is essential because reliable technology does not exist to identify the driver of the vehicle, and when such technology does become available, there are likely to be significant privacy concerns surrounding its use.

Making the registered owner of the vehicle responsible for paying tolls is widely accepted for implementation of AET. For AET transactions involving video billing, enabling legislation or administrative regulations may specify that the transaction occurs when an invoice is sent to the registered owner of the vehicle rather than when the vehicle actually travels on the toll facility. Establishing a specific time for when the transaction occurs is a prerequisite for effective billing.

Identifying the Registered Owner

Using a video billing process allows the tolling authority to determine the registered owner with a variety of methods. The most obvious option for determining the registered owner for Minnesota residents would be to coordinate with the Department of Public Safety, Division of Driver & Vehicle Services for owner lookup. If used, this method allows for the use of commercially accepted vehicle look-up methods for out-of-state drivers or when records at DVS are not current. Adding the ability to skip the lookup completely and send an invoice to a verified address may be the lowest cost option for determining ownership. What constitutes a verified address can be established by law. Flexibility to use other technologies and options such as third-party lookup services may also be considered.

Notice

If a video billing process is adopted, clearly identifying the form of the customer invoice is important. At a minimum, invoices contain the date, time and location of the toll. The invoice may require a picture of the vehicle; however, if multiple transactions are included on the same invoice, it may not be efficient to include a picture for each transaction. Instructions about available actions to the registered owner once the invoice is received are included. Generally, these actions are to pay the toll or contest it. A discussion of contesting invoices is included below under enforcement. The process may also identify how the notice is to be delivered.

Many agencies send an invoice and one or two late notices before beginning collection actions. The number of invoices and late notices sent can be written into law or determined by the agency pursuant to administrative rule. Delivering the initial invoice and one late notice is standard practice before beginning collection actions. Processes related to timing of invoices and late notices vary dramatically from agency to agency. For some agencies, time periods for the initial invoice and for subsequent late notices are written into law. For some tolling facilities, the terms of late notices and collection actions are fully described in statute, although this limits

the agency's ability to adjust time periods to lower transactional costs. Allowing administrative flexibility to adjust procedures over time can facilitate optimal efficiency.

Administrative Fees

Video billing processes typically include escalating fees for each invoice and late notice. Fees vary but are set to reflect administrative costs. Some agencies have fee requirements that are included in statute and others have the flexibility to set fees. Retaining more flexibility at the agency level to set fees to recover administrative costs increases the efficiency of processing video billing transactions. These fees correspond to the increased costs of video billing transactions, so allowing the agency to set fees is prudent.

Leased and Rented Vehicles

Accounting for leased and rented vehicles in the video billing process is needed. Some agencies allow tolling charges to be transferred from the registered owner to the renter or lessee of the vehicle. However, there is a significant administrative burden to re-assign transactions. This is especially true when the owner and renter or lessee reside in different states. A more efficient approach is to retain the liability on the renting and leasing dealer instead of the driver. This would require the renting and leasing dealer to collect any toll payment from the driver pursuant to the rental or lease agreement. This limits the administrative burden of re-assigning transactions and would incentivize renting and leasing dealers to install transponders in leased and rented vehicles. Rental companies have started to use third-party vendors to manage toll transactions for their fleets. Video billing processes also typically provide relief for the owners of stolen vehicles. The owner is normally required to provide a police report or other evidence that the vehicle was stolen.

Exempt Vehicles

One consideration related to tolling generally and not specific to electronic toll collection or all-electronic toll collection is establishing exempt vehicles. This is an area that varies greatly from jurisdiction to jurisdiction. Public police and emergency vehicles are nearly universally exempted. Government vehicles are treated differently depending on the division of government. The important thing to remember when exempting vehicles is that every class of vehicles allowed to travel without charge impacts revenue. Exempting large numbers or different classes of vehicles can increase operational costs as exemptions are a type of exception transaction that generally require more human intervention than standard types of transactions. Additionally, to the extent that any non-government vehicles are exempt it can create fairness and equity issues and even issues with the Commerce Clause. Exempt vehicles are usually clearly identified in enabling legislation or administrative rules.

Signage Requirements

Tolling authority often includes signage requirements. Basic fairness demands that notice be given to customers prior to imposing a toll. However, in some cases if the signing requirement is too prescriptive it can be difficult and prohibitively expensive to install and maintain the required signs. For example, if signs providing notice are required before tolls are imposed, that may mean that for tolls that begin at the state's borders, signs must be installed in the adjoining state. Also, overly prescriptive requirements can result in multiple signs at entrance and exit ramps. This can clutter the ramps and make other signs related to safety less effective.

Other Administrative Considerations

Additional considerations that are not always contemplated during the development of legislation can have a significant impact on an agency's ability to efficiently collect tolls. Some toll invoices may not be capable of collection for a variety of reasons. It is important to consider the concept of "bad debt." The way in which bad debt is written off or otherwise handled requires discussion when legislation is developed. Some toll accounts might have funds but go unused for some period of time. Legislation or administrative rules may define when an account is considered dormant and what is done with funds remaining in dormant accounts.

Although AET has been in use for many years, innovation continues to occur. Laws and rules that provide sufficient contracting flexibility to allow an agency to take advantage of new processes is recommended. One emerging innovation is net revenue contracts where agencies contract with a private company solely responsible for collection of tolls and receive a percentage of revenue collected. Guaranteed revenue contracts are also starting to appear where a private company would take the entire risk of collection.

Enforcement of Non-Payment

Enforcement actions for unpaid tolls raise legal and policy concerns and can result in legal challenges. Increasingly, toll non-payment is being enforced through civil or quasi-civil proceedings. This can create a more streamlined process, but it can also create due process concerns depending on the penalties and appeal rights provided. The degree of due process required varies substantially from state to state and varies depending upon what penalties are imposed for a violation.

The Missouri Supreme Court[1] and Ohio Supreme Court[2] have ruled on the validity of enforcing traffic violations through a civil process. Although these cases are not controlling in Minnesota, they are good examples of what courts may look for if enforcement processes are challenged.

Pursuing a toll violation across state lines is difficult. Collaboration among multiple entities in numerous states is needed to achieve effective enforcement of electronic toll violations. An example of multistate coordination lies within the Interstate 95 region where the states of Maine, New Hampshire and Massachusetts have agreements for information sharing and reciprocal enforcement of out-of-state toll violations. However, state to state agreements can implicate the Compact Clause of the U.S. Constitution, which requires that certain types of agreements between states receive congressional approval. This should be considered if statutes authorize the department to enter into agreements with other states.

Privacy and Data Retention

Appropriate privacy protections are needed in any legislation where data is collected. With AET and ETC toll collection, large amounts of personal data are collected. Groups advocating for privacy may be interested in how this data is managed and for what reasons it may be released. Including strong privacy protections will help assure interested groups that data will be managed in a responsible manner and only released for limited purposes.

[1] See *Tupper v. City of St. Louis*, 468 S.W.3d 360 (2015)
[2] *Walker v. City of Toledo* 143 Ohio St.3d 420 (2014

The use of video, images and other data collected for video billing purposes will be of concern for many stakeholders. It may be publicly acceptable to release information for use in criminal proceedings especially if the release requires a court order.

Many states have recently passed legislation to protect data collected during the AET process. In some cases, this was a direct result of public opposition to data being used in civil cases - like divorce cases - and for enforcement of traffic laws. Clear privacy protections are important. Minn. Stat. Ch. 13 addresses government data generally and Minn. Stat. 13.72 addresses the treatment of the following data pertaining to applicants or users of toll facilities:

- data contained in applications for the purchase, lease, or rental of a device such as an electronic vehicle transponder which automatically assesses charges for a vehicle's use of toll roads
- personal and vehicle identification data
- financial and credit data
- toll road usage data

All of the data on this list is classified as nonpublic or private meaning that the data is accessible only to the subject of the data and not the public generally. As described in Minn. Stat. 13.03, subd. 6, someone who is a party to a criminal, civil or administrative proceeding who wants to use this data in the proceeding can ask for a court order to access the data.

Generally, once a toll is paid, data is no longer necessary for the purposes of toll collection. To ensure appropriate privacy protection, it is recommended that all data that would allow a person to be personally identified be deleted once any applicable audit period for the toll transaction has expired. However, other non-personally identifiable data should be available to the tolling entity for purposes of planning and operational analysis. Minn. Stat. 15.17 describes official records which must be kept by state agencies and Minn. Stat. 138.17 describes procedures for the destruction, preservation and reproduction of records. Neither of these statutes deal specifically with toll collection data, but the general framework established by these two statutes may be adequate for purposes of toll collection data. Minn. Stat. 13.72, subd. 13, allows the production of summary data for toll facilities.

The collection and use of data necessary to process transponder transactions will also be of concern for customers and stakeholders. The personal and financial information that is required to open and replenish prepaid transponder accounts should be maintained with the same level of security that applies to payment systems generally. In developing these systems, industry best practices should be evaluated to ensure that breaches of personal and financial information do not occur.

Various State Statutes Related to Tolling Authority

Each state addresses tolling in different ways that vary from jurisdiction to jurisdiction. Generally, tolling authority is prescribed in law and lays out how tolls are collected, where tolling can take place, under what circumstances, to which jurisdictions tolling authority is conveyed and what the revenue is to be used for. The tables below include links in the column labeled "citation" to the tolling authority of various states with a summary of how that state has addressed certain aspects of tolling policy in the column labeled "statutory points." Appendix D includes the referenced statutory text with comments.

Tolling Revenue Use

Typically, in most states, tolling revenue is restricted by statute as to where and how it can be used. The North Carolina Turnpike Authority and Washington Department of Transportation have clear requirements for use of revenue that limit its use to the facility from which it is derived. Regional tollway authorities in Texas can use revenue off system under certain circumstances. The restrictions on off system use require that there be a benefit to the tolled system.

Table 2: Tolling Revenue Use - Examples of Statutory Restrictions and Limitations

Use of Tolling Revenues (See Appendix D Table 19 for Additional Details)			
State	Citation	Tolling Category	Statutory Points
North Carolina	NC Gen. Stat. 136-89.188	tolling revenue	• Use of toll revenue is restricted by the statute • Limits on tolling revenue for administrative costs-5% • Other limits on the use of tolling revenue when it comes from non-tolled roads that are converted to tolling lanes
Washington	Wash. Rev. Code 47.56.820	tolling revenue	• Tolling revenue is restricted to use on the facility generating the revenue • Revenue can only be used for specifically identified purposes
Texas	Tex. Stat. 366.037	tolling revenue	• Use of surplus toll revenue can be used off of the tolling facility, under certain circumstances • One of the requirements to use surplus tolling revenue off of the turnpike is that the revenue used must improve impacts on the turnpike

Tolling Project Selection

Legislative requirements for tolling project selection often include requirements for feasibility and restrictions on the expansion of an existing toll system. In Washington, the state legislature determines which facilities are authorized for tolling. The Florida Turnpike Enterprise must establish a project's economic feasibility, among other requirements, before getting legislative approval for new tolling projects. The North Carolina Turnpike Authority may study an unlimited number of tolling projects; however, only a maximum of 11 projects can be constructed without additional legislative authority. The NCTA is also required to deliver specifically identified projects.

Table 3: Tolling Project Selection – Examples of Statutory Authority

Toll Project Selection Authority (See Appendix D Table 20 for Additional Detail)			
State	Citation	Tolling Category	Statutory Points
Washington	Wash. Rev. Code 47.56.820	project selection	• Only the legislature can authorize a toll project
Florida	Flor. Stat. 338.223	project selection	• Projects must be economically feasible and included in a tentative work program before becoming part of the system • The MPO must include the project in its TIP
North Carolina	NC Gen. Stat. 136-89.183	project selection	• Authority is limited to the development of 11 turnpike projects, including specific projects noted in statute • Projects other than those specifically listed in statute, have several additional requirements and approvals

Toll Rate Setting

Methods for setting toll rates vary from jurisdiction to jurisdiction. Generally, when tolling is administered by a department of transportation, toll rates are set by the department. When tolling is administered by a turnpike commission or some other type of board, toll rates are set by the commission or board. Some agencies are required to have public hearings to offer an opportunity for public input in setting toll rates. Additionally, legislation commonly requires tolls to be set at a level to fund system operation.

The Florida Turnpike Enterprise must comply with requirements for administrative rulemaking when increasing toll rates for existing projects or establishing toll rates for new projects. In Washington, the toll rates are set by the Washington State Transportation Commission. Ohio law requires the director of transportation to establish a written process for setting tolls. Once the written plan is in place the director may set tolls in accordance with the written plan.

Table 4: Toll Rate Setting – Examples of Statutory Authority

Toll Rate Setting Authority (See Appendix D Table 21 for Additional Detail)			
State	Citation	Tolling Category	Statutory Points
Florida	Flor. Stat. 338.23	rate setting	• Tolls must be set to fund the tolled system • Toll rate changes require publishing notice and holding a public hearing • Department must also collect sufficient amounts to cover payment and collection costs. Broad flexibility in establishing this charge
Washington	Wash. Rev. Code 47.56.850	rate setting	• Toll rates are set by the transportation commission • Toll rates must be sufficient to meet statutory obligations • Variable pricing specifically allowed
Ohio	Ohio Rev. Code 5531.14(B)	rate setting	• Toll rates are set by the director of transportation • Department must develop a written plan. Development of a written plan must comply with administrative rulemaking requirements

Toll Collection

The ability to collect tolls is typically created in one of two ways. One is through a broad grant of authority to the agency to collect tolls by any means. This grant is also usually accompanied by rulemaking authority, which allows the agency to create administrative rules to govern the toll collection process. The second is through detailed legislatively established toll collection systems. To operate an AET, effective video billing processes including certain components that are generally consistent from agency to agency, need to be established.

The Florida Turnpike Enterprise is an example of broad statutory authority. The FTE has the ability to make rules to refine the toll collection process, is required to implement new technology in the toll collection process and may spend money to market electronic toll collection. The Ohio Department of Transportation is an example of an agency with a detailed statutory process for electronic toll collection. The department may also make rules to refine the collection process.

Table 5: Toll Collection – Examples of Statutory Authority

Toll Collection Authority (See Appendix D Table 22 for Additional Detail)			
State	Citation	Tolling Category	Statutory Points
Florida	Flor. Stat. 338.155 Flor Stat. 338.161 Flor. Stat 338.2216(1)(d)	toll collection	• Rulemaking authority for rules related to payment collection and enforcement of tolls • Specific authority to promote electronic toll collection • Florida Turnpike Enterprise must pursue new toll collection technology
Ohio	Ohio Rev. Code 5531.141 Ohio Rev. Code 5531.142 Ohio Rev. Code 5531.143	toll collection	• Legislation allowing for electronic toll collection is specific and includes detailed processes for charging a toll • Process for identifying owner is included in statute • Available options upon receiving an invoice included in statute • Form of invoice established by statute

Toll Enforcement

Toll enforcement authority is usually granted in one of two ways. The first is through a broad grant of authority to an agency to enforce non-payment by creating administrative rules. The second is through legislation establishing the enforcement process. However, as enforcement becomes more complex, it is often expanded to include both legislation and administrative rules. Enforcement processes vary but have some common components. The Florida Turnpike Authority and Illinois State Toll Highway Authority are examples of agencies that rely heavily on administrative rules to establish enforcement processes but also have detailed legislative requirements.

Table 6: Toll Enforcement – Examples of Statutory Authority

Toll Enforcement Authority (See Appendix D Table 23 for Additional Detail)			
State	Citation	Tolling Category	Statutory Points
Florida	Flor. Stat. 338.155 Flor Stat. 316.1001	toll enforcement	• Offense for non-payment established in statute but department given broad rulemaking authority • Process for issuing a citation is included in statute • Accommodation is made for leased and rented vehicles
Illinois	Il. Code 605 10/10	toll enforcement	• Broad authority is included to establish civil fines for non-payment • Registered owner may sue operator to recover fines imposed on owner • Statute requires rules to include certain notice requirements • Unpaid fines are a debt collectable through debt collection procedures • Administrative process may include penalties beyond fines • Statute includes accommodation for leased vehicles

Privacy and Data Retention

Privacy protection requirements are increasingly common components of tolling legislation. With the growth of AET and ETC, agencies are collecting large amounts of personal data. Groups advocating for privacy are interested in how this data is managed and for what reasons it may be released. Illinois recently enacted legislation to protect personal information. The Florida Turnpike Enterprise also has legislation that exempts disclosure of certain personal information.

Table 7: Data Practices, Data Retention and Privacy – Examples of Statutory Authority

Data Practices Authority (See Appendix D Table 24 for Additional Detail)			
State	Citation	Tolling Category	Statutory Points
Illinois	Il. Code 605 10/19	privacy	• Limitation on what information may be collected and stored • Toll authority required to develop privacy policy • Privacy policy must include certain components • Law recognizes legitimate use and release of certain data
Florida	Flor. Stat. 338.155(6)	privacy	• Law exempts certain data from the public records laws

Traffic and Revenue Analysis

This section reviews several interstate and trunk highway corridors across Minnesota and evaluates the feasibility of broader tolling in the state. This tolling evaluation does not constitute a plan to implement tolling on any of the corridors that were analyzed. Additionally, the traffic and revenue analysis is intended to provide an understanding of potential revenue and is not sufficient to support implementation. This portion of the study:

- Establishes the approach to assess the ability of tolling to fund ongoing operations, maintenance and rehabilitation of existing roadway corridors
- Develops selection criteria to identify specific rural and urban corridors for a high-level toll feasibility analysis
- Forecasts a range of toll revenues and the associated tolling and roadway costs on existing corridors
- Identifies traffic diversion and estimates the potential net toll revenue generated on each corridor

Traffic and revenue studies have three tiers, ranging in detail from low (level I) to high (level III). The analysis conducted for this study is level I, intended to investigate, at a high-level, the feasibility of converting existing highways to tolled highways. The objective of a level I T&R analysis is to investigate constructability and implementation opportunities. The corridors evaluated for this study were intended to represent typical corridors to provide indicative traffic and revenue estimates. This selection of corridors was based on several factors that are described in detail below. **The corridors should not be considered preferred corridors for the purpose of any future implementation.** This type of high-level screening analysis of multiple indicative corridors is not a detailed and robust analysis, does not use a sophisticated travel demand model and will not support analysis related to project financing. A more detailed analysis or investment-grade toll traffic and revenue study would be needed to support implementation decisions and toll revenue financing

Corridor Selection and Description

This section provides a description of the methodology used to select corridors for the screening-level feasibility analysis.

Literature Review

FHWA and other agencies use various selection criteria to identify viable corridors to analyze toll feasibility from a revenue standpoint. Three examples are described below.

- National Cooperative Highway Research Project (NCHRP) 722 Assessing Highway Tolling and Pricing Options and Impacts, Volume 1: Decision making Framework[3], provides a decision-making framework and list of criteria to screen and evaluate potential toll corridors. The recommended screening criteria include: congestion relief potential, revenue generation potential, average daily traffic volumes, average daily truck volumes, roadway classification and financial viability. Initial evaluation of candidates should

[3] Jenks, C.W, Jencks, C.F, Sundstrom, L.L, Chamberlain, M, Delaney, E.P, Hagood, M.B, (2012)

be based on a broader set of criteria, with successive stages of screening to look at the financial feasibility in more detail.

- Toll Viability Screening Tool by Texas Transportation Institute researchers (in cooperation with TxDOT and FHWA[4]). This approach uses an analytical spreadsheet tool that allows decision-makers to make realistic "first-cut screening" estimates of potential revenue and determinations about the potential viability of a toll-supported option. Most of the variables associated with revenue prediction are highly variable and subjective such as corridor demand, growth rates, truck traffic, diversion rate and acceptable tolls.
- Reason Public Policy Institute's Corridors for Toll Truckways: Suggested Locations for Pilot Projects[5] uses criteria such as truck percentages, congestion, connectivity and input from the trucking industry.

The above literature sources recommend using the suggested criteria as an initial screening tool, to be supported by toll traffic and revenue studies.

Corridor Selection Methodology

This tolling study identifies and evaluates the potential ability of representative rural and urban corridors to generate toll revenue to support asset lifecycle costs. This section describes the process used to objectively select corridors of various types for the screening analysis. The selection of corridors for analysis are meant to represent other corridors with similar characteristics.

The conditions represented by tolling a single corridor are not the same as tolling all corridors (system tolling). The feasibility analysis is meant to demonstrate tolling implementation on a single corridor and the results cannot be multiplied for all corridors.

The following criteria were developed in coordination with MnDOT to determine the initial toll viability:

- Minimum Average Annual Daily Traffic of 10,000 vehicles per lane for a minimum of five miles (Lower traffic volumes would likely not support efficient toll revenue collection due to the costs of maintaining tolling equipment and processing toll transactions.)
- Limited access roadways only

Based on these criteria, 21 candidates were evaluated as potential toll corridors (shown in **Table 9**). These corridors were broken down into 70 smaller segments to allow for a more granular evaluation. Corridor segments are shown in the *Corridor Maps and Revenue Results* section.

The FHWA functional classifications were used to group the candidates into four types of roadway categories. This is a framework for categorizing roadways by the role they play in the transportation network. Functional classification carries expectations regarding design, speed, capacity and relationship to existing and future land use. Federal legislation uses functional classification in determining eligibility for funding under the federal aid program.

[4] Smith, D.R, Chang-Albitres, C, Stockton, W.R, Smith, C, (2004)
[5] Poole, Jr., R.W, Samuel, P, (2004)

The four types of classification that apply to these roadways are:

- Urban Interstates
- Rural Interstates
- Urban Freeways
- Rural Freeways

Roadways classified as interstates are designated by the U.S. Secretary of Transportation. They are limited access (generally with points of entry limited to interchanges with grade separation), divided highways that link major urban areas. Additionally, the roadways are defined by specific design requirements for overpasses, bridges, signage, etc. Roadways classified as freeways often have characteristics similar to interstates. They have travel lanes typically separated by some type of barrier and access is typically controlled.

Rural and urban boundaries are defined by the U.S. Census Bureau, but may be adjusted outward by federal transportation legislation. The FHWA urban areas defined by population range are shown below in **Table 8**.

Table 8: FHWA Urban and Rural Definitions

FHWA Area Definition	Population Range	Allowed Urban Area Boundary Adjustments
Urban Area	5,000+	Yes
Small Urban Area (From Clusters)	5,000-49,999	Yes
Urbanized Area	50,000+	Yes

The next step in the selection process was to choose at least one corridor from each of the four categories for a high-level toll traffic and revenue analysis. The 70 candidate corridor segments were evaluated and screened using a two-step process described below.

1. **Categorization of Candidate Segments**

Figure 8: Flowchart Illustrating the Categorization and Selection Process for Urban Interstates and **Figure 9**: illustrate the screening and selection criteria for selecting the recommended corridors. Contiguous segments were grouped together if they were part of the same roadway (e.g., several segments of I-94 were consolidated) and fall under the same category. The 70 toll candidate segments were categorized based on the following qualitative and quantitative criteria:

- Average Annual Daily Traffic
- Congestion Level
- Availability of Competing Roadways
- Availability of Frontage Roads

The categorization process is useful because similar factors and parameters are applied to estimate variables such as toll rate per mile, diversion, etc., that are part of the gross traffic and revenue estimation process. Each candidate segment has unique characteristics but candidates in the same category and sub-category will likely have similar plausible ranges for toll rates per mile and associated diversion.

2. **AADT per lane**

As an additional evaluation, the AADT per lane for each of the 70 categorized segments were estimated and ranked.

The criteria used in step one and two are explained below.

AADT (2016)

The study team downloaded 2016 AADT from the MnDOT website and the average AADT was estimated for each segment. A minimum AADT of 10,000 vehicles per lane was used as a basis to screen candidates. It was assumed that volumes below this threshold would not generate material revenue and warrant the cost of the tolling system. Additionally, historical AADT was extracted for all available MnDOT traffic count locations (more than 500 locations) along the 70 candidate corridors to identify historic traffic growth.

The team used AADT as a guide for corridor review and selection. However, some roadway locations with lower than the baseline AADT were analyzed because doing so was the most logical place to define the limits of certain roadway segments. The feasibility of tolling roadways outside of the metro area was explored by analyzing roadways outside the limits of the minimum AADT threshold. As an example, the study considered analyzing I-35 from Duluth to the Iowa border. The traffic volumes on I-35 both north and south of the metro fall below the 10,000 per lane threshold. However, near Duluth the volumes go back up above the threshold. South of the metro area, traffic volumes on I-35 continue to decline to the Iowa border. Therefore, the study begins with the analysis on I-35 at the southern E/W split and continue to Duluth. This provides an example of a rural corridor, and captures the higher volumes present in the Duluth area.

Congestion level

Toll corridor segment candidates were classified based on hours of congestion per day. The study used the daily congestion map from MnDOT's Metropolitan Freeway System 2015 Congestion Report to determine the length of time congestion occurs on the corridors. For this analysis, the following method was used to categorize roadway congestion:

- Low congestion: < 1 hour
- Moderate congestion: 1-3 hours
- High congestion: 3-5 hours
- Very high congestion: > 5 hours

Availability of competing roadways

The corridors were reviewed evaluating the availability of competing routes along some or all of the roadway. For this analysis, the corridors were evaluated as either:

- Yes, if competing trunk highways exist within 10 miles
- No, other competing highways do not exist

Availability of frontage roads

Corridors were reviewed and evaluated for the availability of frontage roads. For this analysis, the corridors were evaluated as either:

- Yes (frontage roads available), if the roadway includes continuous frontage roads (based on Google maps and Google Earth views)
- No, if there is no continuous frontage road system

Table 9: Corridor Summary After Categorization

Category	Roadway	Lanes	AADT Range	Congestion Range	Frontage Roads	Competing Facilities	Limits
URBAN INTERSTATE	I-94	6-8	63,500 – 172,000	Low to Very High	Some	Most Segments	TH 101 to Wisconsin
	I-35E	4-8	48,250 – 117,200	Low to Very High	No	Yes	Entire Corridor
	I-35W	4-8	60,200 – 173,000	Moderate to Very High	No	Most Segments	Entire Corridor
	I-394	6	81,000 – 132,000	Moderate to Very High	Yes	Yes	Entire Corridor
	I-494	6	71,750 – 166,700	Moderate to Very High	Some	Most Segments	Entire Corridor
	I-694	4-8	80,250 – 128,450	Moderate to Very High	No	Yes	Entire Corridor
RURAL INTERSTATE	I-94	4	52,450	Low	No	Yes	St. Cloud to TH 101
	I-35	4-6	25,750 – 76,000	Low	No	Some Segments	I-35 W/E to Duluth
URBAN FREEWAY	TH 100	6	76,850 – 78,200	Moderate to Very High	No	Yes	I-94 to I-494
	TH 36	4	54,450 – 87,750	Moderate	No	Yes	I-35W to I-694
	TH 61	2	10,300	Low	No	Yes	Duluth to Two Harbors
	TH 610	4	28,250 – 67,500	Low	No	Yes	I-94 to US 10
	TH 62	4	58,000 – 87,600	High to Very High	No	Yes	I-494 to TH 13
	TH 77	4-6	71,100 – 71,500	Moderate	No	Yes	TH 62 to McAndrews Road
	US 169	4	75,500 – 88,800	Moderate to Very High	No	Yes	TH 610 to CR 69
	US 10	4-6	60,250 – 93,000	Moderate	No	Yes	TH 78 to I-35W
	US 212	4	50,150 – 55,350	Low to Moderate	No	Yes	Jonathan Carver Pkwy to TH 62
	US 52	4	51,300 – 64,300	Low	No	Yes	I-94 to TH 55
RURAL FREEWAY	TH 36	4	36,900	Low	No	No	I-694 to Wisconsin
	US 52	4	31,500 – 36,000	Low	No	No	TH 55 to Rochester
	US 12	6	23,450	Low	Yes	No	CR 15 to I-494

Figure 8: Flowchart Illustrating the Categorization and Selection Process for Urban Interstates

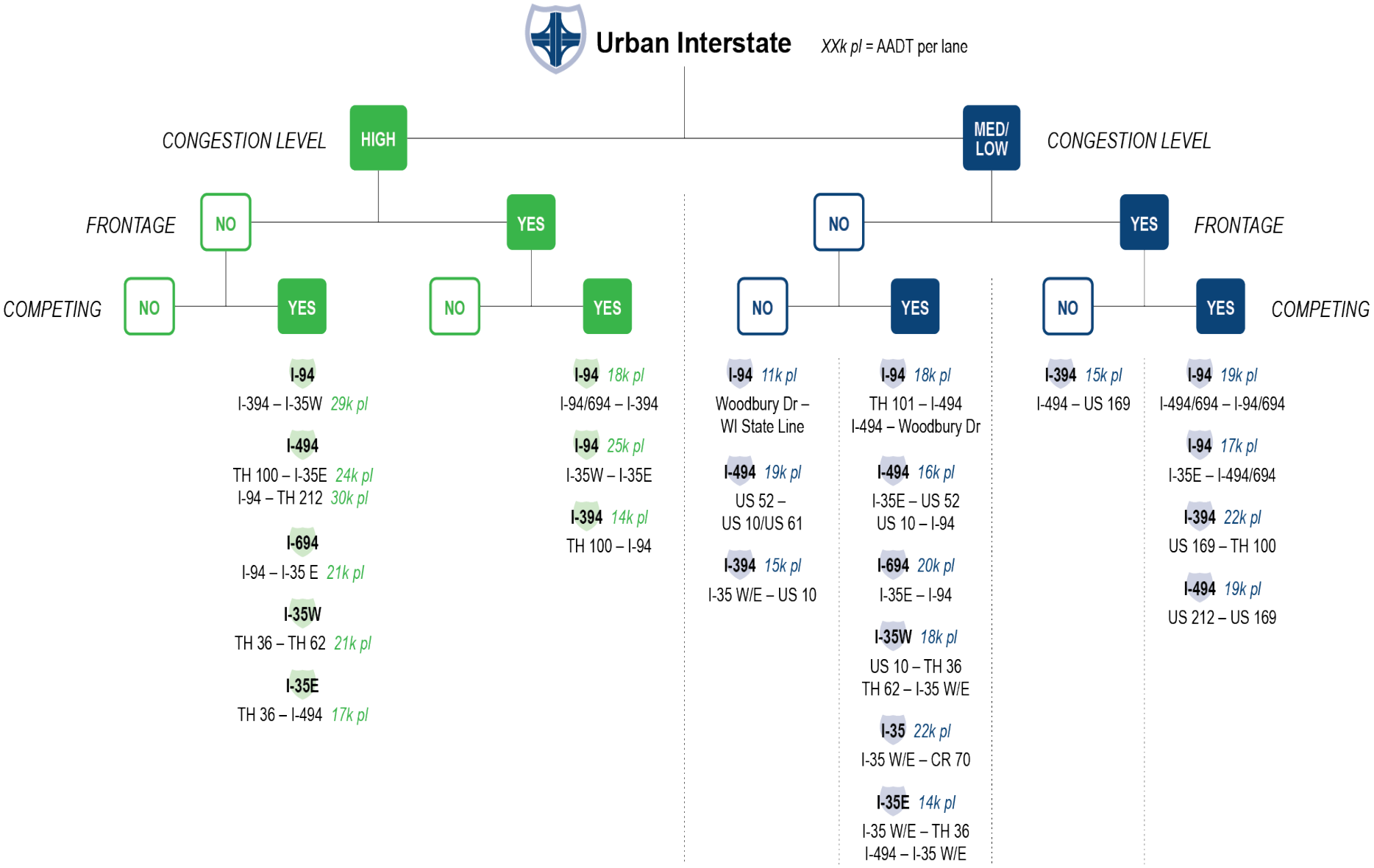
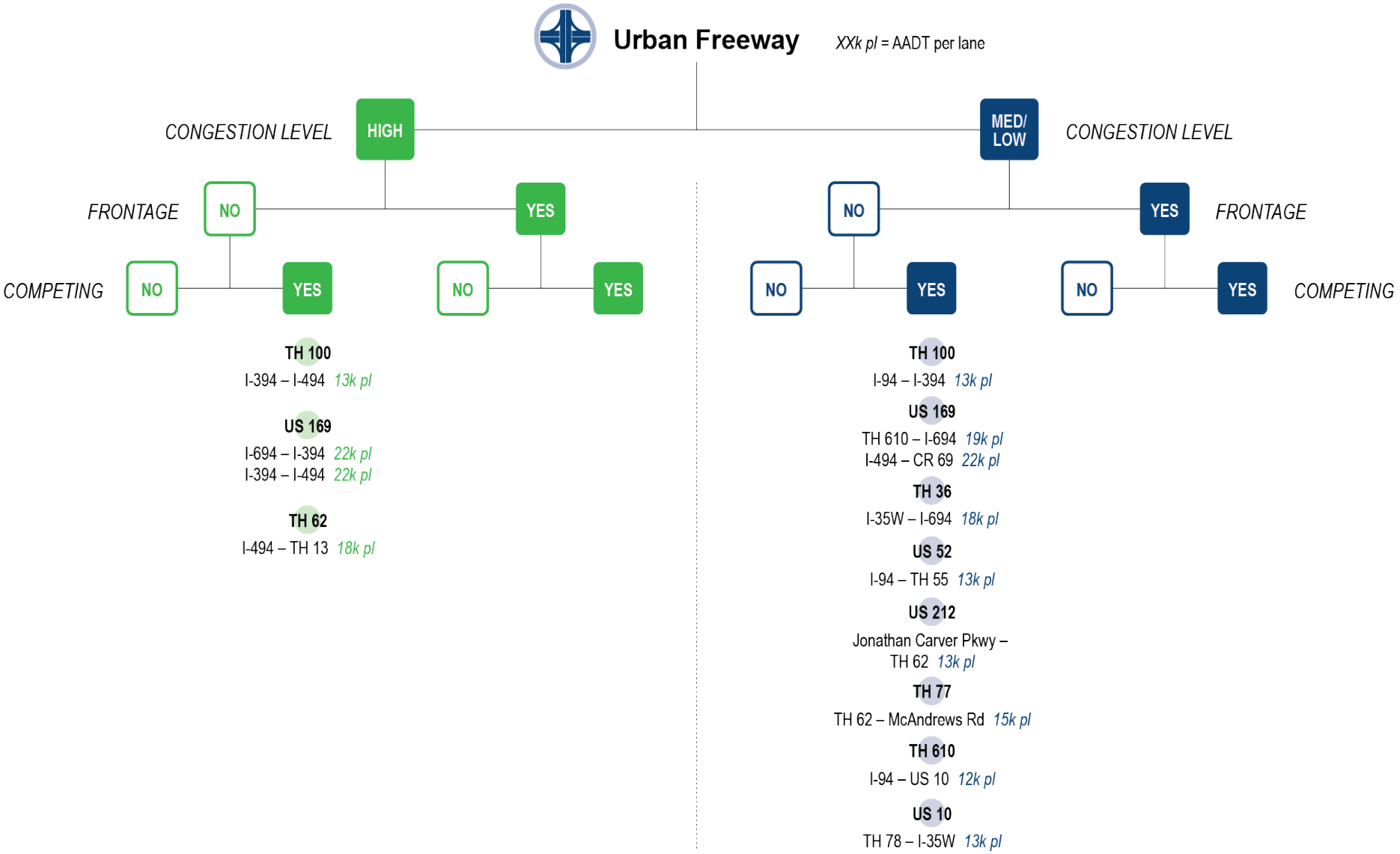


Figure 9: Flowchart Illustrating the Categorization and Selection Process for Urban Freeways



Selected Corridors for Screening Analysis

The corridors listed below were selected for analysis. The corridors are shown in **Table 10** with their attributes and shown on the map in **Figure 11**: Map of Recommended Corridors for Detailed Analysis.

Urban Interstate

- I-94 from TH 101 to the Wisconsin state line
- I-35 W from northern E/W split to southern E/W split

Rural Interstate

- I-35 from northern E/W split to Duluth
- I-94 from St. Cloud to TH-101

Urban Freeway

- US 169
- US 610

Rural Freeway

- US 52 from TH 55 to Rochester

Table 10: Selected Corridors for Analysis

Category	Roadway	Lanes	Length (miles)	AADT Range	Congestion Range	Truck %	Frontage Roads	Competing Facilities	Limits
URBAN INTERSTATE	I-94	6-8	51	63,500 – 172,000	Low to Very High	4.0-10.4	Some	Most Segments	TH 101 to Wisconsin
	I-35W	4-8	41	60,200 – 173,000	Moderate to Very High	3.9-11.7	No	Most Segments	Entire Corridor
RURAL INTERSTATE	I-94	4	41	52,450	Low	10.8-15.9	No	Yes	St. Cloud to TH 101
	I-35	4-6	130	25,750 – 76,000	Low	4.3-8.9	No	Some Segments	I-35 W/E to Duluth
				–					
URBAN FREEWAY	TH 610	4	12	28,250 – 67,500	Low	3.2-6.7	No	Yes	I-94 to US 10
	US 169	4	22	75,500 – 88,800	Moderate to Very High	4.0-11.1	No	Yes	TH 610 to CR 69
				–					
RURAL FREEWAY	US 52	4	68	31,500 – 36,000	Low	6.8-13.0	No	No	TH 55 to Rochester

Figure 10: Statewide Corridor Map

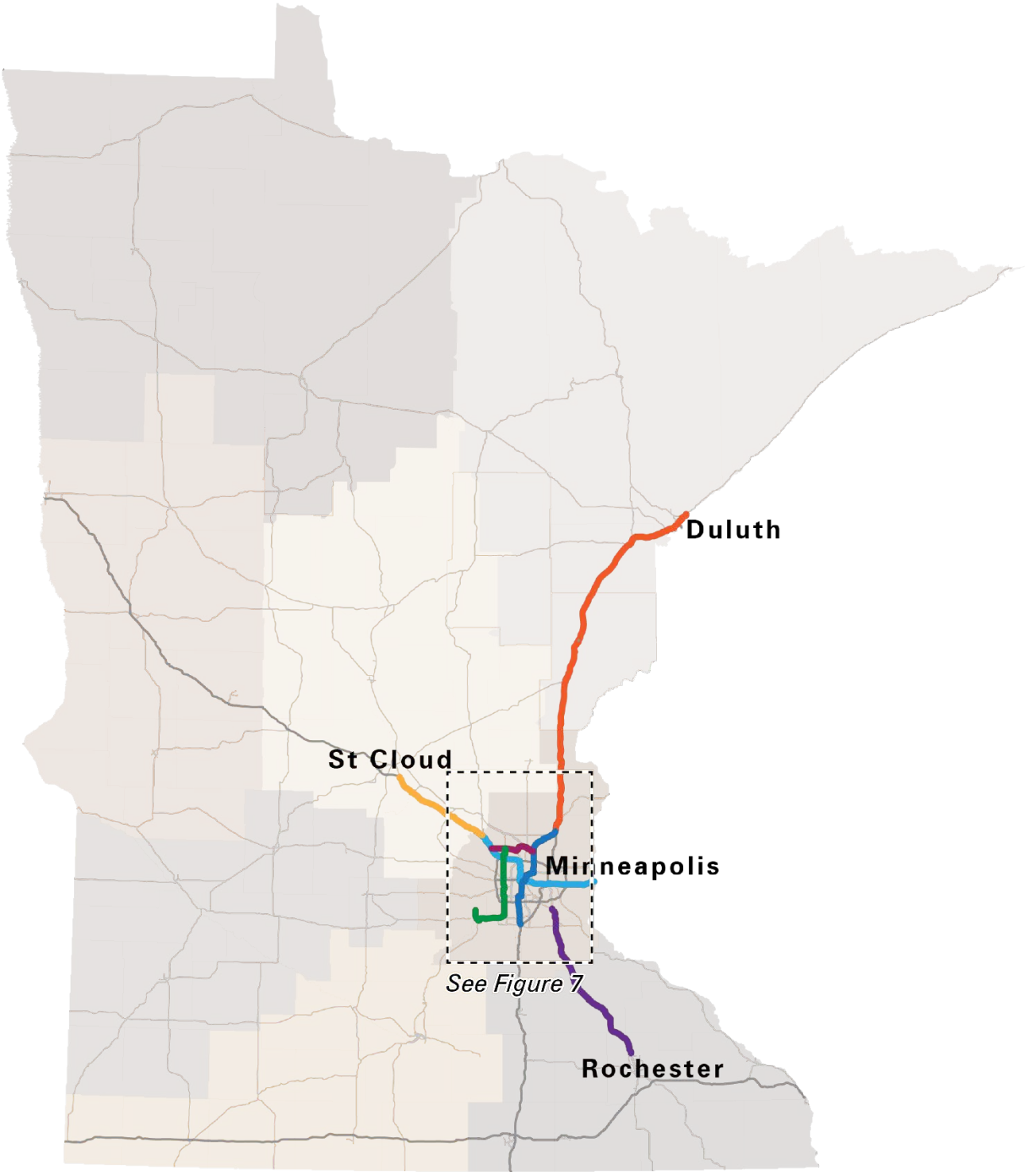


Figure 11: Map of Recommended Corridors for Detailed Analysis

The level 1 T&R analysis is a high-level assessment of toll feasibility based on traffic and travel conditions and the availability of alternate routes. The analysis is based on existing sources of data and assumptions of toll conditions based on tolling agency experience in the U.S.

Existing traffic data from MnDOT was used to establish current conditions and to develop acceptable assumptions for the analysis. A spreadsheet model was used to calculate potential tolling revenue and costs. The following describes the data and assumptions used for this analysis.

Traffic Volumes

The average annual daily traffic volumes from 1992 to 2016 were used with 2016 traffic volumes as the base year for the traffic and revenue analysis. Previous years' data were used to estimate future growth rates.

Traffic volume growth was then applied to existing volumes to determine future traffic and revenue streams. Historical traffic volumes along the study corridors were reviewed to determine future growth assumptions. This analysis assumed an average annual traffic growth rate of 0.5 percent for years 0-20, and a nominal growth rate of 0.15 percent for years 21-30.

Truck percentages were averaged from 1994 to 2016 from MnDOT's website to determine the truck percentage for each corridor.

Payment Options

All-electronic toll collection with two methods of payment is assumed: toll transponders and video billing that identifies vehicle ownership through images of license plates. Toll transponder transactions are less expensive and more efficient to process than video images. For this reason, toll agencies strive to maximize transponder usage to reduce toll collection costs. Transponder use typically increases over time as motorists become familiar with the toll system and the benefits of transponder payment. Transponder use is also typically higher for heavy commercial vehicles.

Table 11 shows the assumed percentage of toll transponder use for autos and trucks on urban and rural corridors in this analysis. The percentages are based on opening year transponder penetration for recently opened toll facilities and industry trends.

Table 11: Percentage of Toll Transponder Use Over Time

Year	Auto ETC%: Rural	Auto ETC%: Urban	Truck ETC%: Rural	Truck ETC%: Urban
2020	60%	65%	75%	80%
2021	61%	66%	76%	81%
2022	62%	67%	76%	81%
2023	62%	68%	77%	82%
2024	63%	69%	77%	82%
2025	64%	70%	78%	83%
2026	65%	71%	78%	83%
2027	65%	72%	79%	84%
2028	66%	73%	79%	84%
2029	67%	74%	80%	85%
2030	67%	75%	80%	85%
2031	68%	76%	81%	86%
2032	69%	77%	81%	86%
2033	70%	78%	82%	87%
2034	70%	79%	82%	87%
2035	71%	80%	83%	88%
2036	72%	81%	83%	88%
2037	73%	82%	84%	89%
2038	73%	83%	84%	89%
2039	74%	84%	85%	90%
2040-2049	75%	85%	85%	90%

Toll Rates

Many factors influence how toll rates are set. The motorist's willingness to pay a toll is influenced by travel time and the driver's value of that time. The agency's goals also influence the toll rate. If the goal is to maximize profit, toll rates are set to be as high as possible without increasing diversion to the point where the revenue may start to decrease. As **Table 12** illustrates, toll rates on similar toll systems around the country vary from 3 to 12 cents per mile for ETC payment. The recommended toll rate for a system ideally balances revenue generation with considerations for fairness among the range of users and public acceptance.

Table 12: Toll Rates Per Mile in Other Jurisdictions

Toll Facility	Facility Length (miles)	2-Axle Vehicles				Effective Truck Multiplier	
		Full-Length Toll		Toll per Mile		5-Axle Truck	
		ETC	Cash	ETC	Cash	ETC	Cash
Indiana Toll Road	157	$10.75	$10.70	$0.07	$0.07	4.0	4.0
Kansas Turnpike	236	$10.60	$13.75	$0.04	$0.06	3.0	2.6
West Virginia Turnpike	88	$3.90	$6.00	$0.04	$0.07	4.2	3.4
Ohio Turnpike	241	$12.75	$18.75	$0.05	$0.08	3.1	2.7
Oklahoma Turnpike	477	$29.55	$32.80	$0.06	$0.07	3.5	3.4
Will Rogers Turnpike	87	$4.50	$4.75	$0.05	$0.05	4.0	4.0
Turner Turnpike	86	$7.15	$7.65	$0.08	$0.09	0.0	0.0
Cimarron Turnpike	59	$3.30	$3.75	$0.06	$0.06	3.8	3.5
Indian Nation Turnpike	105	$6.20	$7.00	$0.06	$0.07	3.2	3.0
HE Bailey Turnpike	86	$5.10	$6.15	$0.06	$0.07	3.0	3.0
Muskogee Turnpike	53	$3.30	$3.50	$0.06	$0.07	3.1	3.1
Illinois Toll Roads	640	$53.08	$83.95	$0.08	$0.13	6.1	4.8
Jane Addams Memorial Tollway (I-90)	76	$3.95	$7.90	$0.05	$0.10	8.7	4.3
Reagan Memorial Tollway (I-88)	96	$5.10	$10.20	$0.05	$0.11	8.6	4.3
Tri-State Tollway (I-94/I-294/I-80)	78	$3.20	$6.40	$0.04	$0.08	8.6	4.3
Veterans Memorial Tollway (I-355)	33	$3.80	$7.60	$0.12	$0.23	6.9	3.4
Pennsylvania Turnpike	360	$37.03	$51.85	$0.10	$0.15	5.2	5.2
Northeast Extension	110	$10.16	$15.00	$0.09	$0.14	5.8	5.5

It should be noted that the rates in **Table 12** are for full-length trips, which are normally the lowest possible rate. All toll roads must recover the cost of processing transactions and therefore a minimum toll cost is embedded in the toll charge at each entry point to the system. It is possible that some shorter-distance trips can have effectively higher per mile rates since the minimum charge is spread across a shorter distance than a full-length trip. This will have non-trivial impacts on both revenue and diversion once specific toll collection points are determined with more specificity.

The study analyzed the corridors using a range of toll rates to provide an example of potential revenue at various rates. The toll rates used are:

- High toll rate: 10 cents per mile
- Medium toll rate: 7 cents per mile
- Low toll rate: 4 cents per mile

To account for the higher collection costs of video payment, toll agencies across the country typically charge a higher toll rate for customers without a transponder. For this study, a 50 percent increase to the transponder toll rates is applied to video customers.

Additionally, trucks typically pay a higher toll rate compared to passenger vehicles to account for the additional wear-and-tear that heavier vehicles and loads have on the roadway. The truck toll rate is typically based on the

number of axles. For this study, truck toll rates were multiplied by a factor of 3.8 based on comparable toll facilities in the region.

Diversion

Traffic diversion occurs when a roadway is tolled. Some motorists choose an alternate route, a different mode choice or will forego trips. Traffic diversion is impacted by many factors, such as the availability of alternate routes, travel times and distance. It also has a direct correlation to the cost of the toll, income levels and willingness of the users to pay. It is highly variable and difficult to predict because of the variation in perception among motorists. For this study, a range of expected diversion was used depending on the characteristics of each corridor. A base diversion rate for each type of roadway was assumed. These base diversion rates are:

- Urban interstate: 15%
- Rural interstate: 20%
- Urban freeway: 20%
- Rural freeway: 25%

The diversion rates were further refined to account for diversion due to other factors including the availability of frontage roads and competing facilities. The traffic diversion rates shown in **Figure 12** and **Figure 13** represent the additional traffic diversion percentage (added on to the base diversion rate) that were applied to each corridor segment.

Figure 12: Example of Diversion Rates for Urban Interstates

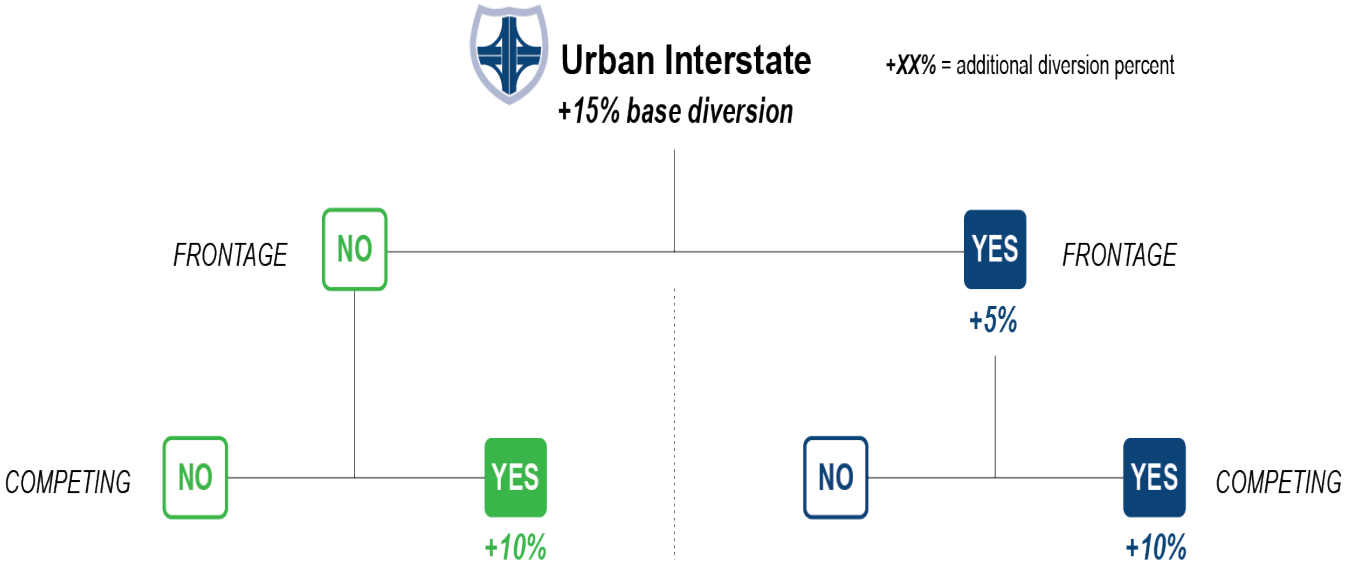
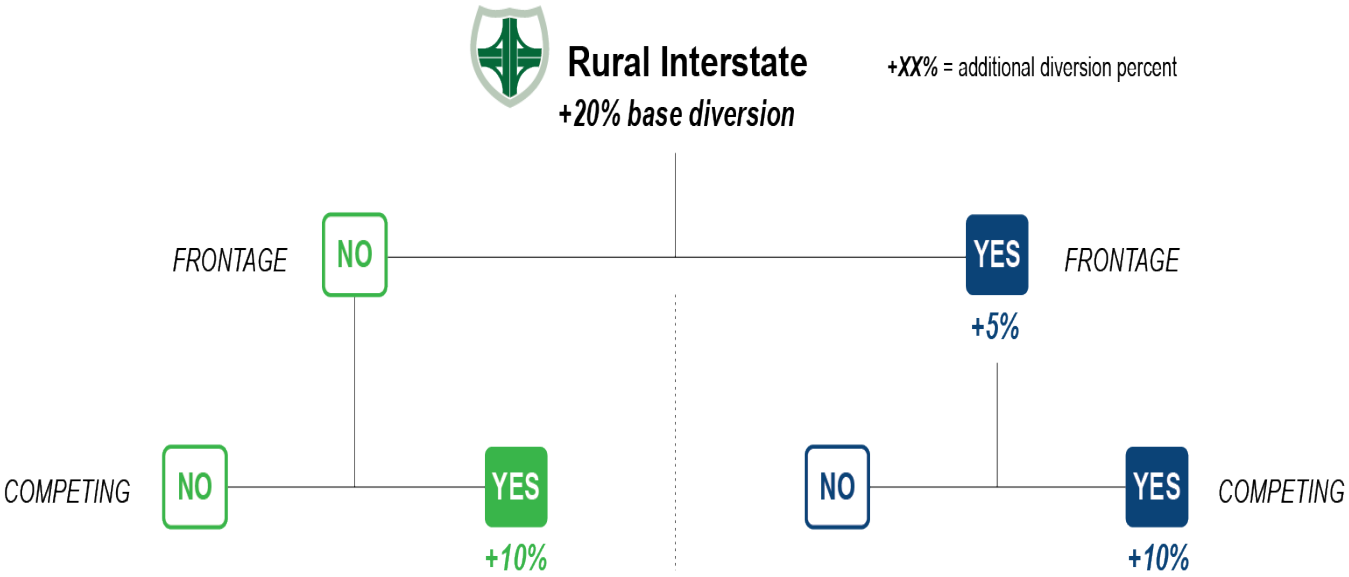


Figure 13: Example of Diversion Rates for Rural Interstates



Each segment of the corridors was analyzed based on the diversion rates established using these criteria.

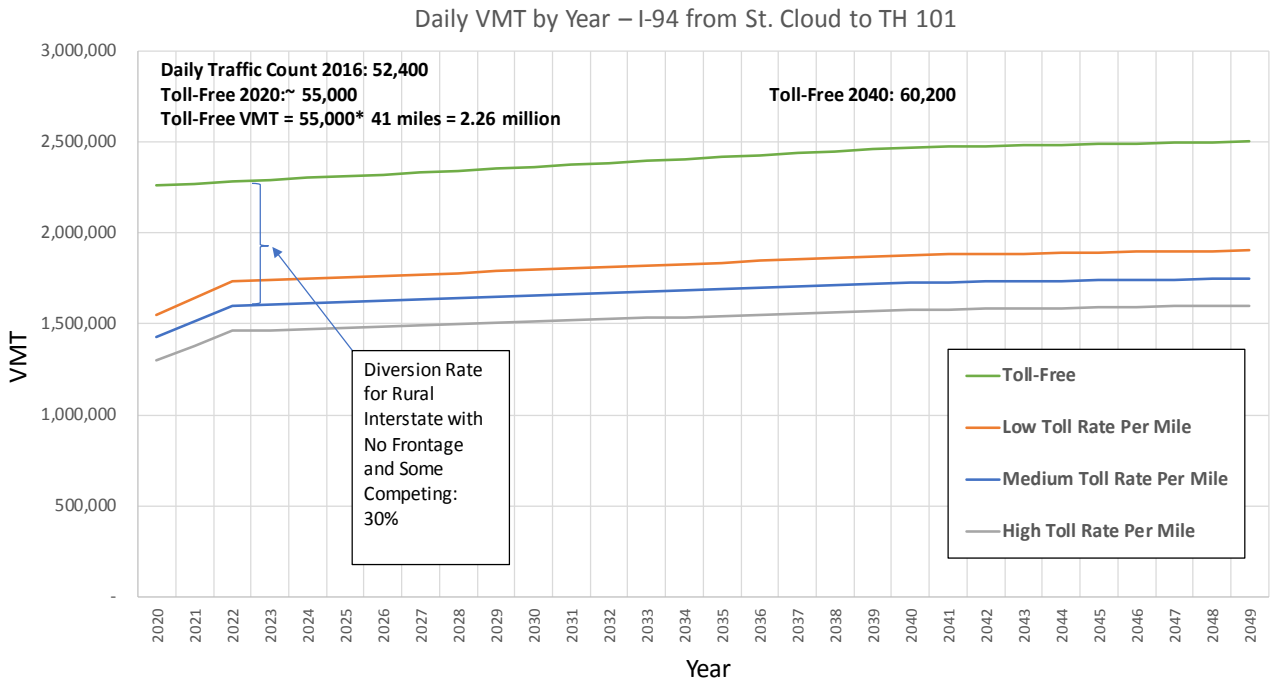
Using I-94 from St. Cloud to Trunk Highway 101 as an example, the average diversion using the methodology described above is 30 percent (20 percent + 0 percent + 10 percent). After these diversion rates were estimated based on the physical characteristics of the roadway, an additional factor was developed that specifically corresponds to the toll rate (20 percent reduction for low toll rate, no change for medium toll rate and 20 percent increase for high toll rate). The toll rate diversion component corresponds to the vehicle miles traveled shown as the blue line in **Figure 14.** If a higher toll rate (10 cents per mile) is implemented it is likely that more motorists will divert. Therefore, the diversion was increased by 20 percent (6 points) from the original estimate of 30 percent resulting in 36 percent diversion at the high toll rate. The resulting vehicle miles traveled is shown as a gray line in **Figure 14.** Similarly, if a low toll rate is used, less traffic will likely divert. Therefore, the traffic diverted was decreased by 20 percent (-6 points) from the original estimate of 30 percent resulting in 24 percent diversion at the low toll rate. The resulting VMT is shown as an orange line in **Figure 14** illustrates the diversion for the corridors evaluated in this analysis. A full table of diversion rates is included in **Appendix A**.

Table 13: Corridor Base and Average Diversion Rates

Category	Roadway	Base Diversion	Average Diversion	Limits
URBAN INTERSTATE	I-94	15%	26%	TH 101 to Wisconsin
	I-35W	15%	24%	Entire Corridor
RURAL INTERSTATE	I-94	20%	30%	St. Cloud to TH 101
	I-35	20%	25%	I-35 W/E to Duluth
URBAN FREEWAY	TH 610	20%	30%	I-94 to US 10
	US 169	20%	30%	TH 610 to CR 69
RURAL FREEWAY	US 52	25%	25%	TH 55 to Rochester

The following graph (**Figure 14**) illustrates how the traffic volumes and diversion rates impact the calculations for total vehicle miles traveled for the I-94 St Cloud to TH 101 corridor.

Figure 14: Sample VMT Calculation



Additional Diversion Considerations:

- The Twin Cities metropolitan area's interstate and freeway system provides readily available alternative routes if only portions of the system are tolled. Diversion rates will be heavily influenced within the Metro area by the decision to toll all interstates and freeways, or only a subset of that system. With a "system" tolling approach, parallel routes are tolled as part of an integrated plan to balance traffic on the corridors and provide equity across the transportation system. The recent reconstruction work on the US 169 and TH 100 corridors illustrate this point, where traffic diverted to the competing route during closures.
- A robust frontage road system, such as the system parallel to I-494 west of I-35W, provides viable diversion routes for shorter trips previously using the system. Most of the urban system does not use frontage roads, therefore reducing the diversion potential.
- Parallel arterial corridors also impact the diversion rates. As an example, the travel time performance of University Avenue in St. Paul will impact the diversion rates from a tolled I-94.
- Diversion rates increase as the toll rates increase. As shown in the table above, the relationship between toll rate and diversion rate is not linear, such that a 50 percent increase in tolls does not equate to a 50 percent increase in diversion. Typically, a portion of the driving population will avoid a toll road regardless of the rate.
- Trucks are tolled at a higher rate than passenger cars, but typically have much higher values of time. Trucks may have different diversion rates from autos, but the same rate of diversion is assumed for the high level of analysis in this study.

A travel demand model provides a more comprehensive analysis of diversion caused by tolling. While this option was not possible for this analysis, a more detailed analysis of traffic growth and potential diversion for each corridor using the regional travel demand model is possible.

Ramp up

When a new toll road is opened, it may take some drivers a brief period of time to become accustomed to paying a toll. When forecasting traffic and revenue for new facilities, this potential recognition lag is accounted for by including a ramp-up factor in the traffic and revenue analysis. The ramp-up factor is applied conservatively to the forecast during the early years of a toll facility where some motorists avoid the new toll roadway because of the cost, payment method or other reason. Typically, this reduction attributable to ramp up is higher initially and then tapers off as motorists accept the system. The ramp-up factor for implementing a toll on an existing roadway is usually considerably less than on a tolled corridor constructed on a new alignment. The ramp up factor is considered separate from diversion. The assumed reduction in traffic due to ramp up for the first few years (from commencement of tolling) is shown below:

- Year one: 10%
- Year two: 5%
- Year three and future: 0%

Leakage

Leakage refers to the amount of toll revenue that is uncollectable. While transponder transactions typically have a leakage rate below 1 percent, video transactions have a higher propensity for leakage due to the more difficult

task of identifying the vehicle owner and receiving payment from the customer. For payment of a video transaction, the toll agency must identify the vehicle, locate an accurate address, process an invoice and rely on the customer to make the payment. The assumed leakage percentage used in this analysis is 6 percent of gross revenue.

Additional Assumptions

This study assumes there are no major changes in technology that would impact the tolling scenario. Although connected and autonomous vehicle technologies are advancing quickly, their impacts on the transportation system are largely unknown.

This study also assumes there are no new roadways added to the network during the study timeframe. Adding capacity through additional roads would change the revenue potential of existing roadways.

Tolling and Roadway Cost Estimates and Methodology

The feasibility aspect of this analysis requires an understanding of the tolling and roadway costs of operating a toll facility. This analysis included an estimation of costs required to develop a new back office tolling system to process transactions and collect toll revenue along with the installation of tolling equipment. The back office system and the roadside tolling equipment will require annual operations and maintenance expense as well as periodic replacement. Additionally, annual forecasts of toll processing costs were developed for each corridor to approximate the cost of processing the transactions generated at each tolling location. Since this study analyzes the ability of a toll facility to contribute funding to its ongoing operations and maintenance, a roadway O&M forecast was also developed for each scenario to identify the costs of routine maintenance of the corridors.

Overview of Tolling Approach

The tolling approach for this study assumes all-electronic toll collection will be used for all toll corridors. All-electronic Tolling is a free-flow type toll collection system that does not require drivers to stop at traditional toll collection booths. AET collection systems identify each vehicle as it passes under toll gantries at highway speeds. These types of facilities do not provide an option for drivers to stop and pay cash. Drivers pay tolls using a transponder system (MnPASS or similar) or an image based invoicing system. Image based systems use cameras located on the toll gantries to capture an image of the driver's license plate. The license plate information is used to identify the registered owner of the vehicle and the owner is invoiced for the toll. Violation enforcement efforts, including collections, occur only after the owner fails to pay the invoice.

Toll Zone Locations

Due to the high-level nature of this screening analysis, individual tolling locations were not identified. However, an estimate for the number of tolling locations for each corridor was developed based on length of the corridor, interchange density and the corridor type. The cost of processing toll transactions was limited to 30 percent of the estimated gross revenue for this analysis. On some urban corridors, the methodology of estimating tolling locations based on interchange density caused the toll processing costs to exceed 30 percent. This analysis

limited toll processing costs to 30 percent because it is assumed that the toll system would be designed to limit the amount of toll transactions and maximize the revenue.

The amount of tolling locations and the traffic volumes along a corridor are used to estimate the number of toll transactions. A refined toll analysis balances the amount and location of tolling points with the resulting costs and traffic diversion impacts. Each toll location requires overhead gantry structures to support the installation and operations of tolling equipment, roadside equipment cabinets, electrical power and communications infrastructure. Specialized pavement material may also be required through the toll zones to allow for identification of axles.

Roadside Toll System

The roadside toll system includes the purchase and installation of all equipment physically located at the toll facility. At each toll zone location, toll equipment is installed over all travel lanes and shoulders wider than 6 feet to ensure that vehicles do not use shoulders to evade tolls. The major components include installation and testing of the following capital equipment:

- Overhead gantry structures (one pair at each toll zone location)
- Transponder antennas and radio-frequency reader modules
- Equipment cabinets and back-up generators
- Front and rear cameras
- Automatic vehicle classification system
- Video audit system
- Vehicle presence detectors and separators
- Host computers

The system requires annual maintenance to ensure performance and to replace parts as needed. Expenditures are primarily maintenance-related services including preventative, predictive and emergency repairs to roadside toll equipment. This includes active spare parts inventory and management. Annual costs are allocated for these services based on the actual number of toll lanes. Additionally, it is recommended to replace the entire system every 10 years. The estimated capital and lifecycle/replacement costs are shown in **Table 14**.

Table 14: RTS Capital and Lifecycle Costs

Corridor Description				Estimate of Tolling Locations			Roadside Tolling System Cost Estimate				Preliminary Cost Estimate for RTS	
				# of Mainline Gantries			Cost per Tolling Location Type**				Total Cost for RTS per Corridor	
Corridor Type	Corridor	Length (miles)	Interchanges / Miles per Interchange	2-Lane Gantries	3-Lane Gantries	4-Lane Gantries	System Design & Implementation Cost*	2-Lane Gantries	3-Lane Gantries	4-Lane Gantries	Total Upfront Cost	Total Replacement Cost (70% every 10 years)
URBAN INTERSTATE	I-94	51	56 / 0.9	0	34	4	$1,750,000	$1,000,000	$1,100,000	$1,200,000	$43,950,000	$30,765,000
	I-35W	41	47 / 0.9	4	20	6	$1,750,000	$1,000,000	$1,100,000	$1,200,000	$34,950,000	$24,465,000
RURAL INTERSTATE	I-94	41	11 / 3.7	10	0	0	$1,750,000	$1,000,000	$1,100,000	$1,200,000	$11,750,000	$8,225,000
	I-35	130	42 / 3.1	26	2	0	$1,750,000	$1,000,000	$1,100,000	$1,200,000	$29,950,000	$20,965,000
URBAN FREEWAY	TH 610	12	17 / 0.7	12	0	0	$1,750,000	$1,000,000	$1,100,000	$1,200,000	$13,750,000	$9,625,000
	US 169	22	38 / 0.8	26	0	0	$1,750,000	$1,000,000	$1,100,000	$1,200,000	$27,750,000	$19,425,000
RURAL FREEWAY	US 52	68	33 / 2.0	32	0	0	$1,750,000	$1,000,000	$1,100,000	$1,200,000	$33,750,000	$23,625,000

Notes:

**Includes the system implementation costs of an integrator/provider (project management, design, testing, labor and host computer).*

***Includes the cost of equipment at the lane (cameras, readers, etc.), the gantries and roadwork.*

Exact tolling locations were not identified; the estimates above are only intended to give a high-level estimate of the potential tolling capital costs for each corridor.

For a more refined tolling capital cost estimate, a tolling plan would need to be identified for each corridor.

Cost estimates are preliminary and subject to change; actual costs and number of tolling locations will vary based on the final tolling plan and policy decisions.

Dynamic toll rates/pricing does NOT apply to these corridors.

Design/installation/implementation/construction duration for the toll system is 18 months.

Capital costs do not include costs for toll system maintenance and operations (e.g., electricity, gas, communications, etc.) and communications network (e.g., fiber-based, leased-line-based, etc.).

Capital costs do not include back office/Customer service center.

Back Office System

The back office system includes the customer service center and video processing system. Capital costs for the back office system include upgrading computer software, hardware and other components needed to process toll transactions and manage customer accounts. This system is more labor intensive than a roadside toll system. It includes customer service representatives to answer calls and communicate with customers, fulfill transponder orders, review license plate images, generate invoices and process payments. These ongoing costs are commonly estimated based on the quantity of toll transactions. While MnDOT may be able to use the existing MnPASS back office system to process transactions on additional toll facilities, this analysis conservatively assumes that a new back office system will be required to handle the increased transactions and account for video invoicing.

The analysis assumed that most tolls will be transponder transactions with image based transactions accounting for a smaller portion of total transactions. Although image based transactions are costlier to process and a small portion of these transactions will not be collectable, the toll differential for image based transactions and additional invoicing and violation fees could result in no net revenue loss for a proposed facility.

Toll processing costs are forecasted based on the amount and type of transactions developed in the traffic and revenue analysis. This analysis assumes transponder transactions would cost 10 cents per transaction to process and video (license plate) transactions would cost 35 cents per transaction. The analysis assumes that differential video tolls and non-payment fines and violations will be sufficient to cover any non-collectable video transactions.

A summary of the back-office system costs are as follows:

- Approximately $15-20 million upfront capital costs to establish the back office system (replacement every 10 years)
- Annual toll processing costs based on forecasted toll transactions (10 cents for transponders and 35 cents for video images)

Roadway Operations and Maintenance

Roadway Operations and Maintenance encompasses all of the routine maintenance functions required on and along the roadway. The major components of roadway O&M are pavement repair, crack sealing, road sweeping, debris removal, graffiti removal, illumination, pavement markings, guardrail and traffic barriers, landscaping, mowing, litter removal and snow and ice control. The analyses calculated routine maintenance at a flat rate of $32,000 per lane mile per year (2017 dollars) based on average costs in Minnesota from 2012 to 2014. Maintenance rates on similar projects range from $15,000 to $40,000 per lane mile, depending on size and condition of the system. Maintenance expenditures were annually increased at 3 percent to account for inflation. **Table 15** presents the lane miles and year one roadway O&M forecast for each corridor.

Table 15: Roadway O&M Costs

Year 1 Roadway Operations and Maintenance Cost					
Category	Corridor	Average Lanes	Length	Lane Miles	$32,000/lane mile
URBAN INTERSTATE	I-94	6.22	51	319	$10,214,000
	I-35W	6.00	41	236	$7,546,000
RURAL INTERSTATE	I-94	4.00	41	164	$5,248,000
	I-35	5.00	130	531	$16,979,000
URBAN FREEWAY	TH 610	4.00	12	47	$1,498,000
	US 169	4.00	30	121	$3,878,000
RURAL FREEWAY	US 52	4.00	67	267	$8,538,000

Gross Revenue Analysis

The gross revenue for the corridors was determined first. Gross revenue is the estimated total toll revenue collected during each year of the toll system's lifetime and does not account for any toll collection costs. It is calculated based on the assumptions described in the *Modeling Methods and Assumptions* section above.

Gross revenues were forecasted for three toll rate and diversion scenarios-high, medium, and low-on each of the seven corridors. In the scenarios shown with inflation, toll rates were annually increased at 1.75 percent. **Figure 15** below summarizes the gross revenue results for the 30-year term for the high, medium and low toll rates. **Figure 16** summarizes the gross revenue results for the 30-year term for the high, medium and low toll rates with inflation.

Figure 15: Gross Revenue Chart in Current Year Dollars

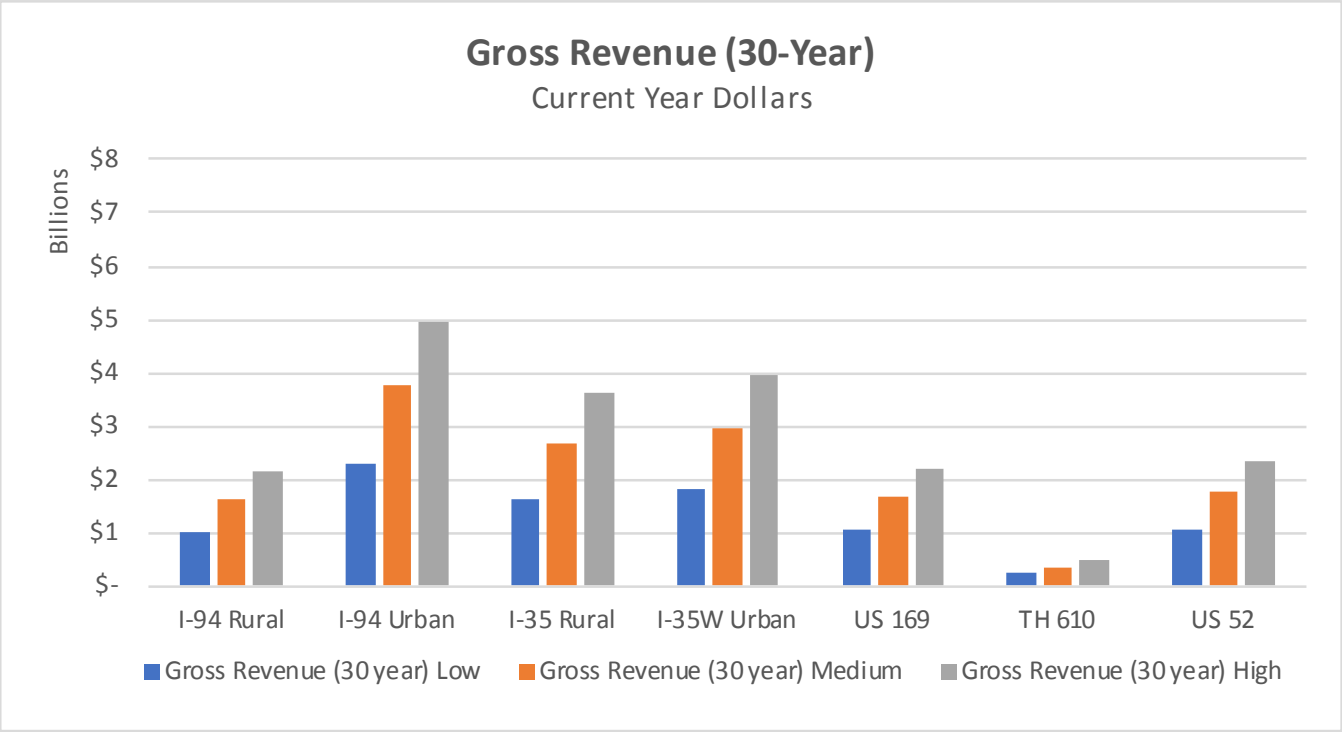


Figure 16: Gross Revenue Graph with Inflation

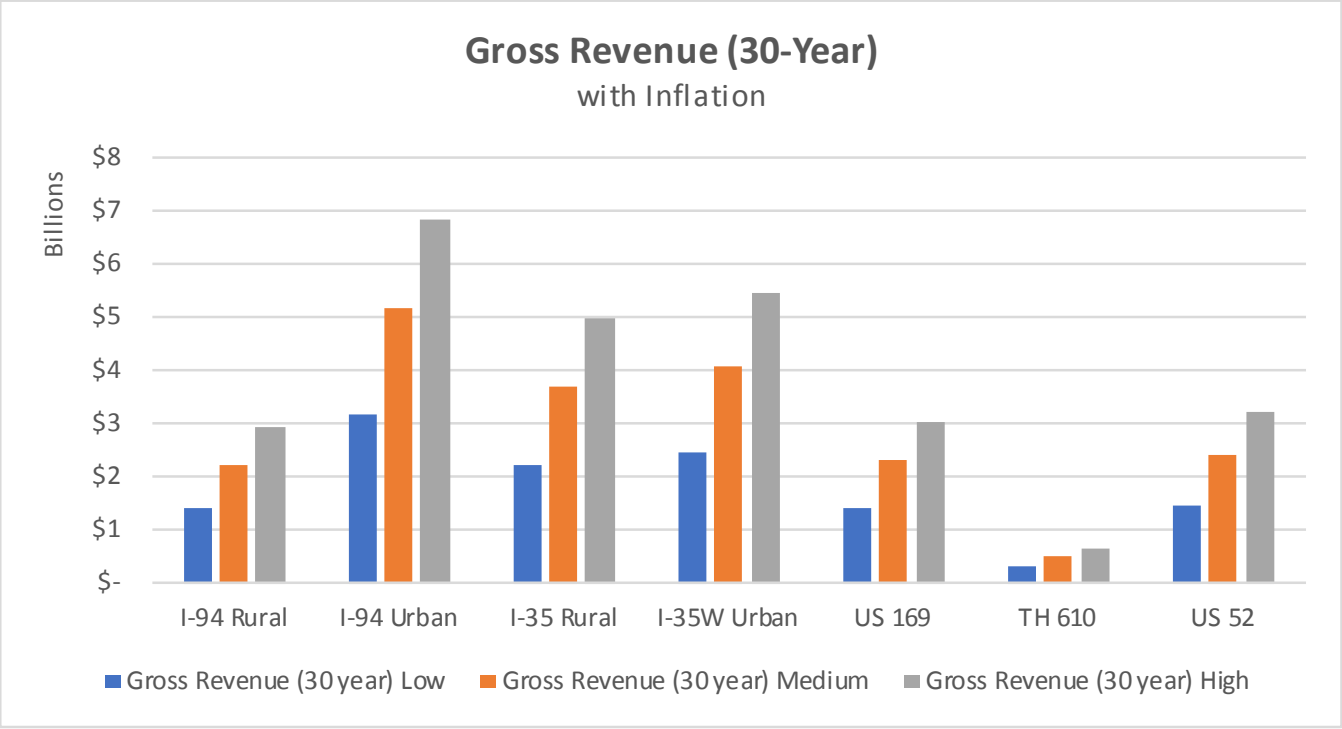


Figure 17: Estimated Annual Gross Revenue

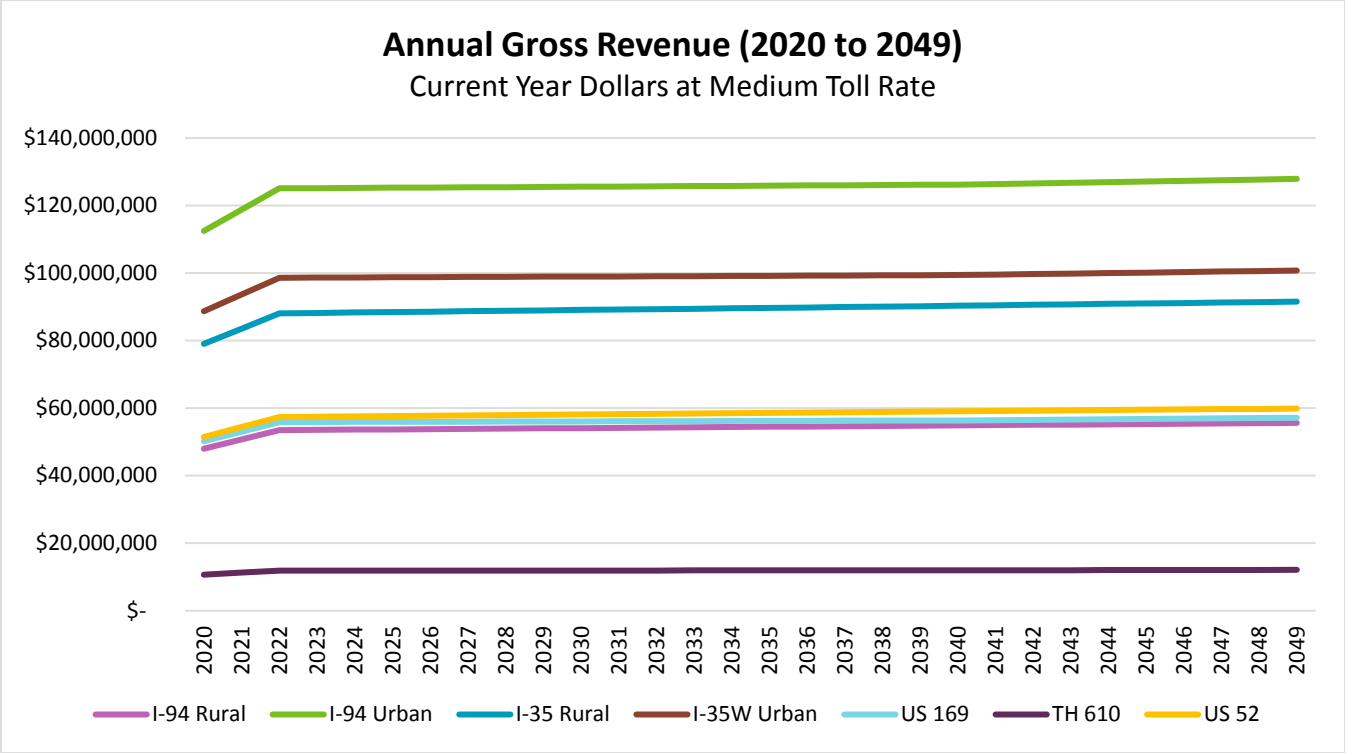
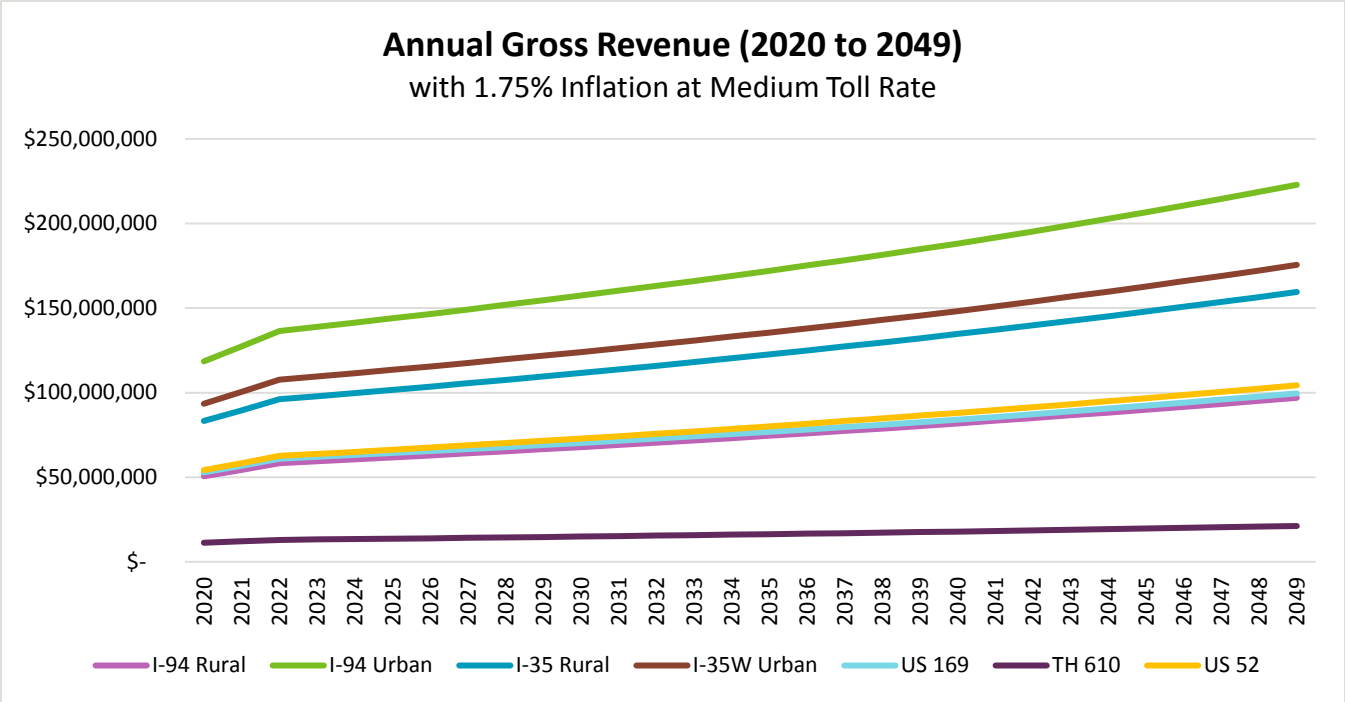


Figure 18: illustrates the estimated annual gross revenue by corridor with inflation at the medium toll rate.

Figure 18: Estimated Annual Gross Revenue with Inflation



Based on estimated gross revenue the I-94 urban corridor has the highest likely revenue potential and TH 610 corridor has the lowest revenue potential.

Results and Net Revenue Analysis

The study forecasts cost components to present a net revenue analysis of remaining toll revenues after leakage and paying for tolling capital costs, toll transaction costs and roadway O&M costs and transit. **Table 16** below is a summary of the cost and revenue categories.

Table 16: Cost and Revenue Summary

Category	Cost and Revenue Summary
Toll Revenue	Annual forecast with 1.75 percent annual inflation.
Tolling Costs	Roadway tolling system includes the cost of all roadside equipment and installation costs occurring in year one, 11 and 21 and include inflation.
	Toll transaction costs were calculated annually based on the amount of transactions. Toll transaction costs were not allowed to exceed 30% of gross revenue.
Roadway O&M	Includes all routine costs associated with maintaining the roadway and right of way.
	O&M is an annual forecast based on $32,000 per lane mile and includes 3% annual inflation.
Net Revenues to Reinvest in Corridor	Remaining toll revenue for reinvestment in the corridor.

Table 17 and **Table 18** on the following page detail the costs in each category for each corridor. **Table 17** shows the estimated costs and available revenue for the 30-year term in current year dollars. **Table 18** shows the estimated costs and available revenue for the 30-year term adjusted for inflation.

Table 17: Estimated Current Year Dollar Costs and Remaining Revenue Over 30 Years

Category	Corridor	Gross Revenue (millions)	Tolling Cost (millions)	Roadway O&M (millions)	Net Revenues to Reinvest in Corridor (millions)
URBAN INTERSTATE	I-94	$3,537	$1,167	$306	$2,064
	I-35W	$2,787	$920	$226	$1,641
RURAL INTERSTATE	I-94	$1,528	$214	$157	$1,157
	I-35	$2,516	$388	$509	$1,619
URBAN FREEWAY	TH 610	$336	$134	$45	$157
	US 169	$1,580	$541	$116	$923
RURAL FREEWAY	US 52	$1,643	$497	$256	$890

Table 18: Estimated Costs and Remaining Revenue Adjusted for Inflation

Category	Corridor	Gross Revenue (millions)	Tolling Cost (millions)	Roadway O&M (millions)	Net Revenues to Reinvest in Corridor (millions)
URBAN INTERSTATE	I-94	$4,856	$1,588	$531	$2,738
	I-35W	$3,827	$1,252	$392	$2,182
RURAL INTERSTATE	I-94	$2,100	$289	$273	$1,538
	I-35	$3,457	$521	$883	$2,054
URBAN FREEWAY	TH 610	$461	$179	$78	$204
	US 169	$2,169	$733	$202	$1,234
RURAL FREEWAY	US 52	$2,258	$669	$444	$1,145

Figure 19: and **Figure 20**: show the estimated cost and revenue summary for each corridor in current dollars, and adjusted for inflation. Revenue estimates are calculated based on the medium (7 cent) toll rate.

Figure 19: Estimated Costs and Net Revenue in Current Year Dollars at the Medium Toll Rate

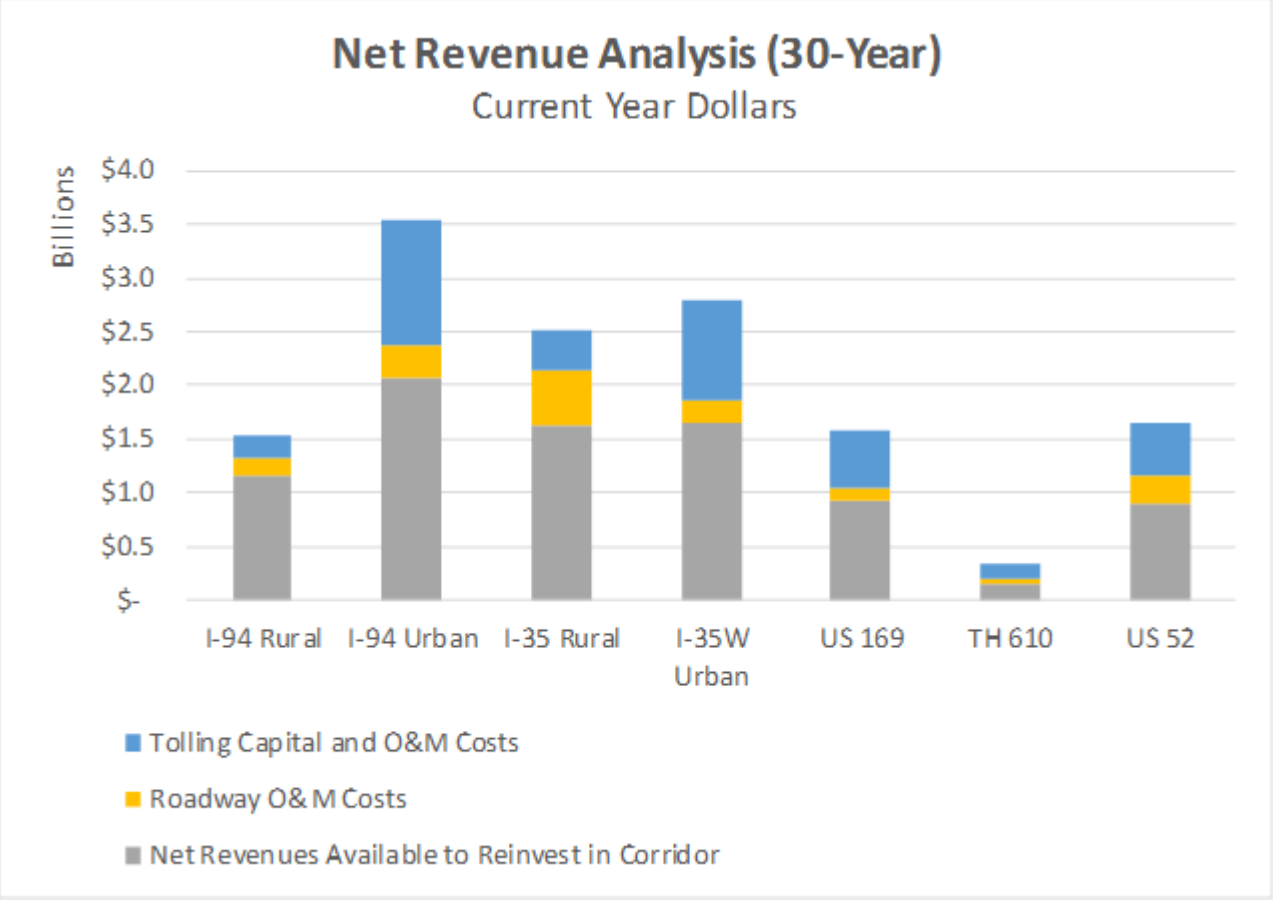
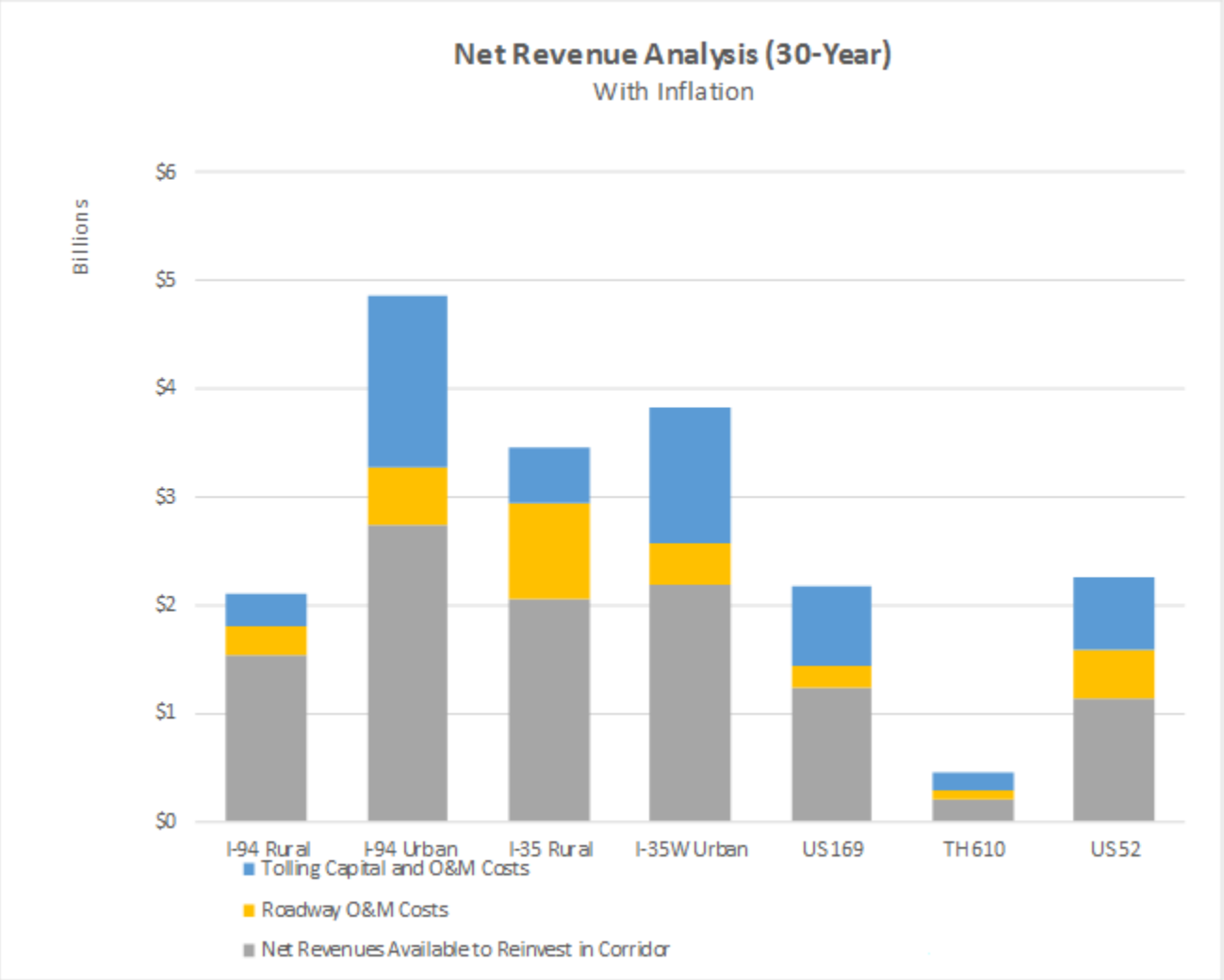


Figure 20: Estimated Costs and Net Revenue at the Medium Toll Rate Adjusted for Inflation

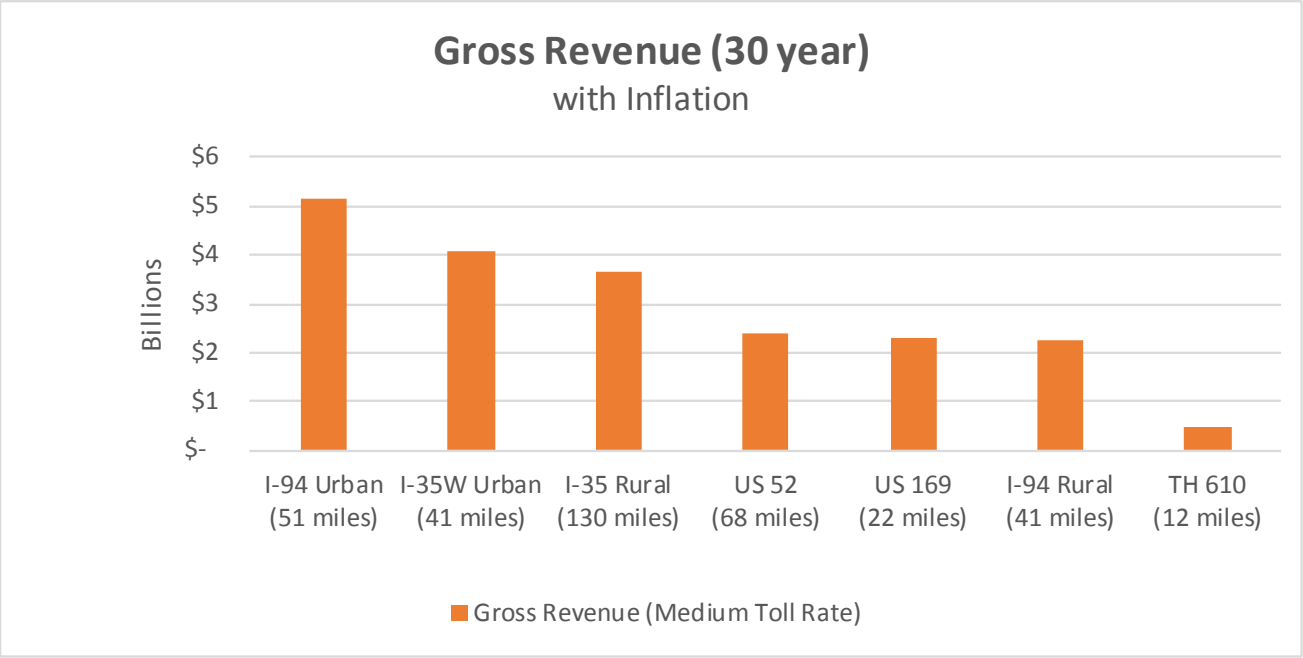


Conclusion

Several interstate and trunk highway corridors across Minnesota were reviewed to evaluate the feasibility of general purpose lane tolling. The traffic and revenue portion of the study forecasted the likely range of toll revenues and the associated tolling and roadway costs on existing sample corridors at a high level.

Based on this high-level analysis, **Figure 21** shows the total gross revenue estimates over the 30-year period for each corridor studied shown at the medium toll rate.

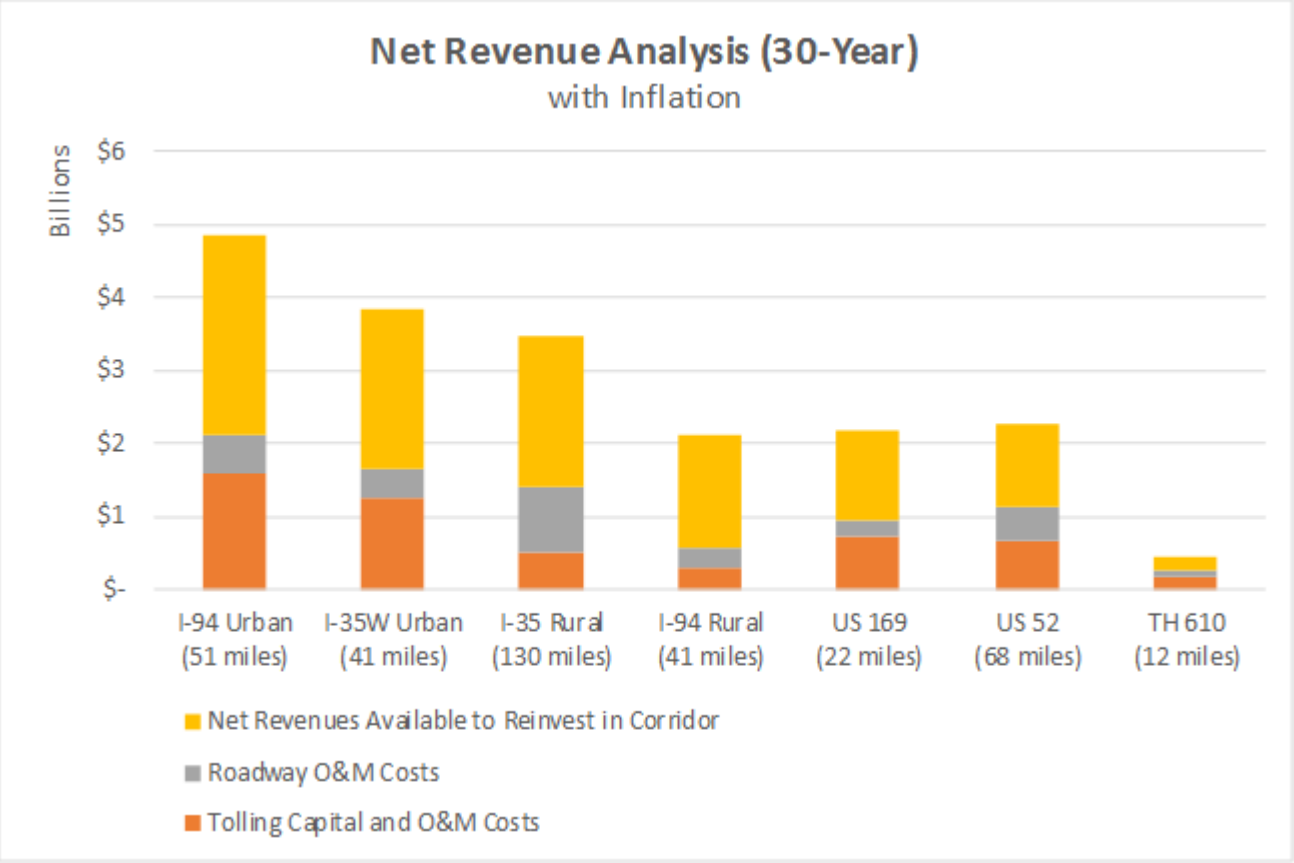
Figure 21: Gross Revenue Estimates by Corridor from Highest to Lowest



As shown in **Figure 21**, the I-94 urban corridor results in the highest total gross revenue and TH 610 results in the lowest total gross revenue. When the length of the corridors is considered, US 169, I-94 urban and I-35W urban had the highest "revenue per mile" ratios compared to the other corridors.

Figure 22 shows the cost categories and net revenue estimates for each corridor. The corridors are ranked based on the estimated amount of net revenue available to reinvest in the corridor.

Figure 22: Net Revenue Analysis from Highest to Lowest Net Revenues Available



As shown in **Figure 22**:, when the length of the corridors is considered US 169 results in the highest revenue available for reinvestment per mile and I-35 results in the lowest revenue available for reinvestment per mile. The analysis shows the urban corridors, except for TH 610, result in the highest amount of revenue available for reinvestment.

The potential toll corridors were grouped into four categories: urban interstates, rural interstates, urban freeways and rural freeways. The selected corridors were analyzed in detail based on the characteristics of the corridors within each of those categories. These results represent the expected revenue based on how suitable tolling is for that corridor. Other potential corridors within the categories would likely have similar results based on their suitability. This is demonstrated by the TH 610 analysis. TH 610 was selected as an urban freeway that was likely not as strong a candidate for tolling and the resulting analysis supported this presumption.

As noted earlier, it is important to emphasize the conditions represented by tolling a single corridor would not be the same as tolling all corridors (system tolling). The revenue generated by tolling a single corridor was calculated based on assumptions that would change in a system tolling scenario. These revenue results cannot be multiplied to represent system wide tolling.

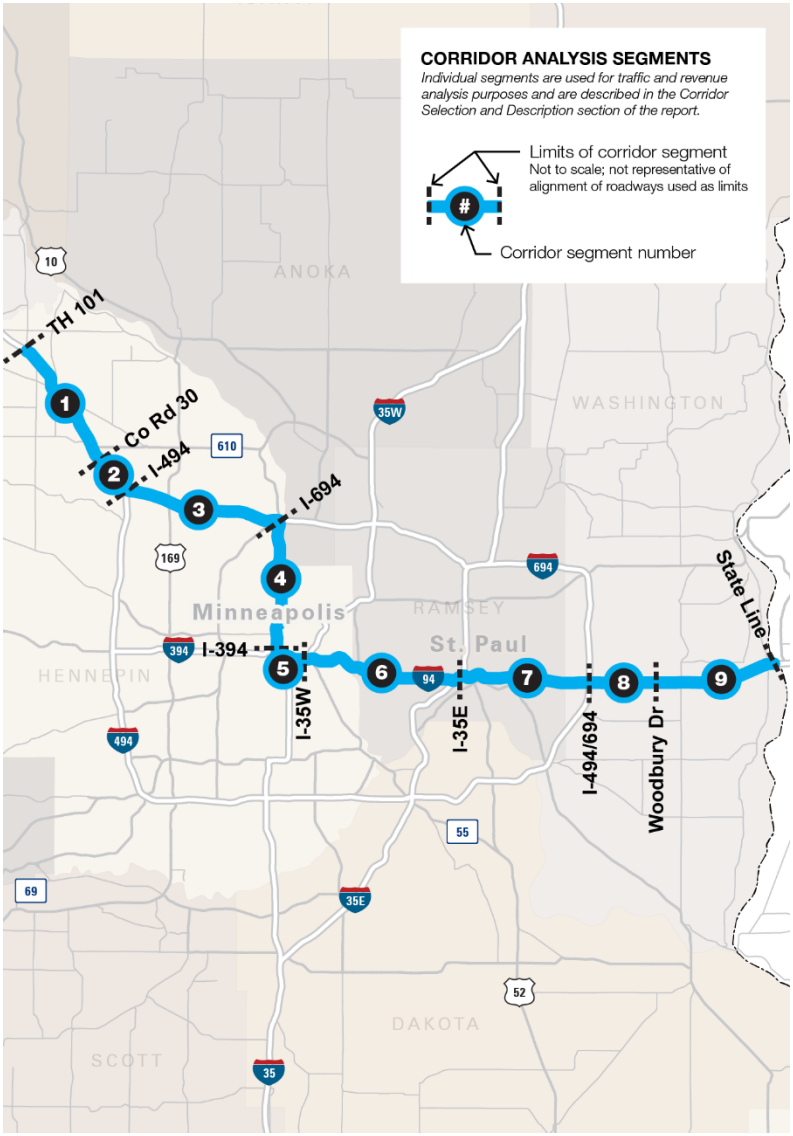
Corridor Maps and Revenue Results

Urban Interstate

Corridor 1: I-94

CORRIDOR ATTRIBUTES	
CORRIDOR LIMITS	TH 101 to Wisconsin State Line
CORRIDOR LENGTH	51 miles
COMPETING ROUTES/ FRONTAGE ROADS	I-694, US 10, TH 36
MAJOR CITIES/TOWNS	Minneapolis, St Paul, Suburbs
SEGMENTS USED FOR ANALYSIS	9

	MIN	MAX
CONGESTION LEVEL	Low	Very high
NUMBER OF LANES	6	8
TRAFFIC VOLUMES		
AADT	63,500 (9)	172,000 (5)
AVERAGE AADT PER LANE FOR CORRIDOR	10,600	28,700
FUTURE YEAR 2040 TOLL FREE TRAFFIC	73,000	198,000
AVERAGE TRUCK PERCENTAGE	4.0%	10.4%



NET REVENUE AVAILABLE					
TOLL RATE	30 YEAR TOTAL WITH INFLATION ($M) GROSS REVENUE	TOLLING COST	ROADWAY O&M	NET REVENUE AVAILABLE	DIVERSION
4 CENTS/MILE	2,984	1,588	531	865	21%
7 CENTS/MILE	4,856	1,588	531	2,738	26%
10 CENTS/MILE	6,414	1,588	531	4,296	31%

Urban Interstate

Corridor 2: I-35W

CORRIDOR ATTRIBUTES	
CORRIDOR LIMITS	Northern E/W Split to Southern E/W
CORRIDOR LENGTH	41 miles
COMPETING ROUTES/ FRONTAGE ROADS	Multiple
MAJOR CITIES/TOWNS	Minneapolis, Suburbs
SEGMENTS USED FOR ANALYSIS	8

	MIN	MAX
CONGESTION LEVEL	Low	High
NUMBER OF LANES	4	8
TRAFFIC VOLUMES		
AADT	60,200 (1)	173,000 (5)
AVERAGE AADT PER LANE FOR CORRIDOR	12,600	21,700
FUTURE YEAR 2040 TOLL FREE TRAFFIC	69,000	199,000
AVERAGE TRUCK PERCENTAGE	3.9%	11.7%

NET REVENUE AVAILABLE					
TOLL RATE	30 YEAR TOTAL WITH INFLATION ($M) GROSS REVENUE	TOLLING COST	ROADWAY O&M	NET REVENUE AVAILABLE	DIVERSION
4 CENTS/MILE	2,320	1,252	392	676	19%
7 CENTS/MILE	3,827	1,252	392	2,182	24%
10 CENTS/MILE	5,130	1,252	392	3,486	29%

Rural Interstate

Corridor 3: I-94

CORRIDOR ATTRIBUTES	
CORRIDOR LIMITS	TH 101 to St Cloud
CORRIDOR LENGTH	41 miles
COMPETING ROUTES/ FRONTAGE ROADS	US 10
MAJOR CITIES/TOWNS	St Cloud, Rural Cities
SEGMENTS USED FOR ANALYSIS	1

	MIN	MAX
CONGESTION LEVEL	Low	Medium
NUMBER OF LANES	4	4
TRAFFIC VOLUMES		
AADT	52,500 (1)	52,500 (1)
AVERAGE AADT PER LANE FOR	13,100	13,100
FUTURE YEAR 2040 TOLL FREE TRAFFIC	60,000	60,000
AVERAGE TRUCK PERCENTAGE	10.8%	15.9%

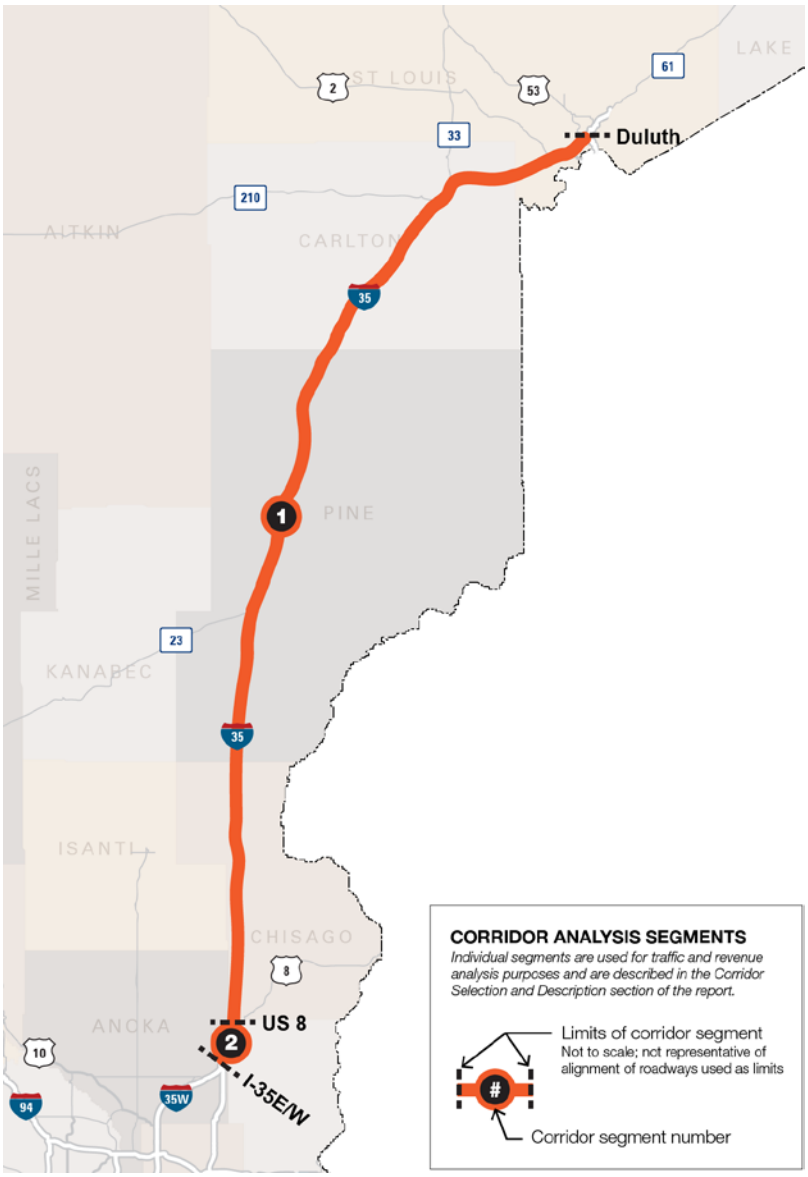
NET REVENUE AVAILABLE					
TOLL RATE	30 YEAR TOTAL WITH INFLATION ($M) GROSS REVENUE	TOLLING COST	ROADWAY O&M	NET REVENUE AVAILABLE	DIVERSION
4 CENTS/MILE	1,305	289	273	743	24%
7 CENTS/MILE	2,100	289	273	1,538	30%
10 CENTS/MILE	2,744	289	273	2,182	36%

Rural Interstate

Corridor 4: I-35

CORRIDOR ATTRIBUTES	
CORRIDOR LIMITS	Duluth to Northern E/W Split
CORRIDOR LENGTH	130 miles
COMPETING ROUTES/ FRONTAGE ROADS	Co. Rd. 61, TH 23, TH 65
MAJOR CITIES/TOWNS	Duluth, Rural Cities
SEGMENTS USED FOR ANALYSIS	2

	MIN	MAX
CONGESTION LEVEL	Low	Medium
NUMBER OF LANES	4	6
TRAFFIC VOLUMES		
AADT	25,800 (1)	76,000 (2)
AVERAGE AADT PER LANE FOR CORRIDOR	6,500	12,700
FUTURE YEAR 2040 TOLL FREE TRAFFIC	30,000	87,000
AVERAGE TRUCK PERCENTAGE	4.3%	8.9%



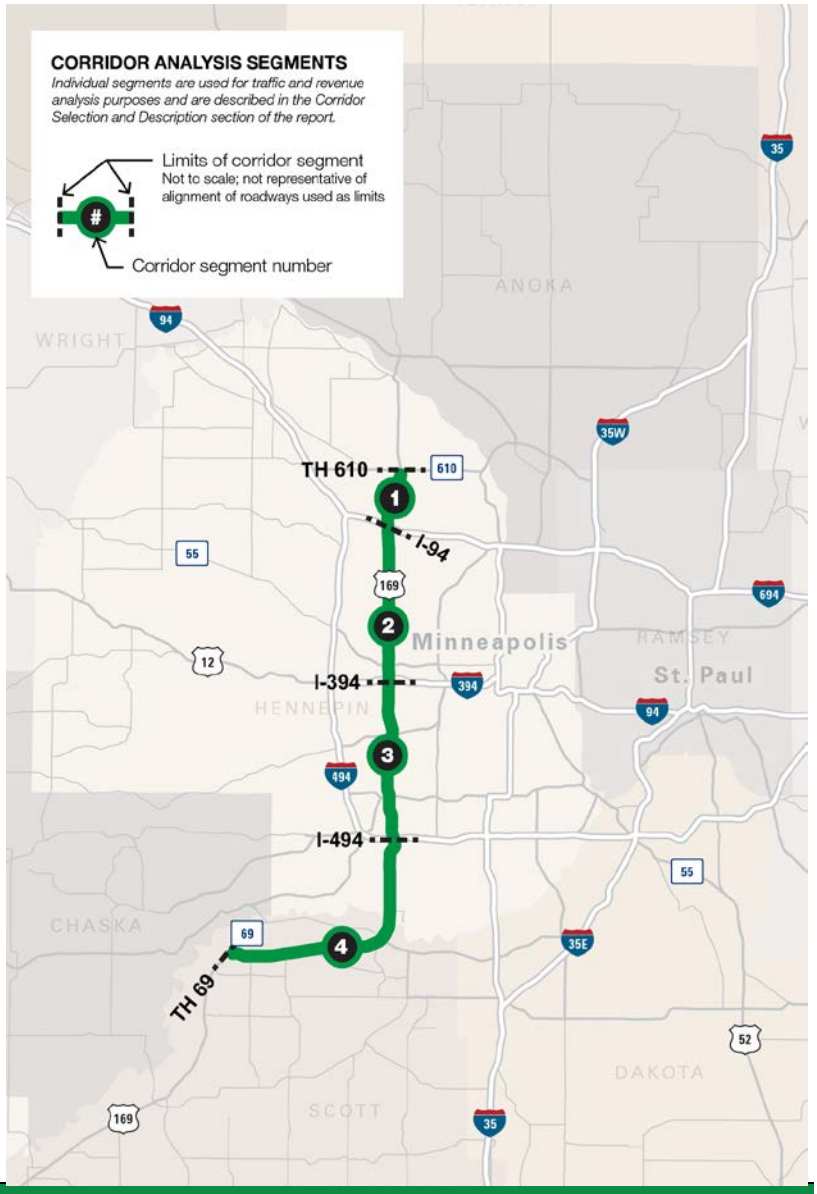
NET REVENUE AVAILABLE					
TOLL RATE	30 YEAR TOTAL WITH INFLATION ($M) GROSS REVENUE	TOLLING COST	ROADWAY O&M	NET REVENUE AVAILABLE	DIVERSION
4 CENTS/MILE	2,082	521	883	679	20%
7 CENTS/MILE	3,457	521	883	2,054	25%
10 CENTS/MILE	4,672	521	883	3,268	30%

Urban Freeway

Corridor 6: US 169

CORRIDOR ATTRIBUTES	
CORRIDOR LIMITS	TH 610 to TH 69
CORRIDOR LENGTH	22 miles
COMPETING ROUTES/ FRONTAGE ROADS	I-494, TH 100, US 212
MAJOR CITIES/TOWNS	Twin Cities Suburbs
SEGMENTS USED FOR ANALYSIS	4

	MIN	MAX
CONGESTION LEVEL	Low	High
NUMBER OF LANES	4	4
TRAFFIC VOLUMES		
AADT	75,500 (1)	88,800 (2)
AVERAGE AADT PER LANE FOR CORRIDOR	18,900	22,200
FUTURE YEAR 2040 TOLL FREE TRAFFIC	87,000	102,000
AVERAGE TRUCK PERCENTAGE	4.0%	11.1%



NET REVENUE AVAILABLE

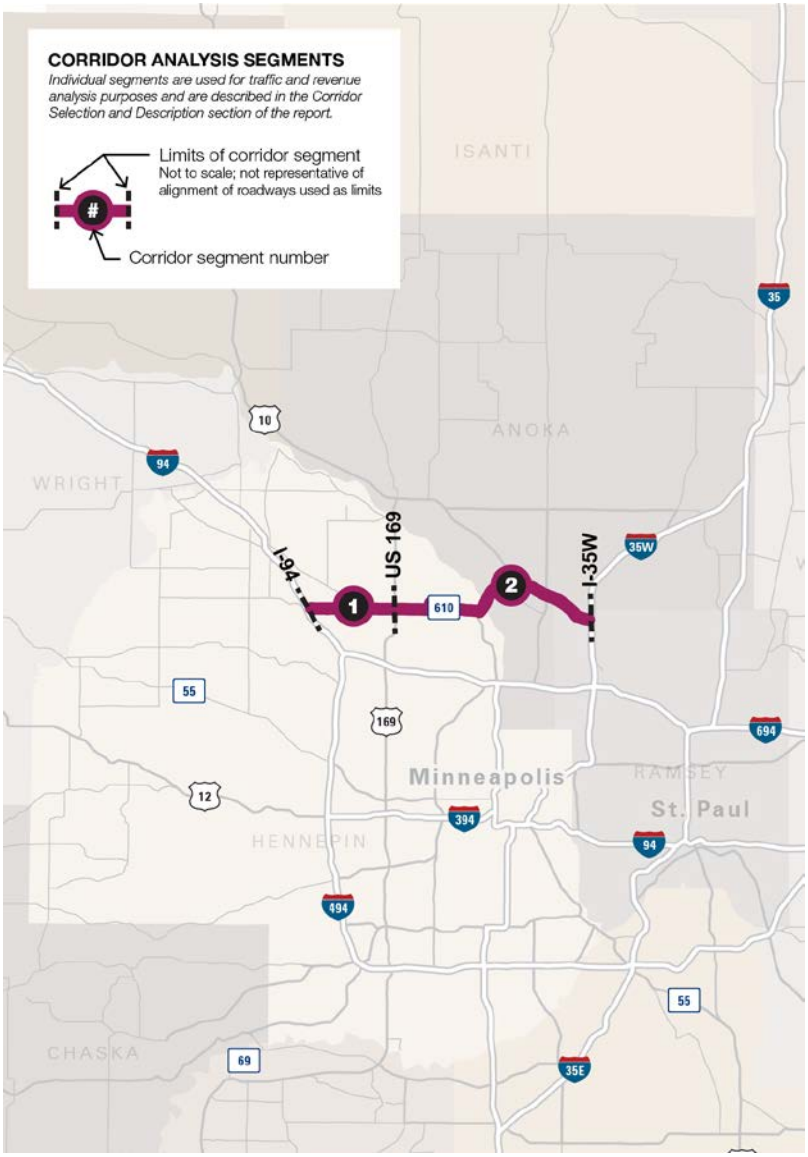
TOLL RATE	30 YEAR TOTAL WITH INFLATION ($M) GROSS REVENUE	TOLLING COST	ROADWAY O&M	NET REVENUE AVAILABLE	DIVERSION
4 CENTS/MILE	1,346	733	202	411	24%
7 CENTS/MILE	2,169	733	202	1,234	30%
10 CENTS/MILE	2,833	733	202	1,898	36%

Urban Freeway

Corridor 6: TH 610

CORRIDOR ATTRIBUTES	
CORRIDOR LIMITS	I-94 to I-35W
CORRIDOR LENGTH	12 miles
COMPETING ROUTES/ FRONTAGE ROADS	I-694
MAJOR CITIES/TOWNS	Twin Cities Suburbs
SEGMENTS USED FOR ANALYSIS	2

	MIN	MAX
CONGESTION LEVEL	Low	Medium
NUMBER OF LANES	4	4
TRAFFIC VOLUMES		
AADT	28,300 (1)	67,500 (2)
AVERAGE AADT PER LANE FOR CORRIDOR	7,100	16,900
FUTURE YEAR 2040 TOLL FREE TRAFFIC	32,000	78,000
AVERAGE TRUCK	3.2%	6.7%



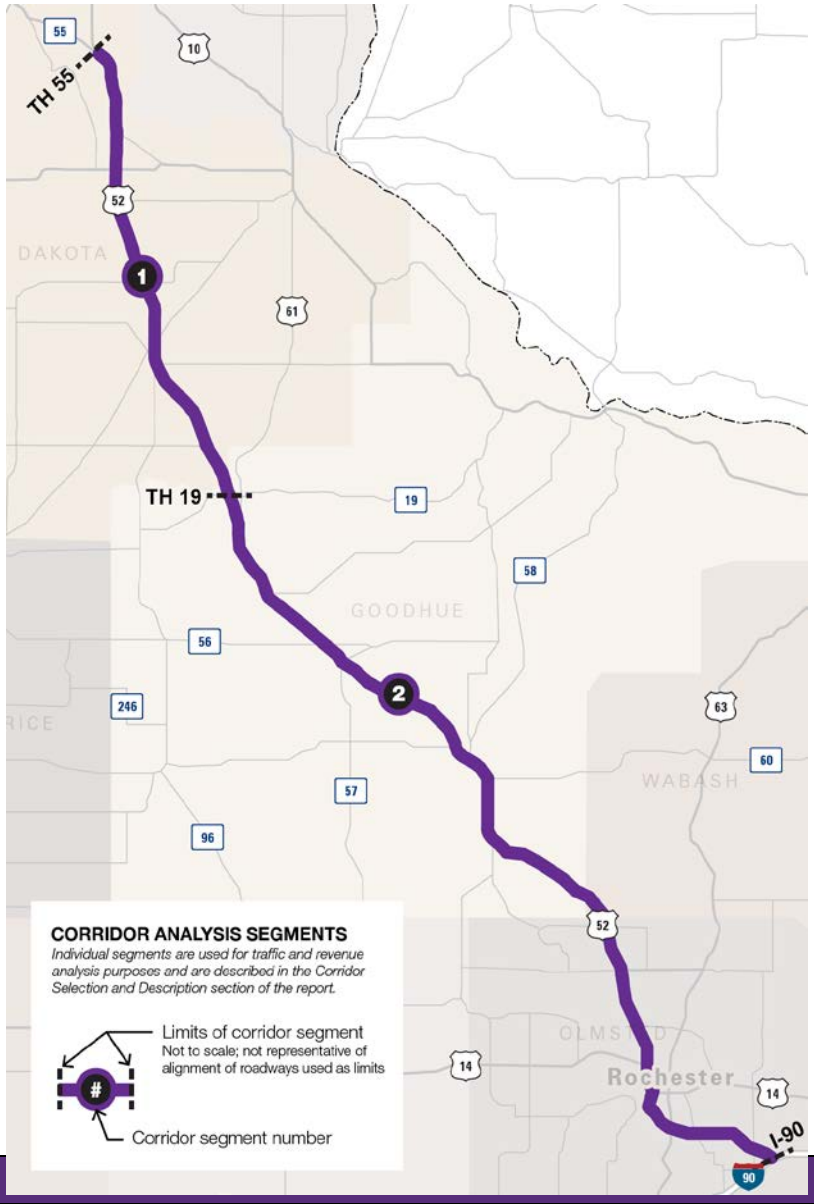
NET REVENUE AVAILABLE					
TOLL RATE	30 YEAR TOTAL WITH INFLATION ($M) GROSS REVENUE	TOLLING COST	ROADWAY O&M	NET REVENUE AVAILABLE	DIVERSION
4 CENTS/MILE	286	179	78	29	24%
7 CENTS/MILE	461	179	78	204	30%
10 CENTS/MILE	602	179	78	345	36%

Urban Freeway

Corridor 7: US 52

CORRIDOR ATTRIBUTES	
CORRIDOR LIMITS	TH 55 to Rochester
CORRIDOR LENGTH	68 miles
COMPETING ROUTES/ FRONTAGE ROADS	None
MAJOR CITIES/TOWNS	Rochester, Rural Cities
SEGMENTS USED FOR ANALYSIS	2

	MIN	MAX
CONGESTION LEVEL	Low	Medium
NUMBER OF LANES	4	4
TRAFFIC VOLUMES		
AADT	31,500 (1)	36,000 (2)
AVERAGE AADT PER LANE FOR CORRIDOR	7,900	9,000
FUTURE YEAR 2040 TOLL FREE TRAFFIC	36,000	41,000
AVERAGE TRUCK PERCENTAGE	6.8%	13.0%



NET REVENUE AVAILABLE

TOLL RATE	30 YEAR TOTAL WITH INFLATION ($M) GROSS REVENUE	TOLLING COST	ROADWAY O&M	NET REVENUE AVAILABLE	DIVERSION
4 CENTS/MILE	1,375	669	444	263	20%
7 CENTS/MILE	2,258	669	444	1,145	25%
10 CENTS/MILE	3,007	669	444	1,894	30%

Appendix A: Diversion Rates

Diversion rates shown below are selected based on the characteristics of the corridor segment.

Facility Type	Frontage Road Availability	Nearby Competing Facilities	Low	Medium	High
Urban Interstate	Yes	Yes	24%	30%	36%
Urban Interstate	Yes	No	16%	20%	24%
Urban Interstate	No	Yes	20%	25%	30%
Urban Interstate	No	No	12%	15%	18%
Urban Interstate	Yes	Yes	24%	30%	36%
Urban Interstate	Yes	No	16%	20%	24%
Urban Interstate	No	Yes	20%	25%	30%
Urban Interstate	No	No	12%	15%	18%
Rural Interstate	Yes	Yes	28%	35%	42%
Rural Interstate	Yes	No	20%	25%	30%
Rural Interstate	No	Yes	24%	30%	36%
Rural Interstate	No	No	16%	20%	24%
Rural Interstate	Yes	Yes	28%	35%	42%
Rural Interstate	Yes	No	20%	25%	30%
Rural Interstate	No	Yes	24%	30%	36%
Rural Interstate	No	No	16%	20%	24%
Urban Freeway	Yes	Yes	28%	35%	42%
Urban Freeway	Yes	No	20%	25%	30%
Urban Freeway	No	Yes	24%	30%	36%
Urban Freeway	No	No	16%	20%	24%
Urban Freeway	Yes	Yes	28%	35%	42%
Urban Freeway	Yes	No	20%	25%	30%
Urban Freeway	No	Yes	24%	30%	36%
Urban Freeway	No	No	16%	20%	24%
Rural Freeway	Yes	Yes	32%	40%	48%
Rural Freeway	Yes	No	24%	30%	36%
Rural Freeway	No	Yes	28%	35%	42%
Rural Freeway	No	No	20%	25%	30%
Rural Freeway	Yes	Yes	32%	40%	48%
Rural Freeway	Yes	No	24%	30%	36%
Rural Freeway	No	Yes	28%	35%	42%
Rural Freeway	No	No	20%	25%	30%

Appendix B: Glossary of Terms Definitions, Common Terms and Acronyms

Unless otherwise noted, all descriptions and definitions are from the International Bridge, Tunnel, and Turnpike Association Glossary of Terms, 2014 Edition[6].

TERM (ACRONYM)	DESCRIPTION/DEFINITION
A	
American Association of Motor Vehicle Administrators (AAMVA)	Represents the state and provincial officials in the United States and Canada who administer and enforce motor vehicle laws. AAMVA encourages uniformity and reciprocity among the states and provinces and develops model programs in motor vehicle administration, law enforcement and highway safety.
American Association of State Highway and Transportation Officials (AASHTO)	Is an interest group based in Washington, DC, involved in research, advocacy and technical assistance. Primary focus is highways. AASHTO is also a standard setting organization.
Account	Each On-Board Unit (OBU) is assigned to a User's Account. The Account serves as the final destination for system transactions. For a pre-paid account the User periodically credits funds (from a Fiduciary) to the Account to offset the transaction cost.
Account Processor	Is a third party organization that processes Accounts and transactions for an Issuer. For example, retailers who issue credit cards often contract account processing to third party companies like Payment Tech. In tolling, third-party Account Processors often operate customer service center (CSC) entities.
Automated Clearinghouse (ACH)	Is a financial transaction network operated by the Federal Reserve. The ACH processes a number of different types of financial transactions including inter-bank transactions, credit card transactions, E-checks (a form of electronic payment), etc.
Automated Coin Machine (ACM)	Unattended machines used for toll payment by coinage
Average Daily Traffic (ADT)	The total traffic volume during a given time period divided by the time period
All-Electronic Tolling (AET)	Technology which enables cashless toll collection, either through transponders and/or license plate readers, eliminating the necessity of stopping the vehicle to pay the toll. AET is sometimes referred to as "cashless" tolling.
All-Electronic Tolling Conversion (AETC)	Process of changing a toll collection method from manual cash payments to fully automated electronic payments.

[6] IBTTA, (2014)

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Association of Electronic Toll and Interoperable Services (AETIS)	Association representing European Electronic Toll Services (EETS) providers as a stakeholder group with regard to the European Union (EU).
Aggregation	Transaction processing costs in electronic toll collection can be a significant component of an Issuer's operating costs. To minimize this cost, Issuers often aggregate groups of transactions from Service Providers into a single transaction that is sent to the Fiduciary. This lowers the transaction cost by splitting the credit card transaction fee across a number of transactions. For example, a customer service center (CSC) may collect all transactions for a period of time, and Aggregate those transactions into a single credit card charge to the User's card account. As a result the Authority pays only a single transaction fee.
Automatic Number Plate Recognition (ANPR)	Is a technology for automatically reading vehicle number plates.
American National Standards Institute (ANSI)	Is the primary organization for fostering the development of technology standards.
Application	This is the software that runs on the On-Board Unit and RSU Application Platform. The Application contains the "brains" (i.e. logic) that conducts the transaction using the Public and Private Keys (see below).
Application Platform	This is the computer that is collocated with the On-Board Unit and Roadside Unit. It runs the Application, or software that conducts the transaction.
American Public Transportation Association (APTA)	The American Public Transportation Association (APTA) advocates the advancement of public transportation. APTA members are public organizations that are engaged in the areas of bus, paratransit, light rail, commuter rail, subways, waterborne passenger services, and high-speed rail.
American Trucking Associations (ATA)	Is the national trade association for the trucking industry.
Alliance for Toll Interoperability (ATI)	Organization established to promote and implement toll collection interoperability among states and agencies. ATI's goals include establishing interstate customer video tolling and interoperability, establishing protocols and systems allowing for secure sharing of vehicle information and the investigation of RFID toll technology interoperability. ATI's membership consists exclusively of toll facility operators.
Automatic Teller Machine (ATM)	An electronic telecommunications device that enables the customers of a financial institution to perform financial transactions without the need for a human cashier or clerk
Authority	A legal jurisdiction created to operate tolled infrastructure (e.g., E-470 Public Highway Authority, New York State Thruway Authority, North Texas Tollway Authority). Also known as the "District" in some states.
Automatic/Automated Vehicle Identification (AVI)	A system which transmits signals from an on-board tag or transponder to roadside receivers for uses such as electronic fee collection and stolen vehicle recovery.

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Automatic/Automated Vehicle Classification (AVC)	Determines the type of vehicle (car, truck, bus, etc.) and the vehicle characteristics (weight, number of axles, tires, etc.) as required for toll classification.
Automated Vehicle Identification (AVI)	A system which transmits signals from an on-board tag or transponder to roadside receivers for uses such as electronic fee collection and stolen vehicle recovery.
B	
Back-office	Database system that enables registration and maintenance of customer accounts; facilitates funds transfer between participating Authorities.
Barrier System	A toll system, parking facility, etc. wherein the customer must come to a partial or full stop at a barrier until the payment has been processed.
Beacon	Also known as Road-Side Unit and RSU. The roadside infrastructure component of an ETC system; a receiver or transceiver that identifies the On-Board Unit in the vehicle, and identifies the account, permitting an electronic toll transaction to occur.
C	
Closed Circuit Television (CCTV)	Is a TV system in which signals are not publicly distributed but are monitored.
Classify	To determine the category of the vehicle to be tolled based upon its specific structure, weight, axles, tires, etc.
Clearinghouse (Financial)	A Clearinghouse Network routes transactions for reconciliation. The term applies to all types of financial transactions, not just toll transactions. Examples of Clearinghouses (or Clearinghouse Networks) include the Federal Reserve Automated Clearinghouse Network (ACH), VISA, MasterCard, American Express, Pulse and Cirrus. It is important to note the distinction between a Clearinghouse and a Fiduciary (defined below): A Fiduciary converts transactions into Funds, Clearinghouse routes transactions to Fiduciaries.
Clearinghouse (Toll Authorities)	Provides all requisite financial services to transfer monies between participating Authorities; provides accurate and timely downloads of customer accounts, violations and all other information necessary for an interoperable system.
Closed Barrier System	A facility that has both mainline toll barriers as well as ramp toll plazas, placed such that no toll-free traffic movement is permitted.
Closed System	A system that monitors your entrance and exit and calculates the toll on the basis of distance traveled.
Concession	A grant of a tract of land made by a government or other controlling authority in return for stipulated services or a promise that the land will be used for a specific purpose. In some cases this will mean the exclusive right to market some product like fuel or food on a turnpike. In the U.S. it increasingly relates to leased space in a rest area. In some instances, both inside and outside the U.S. the concession is the road itself and a private company operates the road for a profit under agreed upon guidelines or payments. This is especially true in European countries.

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Concessionaire company	Mainly in Europe: A company which is awarded, by a conceding Administration, the operation of a toll facility. Usually the contract includes the design, construction, financing and operation of the facility.
Congestion Pricing	Also called Value Pricing refers to variable road pricing (higher prices under congested conditions and lower prices at less congested times and locations) intended to reduce peak-period vehicle trips. Tolls can vary based on a fixed schedule, or they can be dynamic, meaning that rates change depending on the level of congestion that exists at a particular time. It can be implemented when road tolls are implemented to raise revenue, or on existing roadways as a demand management strategy to avoid the need to add capacity. Some highways have a combination of un-priced lanes and Value Priced lanes, allowing motorists to choose between driving in congestion and paying a toll for an un-congested trip. This is a type of Responsive Pricing, meaning that it is intended to change consumption patterns (Vickrey, 1994).
Connected Vehicle	The U.S. DOT Research and Innovative Technology Administration (RITA) \ ITS Joint Program Joint Program Office (ITS JPO) is the major sponsor of the Connected Vehicle program. Connected Vehicle focuses on localized Vehicle-to-Vehicle, Vehicle-to-Infrastructure and Vehicle-to-Device Systems (V2X) to support safety, mobility and environmental applications using vehicle Dedicated Short Range Communications (DSRC)\Wireless Access for Vehicular Environments (WAVE). This program has support from most of the automakers and a number of state departments of transportation.
Cordon (Area) Tolls	Are fees paid by motorists to drive in a particular area, usually a city center. Some cordon tolls only apply during peak periods, such as weekdays. This can be done by simply requiring vehicles driven within the area to display a pass, or by tolling at each entrance to the area.
Customer Service Center (CSC)	A facility used to service customers.
D	
Dedicated ETC Lane	A lane in which only electronic toll transactions are processed.
Dedicated Short Range Communication	A short to medium range communications service that supports both Public Safety and Private operations engaged in roadside-to-vehicle and vehicle-to-vehicle communication environments. DSRC is meant to be a complement to cellular communications by providing very high data transfer rates in circumstances where minimizing latency in the communication link and isolating relatively small communication zones are important. Typically this refers to 5.9GHz communication.
Dynamic Message Sign (DMS)	Also known as Variable Message Sign (VMS) is a changeable message boards located on a facility that display to customers text information such as weather and road conditions that may affect traffic conditions and travel times.
Department of Transportation (DOT)	Agency (either state or federal) that oversees local or national transportation systems.

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Dedicated Short Type Range Communication (DSRC)	A short to medium range communications service that supports both Public Safety and Private operations engaged in roadside-to-vehicle and vehicle-to-vehicle communication environments. DSRC is meant to be a complement to cellular communications by providing very high data transfer rates in circumstances where minimizing latency in the communication link and isolating relatively small communication zones are important. Typically this refers to 5.9GHz communication.
E	
Electronic Fee Collection (EFC)	See “Electronic Road Pricing”
Electronic Funds Transfer	Process by which payments associated with toll passage, parking fees, etc. are communicated from the Authority maintaining the Customer account to the Authority providing the service.
Electronic Toll Collection (ETC)	The collection of tolls based the automatic identification and classification of vehicles using electronic systems.
Electronic Payment Services (EPS)	Any use of an On-Board Unit to pay for a service.
Electronic Road Pricing (EPR)	Is a system used for managing road congestion. Based on a pay-as-you-use principle, motorists are charged when they use priced roads during peak hours. ERP rates vary for different roads and time periods depending on local traffic conditions. This encourages motorists to change their mode of transport, travel route or time of travel.
ETC Lane	A toll lane that accepts ETC as toll payment from a driver, without having to stop.
Electronic Vehicle Registration (EVR)	Electronic vehicle registration (EVR) uses radio frequency identification technology (RFID) to electronically identify vehicles and validate the identity, status, and authenticity of vehicle data. A unique electronic identification code is established for each vehicle via a tamper-resistant windshield sticker tag, and each unique code is linked to a record in the centralized owner/vehicle-based database. EVR can be used to automate vehicle registration, reduce car theft and other fraudulent activities and increase tax and toll revenues.
Express Lane	A popular naming convention used to depict and differentiate it from other types of Electronic Toll Collection lanes, an Express Lane is an ETC lane where vehicles pass the collection point (Gantry, plaza, Road-Side Unit) at highway speeds without stopping.
E-ZPass	The E-ZPass Group is an association of 25 toll agencies in 15 states that operates the ... E-ZPass electronic toll collection program. E-ZPass ... is the world leader in toll interoperability, with more than 24 million E-ZPass devices in circulation.
F	
FasTrak	The trade name of electronic toll collection in California (e.g. E-Z Type Pass, Sun Pass, etc.)
Federal Highway Administration	Is a part of the U.S. Department of Transportation and is headquartered in Washington, D.C., with field offices across the United States.

TERM (ACRONYM)	DESCRIPTION/DEFINITION
(FHWA)	
Fiduciary	The Fiduciary as used here is a bank, credit card company, etc. that functions as the funds source to replenish the User's Account.
Florida's Turnpike Enterprise (FTE)	Is a business unit of the Florida Department of Transportation (FDOT). The FTE is responsible for all operations on every FDOT owned and operated toll road and bridge, representing about 600 miles of roadway and 80 percent of all toll facilities in Florida.
G	
Gantry	A physical structure, generally located over the toll lanes, used for the location of ETC equipment, signs, etc.
Global Positioning System (GPS)	Used for positioning and road segment identification. Similar to GALILEO.
H	
Highway Capacity Manual (HCM)	An engineering reference manual for road design.
High-Occupancy Toll Lanes (HOT Lanes)	Are high-occupancy vehicle (HOV) lanes that also allow access to low occupancy vehicles if drivers pay a toll. It is a type of managed lane. This allows more vehicles to use HOV lanes while maintaining an incentive for mode shifting and raising revenue. HOT lanes are often proposed as a compromise between HOV lanes and Road Pricing.
High Occupancy Vehicle (HOV) Lanes	Lanes typically reserved for vehicles with two or more occupants.
Hub	Or "Clearinghouse Hub", is a node on the Clearinghouse Network, interfaces to all other Hubs on the Clearinghouse Network.
I	
Interagency Group (IAG)	The E-ZPass Interagency Group is the entity responsible for creating and administering E-ZPass, collaboration between 21 member agencies on the east coast of the United States that provides interoperable electronic tolling.
International Bridge, Tunnel and Turnpike Association (IBTTA)	Is the worldwide alliance of toll operators and associated industries that provides a forum for sharing knowledge and ideas to promote and enhance toll-financed and other direct-user-fee-financed transportation services.
Interoperability (IOP)	A cooperative arrangement established between public and/or commercial entities (Authorities, parking lot operators, etc.) wherein tags issued by one entity will be accepted at facilities belonging to all other entities without degradation in service performance.
International Organization for Standardization (ISO)	An association composed of representatives of several national standards bureaus

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Intelligent Transportation Systems (ITS)	A broad range of diverse technologies, including information processing, communications, control and electronics, which, when applied to our transportation system, can save time, money and lives.
L	
Lane Controller	A specific type of in-lane (generally, but not always) equipment used to respond to or detect in-lane sensors (AVI Reader, treadles, beam detectors, loops, etc.) and using precision algorithms, make appropriate decisions (raise gate, take violation image, activate driver feedback lights, etc.).
Loop Detector	A vehicle sensor used either to count or detect the presence of a vehicle in the toll lane. The metallic mass of a vehicle located above wires laid in the concrete produce electromagnetic signals that can be sensed electronically.
M	
Managed Lanes	Are highway facilities or lanes whose operation is modified in response to changing traffic conditions. A managed lane operates as a "freeway-within-a-freeway" and is separated from the general-purpose lanes. Examples include high-occupancy vehicle (HOV) lanes, value priced lanes, high-occupancy toll (HOT) lanes, or exclusive or special use lanes. Each of these concepts offers unique benefits; therefore, careful consideration is given to project goals and objectives in choosing an appropriate lane management strategy or combination of strategies. Project goals may include increasing transit use, providing choices to the traveler, or generating revenue.
Manual Lane	A toll lane wherein a Toll Service Attendant is present to accept cash, token or ticket as toll payment from a Customer.
Mixed Use Lane	A toll lane in which different kinds of means of payments are accepted (e.g. card-based and electronic toll transactions).
Memorandum of Understanding (MoU)	A document that expresses mutual agreement on an issue between two or more parties.
Metropolitan Planning Organizations (MPO)	Are responsible for transportation planning in metropolitan areas
Multiprotocol Technology	Bridges the interoperability gap between diverse RFID technologies used for electronic toll collection and other ITS applications such as Automatic Equipment Identification and Electronic Vehicle Registration.
O	
Operations and Maintenance (O&M)	This department is responsible for operating and for maintaining the tollways.
On-Board Unit (OBU)	The in-vehicle device component of a DSRC (or ETC) system. A receiver or transceiver permitting the Operator's Roadside Unit (RSU) to

TERM (ACRONYM)	DESCRIPTION/DEFINITION
	communicate with, identify, and conduct an electronic toll transaction; also called a 'transponder' or 'tag.'
Occupancy	The portion of time where a point or short road section is occupied by one or more vehicles or persons.
Optical Character Recognition (OCR)	Hardware and software system capable of recognizing alphanumerical characters.
On-Board Transponder	Also called a transponder, tag, and On-Board Unit. The in-vehicle device component of a DSRC (or ETC) system. A receiver or transceiver permitting the Operator's Roadside-Unit (RSU) to communicate with, identify, and conduct an electronic toll transaction.
Open Barrier Systems	Differ throughout the industry but often are designed to have toll barriers across the mainline plazas, but do not have ramp toll barriers on all of the interchanges, typically allowing some local traffic movements toll-free.
Open Road Tolling (ORT) System	An electronic Toll Collection System without toll plazas, where drivers will get charged the toll without having to stop, slow down, or stay in a given lane.
Operator	An entity that manages the functions of a tolled facility, parking lot, etc.
P	
Public / Private Partnership (PPP or P3)	Is a government service or private business venture funded and operated through a partnership of government and one or more private sector companies. A PPP involves a contract between a public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project.
Priced Managed Lanes	See "Managed Lanes"
R	
Reconciliation	The process by which the back-office is used to adjudicate conflicts in transaction data (e.g. the difference between an Automatic/Automated Vehicle Classification (AVC)-determined vehicle class and the customer's pre-programmed tag class) and establish the toll amount to be deducted from the customer's account.
Registered Toll Customer	A toll facility user who has enrolled in either an RFID tag or "pay by plate" program.
Responsive Pricing	Pricing that is intended to change consumption patterns.
Radio Frequency Identification (RFID)	Is the wireless contactless use of radio-frequency electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by and read at short ranges (a few meters) via magnetic fields (electromagnetic induction). Others use a local power source such as a battery, or else have no battery but collect energy from the interrogating EM field, and then act as a passive transponder to emit microwaves or UHF radio waves.

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Road Pricing	Also called Value Pricing. A system by which congestion and improved roadways can be managed through different levels of toll rates at peak and non-peak hours.
Road-Side Unit (RSU)	The roadside infrastructure component of an ETC system; a receiver or transceiver that identifies the On-Board Unit in the vehicle, and identifies the account, permitting an electronic toll transaction to occur. Also called a 'reader,' or 'beacon.'
Roadside Equipment (RSE)	Roadside devices that are used to send messages to, and receive messages from, nearby vehicles using Dedicated Short Range Communications (DSRC) or other alternative wireless communications technologies.
S	
Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)	Is US federal transportation legislation, enacted Aug. 2005, which provided for funding and directions to support the federal-aid highway program.
Smart Card	A small plastic card embedded with a memory chip and often a microprocessor, used for financial transactions, identification, as a key, etc.
Sticker	Or vignette proving that a distance or time-related toll has been paid by a user.
SunPass	Electronic toll collection system used in Florida.
T	
Tag	Also known as an On-Board Unit and Transponder. The in-vehicle device component of a DSRC (or ETC) system. A receiver or transceiver permitting the Operator's Road-side Unit (RSU) to communicate with, identify, and conduct an electronic toll transaction.
Telematics	Technologies in automotive communications, combining wireless voice and data capability for management information and safety applications.
Ticket Systems	Require each driver to stop and pick up a ticket upon entry and then stop and relinquish the ticket and pay the toll upon exit. The concept of ticket systems can be extended to that of an "electronic ticket" as determined by electronic sensors located in entry and exit lanes, parking lots, etc.
Toll	A fee charged by a toll facility operator in an amount set by the operator for the privilege of traveling on said toll facility.
Toll Collection System	The combination of elements and components that constitute the means to collect a fee for use of a tolled facility.
Toll Lane	Restricts traffic flow to facilitate either the automatic or manual collection of tolls.
Toll Plaza	An area, with restricted traffic flow, where tolls are collected from drivers, either manually or electronically.

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Toll Receipt	Receipt given to customer while in the toll lane that can show amount paid, date, time, lane, Toll Service Attendant and vehicle classification. The concept of a toll receipt may be extended to that of a monthly statement listing all toll transactions for that period.
Toll Service Attendant (TSA)	An employee of an operator or other entity who is assigned the duty of collecting tolls from toll facility customers.
Transaction	A time-framed event occurring in the toll lane representing either a cash or electronic toll. The transaction is identified by all or a combination of the following parameters; location, time, date, vehicle class, vehicle ID, toll amount, etc.
Transponder	The in-vehicle device component of a DSRC (or ETC) system. A receiver or transceiver permitting the Operator's Road-Side Unit to communicate with, identify, and conduct an electronic toll transaction. Also called On-Board Unit and Tag.
Transportation Research Board (TRB)	Provides leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. TRB is one of six major divisions of the (US) National Research Council— a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. The National Research Council is jointly administered by the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.
Turnpike	In the U.S.A.: toll road
U	
Urban Road Pricing	Also called road user charges (RUC), urban road pricing consists of direct charges levied for the use of roads, including tolls, distance or time based fees, congestion charges and charges designed to discourage use of certain classes of vehicle, fuel sources or more polluting vehicles. These charges may be used primarily for revenue generation, usually for road infrastructure financing, or as a transportation demand management tool to reduce peak hour travel and associated traffic congestion or other social/environmental externalities associated with road travel such as air pollution, greenhouse gas emissions, visual intrusion, noise and road accidents.
United States Department of Transportation (U.S. DOT)	Is a federal Cabinet department of the U.S. government concerned with transportation.
User	Any driver driving on a Toll Facility. The User is the holder of an account and On-Board Unit. The User may use the On-Board Unit to pay for tolls or services. In toll collection terms the User may be referred to as the “motorist”.
User Charge	Payment of a given sum of money that allows the use of a service for a certain time period.
V	

TERM (ACRONYM)	DESCRIPTION/DEFINITION
Value Pricing	See also Road Pricing. A system by which congestion and improved roadways can be managed through different levels of toll rates at peak and non-peak hours.
Violation Enforcement System (VES)	The collective equipment and procedures that capture a violation transaction, image and the citation process.
Video Billing	A billing system using video images of a vehicle's license plate to identify the customer responsible for toll payment.
Violation	A record of an unpaid toll which occurs when a customer does not pay the proper amount.
Violation Camera	Camera located at each toll lane that takes pictures of violation events. Image capture contains, at minimum, human or Optical Character Recognition (OCR) readable pictures of the front, rear or both license plates.
Violation Processing Center (VPC)	A place where violation processing systems and/or human reviewers work on reviewing and processing violations through the system.
Vehicle Miles of Travel (VMT)	The sum of all the miles traveled by vehicles (not people) in a specified amount of time

Appendix C: List of Acronyms Used in the Report

AADT: Average Annual Daily Traffic

ADT: Average Daily Traffic

AET: All-Electronic Toll Collection

AV: Automated Vehicles

BOS: Back-Office System

BTO: Build-Transfer-Operate

Cap Ex: Capital Expenditure

CSC: Customer Service Center

CDA: Comprehensive Development Agreement

CTRMA: Central Texas Regional Mobility Authority

CV: Connected Vehicles

DBE: Disadvantaged Business Enterprises

DMV: Department of Motor Vehicles

EIS: Environmental Impact Statement

ETC: Electronic Toll Collection

FDOT: Florida Department of Transportation

FHWA: Federal Highway Administration

FM: For Texas, Farm to Market Road

FSTA: Florida State Turnpike Authority

FTE: Florida Turn Pike

HCTRA: Harris County Toll Road Authority

HEFT: Homestead Extension of Florida's Turnpike

HOT: High Occupancy Toll

HOV: High Occupancy Vehicle(s)

IDOT: Illinois Department of Transportation

ISRRPP: Interstate System Reconstruction and Rehabilitation Pilot Program

NTE: North Tarrant Express

O&M: Operations and Maintenance

ORT: Open Road Tolling

PAB: Private Activity Bond

PPP: Public-Private Partnerships

RF: Radio Frequency

RM: For Texas, Ranch to Market Road

RTS: Roadside Toll System

SH: For Texas, State Highway

TIFIA: Transportation Infrastructure Finance and Innovation Act (federal loan program)

TxDOT: Texas Department of Transportation

WSTC: Washington State Transportation Commission

Appendix D: Statutory Tolling Language from Other States

Table 19: Tolling Revenue Use – Statutory Authority with Comments

NC Gen. Stat. 136-89.188 – Turnpike Authority - Use of revenues:	
(a) Revenues derived from Turnpike Projects authorized under this Article shall be used only for the following: (1) Authority administration costs. (2) Turnpike Project development, right-of-way acquisition, design, construction, operation, maintenance, reconstruction, rehabilitation, and replacement. (3) Debt service on the Authority's revenue bonds or related purposes such as the establishment of debt service reserve funds. (4) Debt service, debt service reserve funds, and other financing costs related to any of the following: a. A financing undertaken by a private entity under a partnership agreement with the entity for a Turnpike Project. b. Private activity bonds issued under law related to a Turnpike Project. c. Any federal or State loan, line of credit, or loan guarantee relating to a Turnpike Project. (5) A return on investment of any private entity under a partnership agreement with the entity for a Turnpike Project. (6) Any other uses granted to a private entity under a partnership agreement with the entity for a Turnpike Project.	Use of toll revenue restricted by statute.
(b) The Authority may use up to one hundred percent (100%) of the revenue derived from a Turnpike Project for debt service on the Authority's revenue bonds or for a combination of debt service and operation and maintenance expenses of the Turnpike Projects.	
(c) The Authority shall use not more than five percent (5%) of total revenue derived from all Turnpike Projects for Authority administration costs.	Only 5% of toll revenue may be used for administrative costs.
(d) Notwithstanding the provisions of subsections (a) and (b) of this section, toll revenues generated from a converted segment of the State highway system previously planned for operation as a nontoll facility shall only be used for the funding or financing of the right of way acquisition, construction, expansion, operations, maintenance, and Authority administration costs associated with the converted segment or a contiguous toll facility.	Additional limitations on revenue use when non-toll roads are converted to toll roads.
Wash. Rev. Code 47.56.820 – Imposition of tolls on eligible toll facilities--Who may authorize, revenue expenditures:	
(1) Unless otherwise delegated, only the legislature may authorize the imposition of tolls on eligible toll facilities.	
(2) All revenue from an eligible toll facility must be used only to construct, improve, preserve, maintain, manage, or operate the eligible toll facility on or in which the revenue is collected. Expenditures of toll revenues are subject to appropriation and must be made only:	Revenue is tied to the facility that generates the revenue.
(a) To cover the operating costs of the eligible toll facility, including necessary maintenance, preservation, administration, and toll enforcement by public law enforcement within the boundaries of the facility;	Revenue may only be used for specifically identified purposes.
(b) To meet obligations for the repayment of debt and interest on the eligible toll facilities, and any other associated financing costs including, but not limited to, required reserves and insurance;	

(c) To meet any other obligations to provide funding contributions for any projects or operations on the eligible toll facilities; (d) To provide for the operations of conveyances of people or goods; or (e) For any other improvements to the eligible toll facilities.	
Tex. Stat. 366.037 – Other Highway Projects: (a) In addition to the powers granted under this chapter and without supervision or regulation by any state agency or local governmental entity, but subject to an agreement entered into under Subsection (c), the board of an authority may by resolution, and on making the findings set forth in this subsection, authorize the use of surplus revenue of a turnpike project or system for the study, design, construction, maintenance, repair, and operation of a highway or similar facility that is not a turnpike project if the highway or similar facility is: (1) situated in a county in which the authority is authorized to design, construct, and operate a turnpike project; (2) anticipated to either: (A) enhance the operation or revenue of an existing, or the feasibility of a proposed, turnpike project by bringing traffic to that turnpike project or enhancing the flow of traffic either on that turnpike project or to or from that turnpike project to another facility; or (B) ameliorate the impact of an existing or proposed turnpike project by enhancing the capability of another facility to handle traffic traveling, or anticipated to travel, to or from that turnpike project; and (3) not anticipated to result in an overall reduction of revenue of any turnpike project or system. (b) The board in the resolution may prescribe terms for the use of the surplus revenue, including the manner in which the highway or related	An authority may use surplus revenue on non-turnpike projects. Among other requirements, surplus revenue on non-turnpike projects must benefit the turnpike.

Table 20: Tolling Project Selection -Statutory Authority with Comments

Wash. Rev. Code 47.56.820 – Imposition of tolls on eligible toll facilities--Who may authorize, revenue expenditures: (1) Unless otherwise delegated, only the legislature may authorize the imposition of tolls on eligible toll facilities. (2) All revenue from an eligible toll facility must be used only to construct, improve, preserve, maintain, manage, or operate the eligible toll facility on or in which the revenue is collected. Expenditures of toll revenues are subject to appropriation and must be made only: (a) To cover the operating costs of the eligible toll facility, including necessary maintenance, preservation, administration, and toll enforcement by public law enforcement within the boundaries of the facility; (b) To meet obligations for the repayment of debt and interest on the eligible toll facilities, and any other associated financing costs including, but not limited to, required reserves and insurance; (c) To meet any other obligations to provide funding contributions for any projects or operations on the eligible toll facilities; (d) To provide for the operations of conveyances of people or goods; or (e) For any other improvements to the eligible toll facilities.	Generally, only the legislature may authorize a toll project.

Flor. Stat. 338.223 – Proposed turnpike projects: (1)(a) Any proposed project to be constructed or acquired as part of the turnpike system and any turnpike improvement shall be included in the tentative work program. A proposed project or group of proposed projects may not be added to the turnpike system unless such project or projects are determined to be economically feasible and a statement of environmental feasibility has been completed for such project or projects and such projects are determined to be consistent, to the maximum extent feasible, with approved local government comprehensive plans of the local governments in which such projects are located. The department may authorize engineering studies, traffic studies, environmental studies, and other expert studies of the location, costs, economic feasibility, and practicality of proposed turnpike projects throughout the state and may proceed with the design phase of such projects. The department may not request legislative approval of a proposed turnpike project until the design phase of that project is at least 30 percent complete. If a proposed project or group of proposed projects is found to be economically feasible, consistent, to the maximum extent feasible, with approved local government comprehensive plans of the local governments in which such projects are located, and a favorable statement of environmental feasibility has been completed, the department, with the approval of the Legislature, shall, after the receipt of all necessary permits, construct, maintain, and operate such turnpike projects.	Projects must be economically feasible and included in a tentative work program before becoming part of the system.
(b) Any proposed turnpike project or improvement shall be developed in accordance with the Florida Transportation Plan and the work program pursuant to s. 339.135. Turnpike projects that add capacity, alter access, affect feeder roads, or affect the operation of the local transportation system shall be included in the transportation improvement plan of the affected metropolitan planning organization. If such turnpike project does not fall within the jurisdiction of a metropolitan planning organization, the department shall notify the affected county and provide for public hearings in accordance with s. 339.155(5)(c).	MPO must include the project in their TIP.
(c) Prior to requesting legislative approval of a proposed turnpike project, the environmental feasibility of the proposed project shall be reviewed by the Department of Environmental Protection. The department shall submit its Project Development and Environmental Report to the Department of Environmental Protection, along with a draft copy of a public notice. Within 14 days of receipt of the draft public notice, the Department of Environmental Protection shall return the draft public notice to the Department of Transportation with an approval of the language or modifications to the language. Upon receipt of the approved or modified draft, or if no comments are provided within 14 days, the Department of Transportation shall publish the notice in a newspaper to provide a 30-day public comment period. The headline of the required notice shall be in a type no smaller than 18 point. The notice shall be placed in that portion of the newspaper where legal notices appear. The notice shall be published in a newspaper of general circulation in the county or counties of general interest and readership in the community as provided in s. 50.031, not one of limited subject matter. Whenever possible, the notice shall appear in a newspaper that is published at least 5 days a week. The notice shall include, but is not limited to, the following information: 1. The purpose of the notice is to provide for a 30-day period for written public comments on the environmental impacts of a proposed turnpike project. 2. The name and description of the project, along with a geographic location map clearly indicating the area where the proposed project will be located. 3. The address where such comments must be sent and the date such comments are due.	

After a review of the department's report and any public comments, the Department of Environmental Protection shall submit a statement of environmental feasibility to the department within 30 days after the date on which public comments are due. The notice and the statement of environmental feasibility shall not give rise to any rights to a hearing or other rights or remedies provided pursuant to chapter 120 or chapter 403, and shall not bind the Department of Environmental Protection in any subsequent environmental permit review. (2)(a) Subject to the provisions of s. 338.228, the department is authorized to expend, out of any funds available for the purpose, such moneys as may be necessary for studies, preliminary engineering, construction, right-of-way acquisition, and construction engineering inspection of any turnpike project and is authorized to use its engineering and other resources for such purposes. (b) In accordance with the legislative intent expressed in s. 337.273, and after the requirements of paragraph (1)(c) have been met, the department may acquire lands and property before making a final determination of the economic feasibility of a project. The requirements of paragraph (1)(c) do not apply to hardship and protective purchases of advance right-of-way by the department. The cost of advance acquisition of right-of-way may be paid from bonds issued under s. 337.276 or from turnpike revenues. For purposes of this paragraph, the term “hardship purchase” means purchase from a property owner of a residential dwelling of not more than four units who is at a disadvantage due to health impairment, job loss, or significant loss of rental income. For purposes of this paragraph, the term “protective purchase” means that a purchase to limit development, building, or other intensification of land uses within the area right-of-way is needed for transportation facilities. The department shall give written notice to the Department of Environmental Protection 30 days before final agency acceptance as set forth in s. 119.0711, which notice shall allow the Department of Environmental Protection to comment. Hardship and protective purchases of right-of-way shall not influence the environmental feasibility of a project, including the decision relative to the need to construct the project or the selection of a specific location. Costs to acquire and dispose of property acquired as hardship and protective purchases are considered costs of doing business for the department and are not to be considered in the determination of environmental feasibility for the project. (3) All obligations and expenses incurred by the department under this section shall be paid by the department and charged to the appropriate turnpike project. The department shall keep proper records and accounts showing each amount that is so charged. All obligations and expenses so incurred shall be treated as part of the cost of such project and shall be reimbursed to the department out of turnpike revenues or out of the bonds authorized under ss. 338.22-338.241 except when such reimbursement is prohibited by state or federal law. (4) The department is authorized, with the approval of the Legislature, to use federal and state transportation funds to lend or pay a portion of the operating, maintenance, and capital costs of turnpike projects. For operating and maintenance loans, the maximum net loan amount in any fiscal year shall not exceed 1.5 percent of state transportation tax revenues for that fiscal year.	
NC Gen. Stat. 136-89.183 – Powers of the Authority: (a) The Authority shall have all of the powers necessary to execute the provisions of this Article, including the following: (1) The powers of a corporate body, including the power to sue and be sued, to make contracts, to adopt and use a common seal, and to alter the adopted seal as needed. (2) To study, plan, develop, and undertake preliminary design work on Turnpike Projects. At the conclusion of these activities, the Turnpike Authority is authorized to	

design, establish, purchase, construct, operate, and maintain no more than eleven projects, which shall include the following: a. Triangle Expressway, including segments also known as N.C. 540, Triangle Parkway, and the Western Wake Freeway in Wake and Durham Counties. The described segments constitute one project. b. Repealed by S.L. 2013-183, § 5.1, eff. July 1, 2013. c. Monroe Connector/Bypass. d., e. Repealed by S.L. 2013-183, § 5.1, eff. July 1, 2013. f. Repealed by S.L. 2008-225, § 4, eff. Aug. 17, 2008. Any other project proposed by the Authority in addition to the projects listed in this subdivision requires prior consultation with the Joint Legislative Commission on Governmental Operations pursuant to G.S. 120-76.1 no less than 180 days prior to initiating the process required by Article 7 of Chapter 159 of the General Statutes. With the exception of the two projects set forth in sub-subdivisions a. and c. of this subdivision, the Turnpike projects selected for construction by the Turnpike Authority, prior to the letting of a contract for the project, shall meet the following conditions: (i) two of the projects must be ranked in the top 35 based on total score on the Department-produced list entitled "Mobility Fund Project Scores" dated June 6, 2012, and, in addition, may be subject to G.S. 136-18(39a); (ii) of the projects not ranked as provided in (i), one may be subject to G.S. 136-18(39a); (iii) the projects shall be included in any applicable locally adopted comprehensive transportation plans; (iv) the projects shall be shown in the current State Transportation Improvement Program; and (v) toll projects must be approved by all affected Metropolitan Planning Organizations and Rural Transportation Planning Organizations for tolling.	Authority to develop eleven turnpike projects. Specific projects must be developed. If project isn't included in statute NCTA must consult the Joint Legislative commission on Governmental Operations.

Table 21: Toll Rate Setting – Statutory Authority with Comments

Flor. Stat. 338.23 – Turnpike tolls, fixing; pledge of tolls and other revenues: The department shall at all times fix, adjust, charge, and collect such tolls and amounts for the use of the turnpike system as are required in order to provide a fund sufficient with other revenues of the turnpike system to pay the cost of maintaining, improving, repairing, and operating such turnpike system; to pay the principal of and interest on all bonds issued to finance or refinance any portion of the turnpike system as the same become due and payable; and to create reserves for all such purposes. (1) Notwithstanding any other law, the department may defer the scheduled July 1, 1993, toll rate increase on the Homestead Extension of the Florida Turnpike until July 1, 1995. The department may also advance funds to the Turnpike General Reserve Trust Fund to replace estimated lost revenues resulting from this deferral. The amount advanced must be repaid within 12 years from the date of advance; however, the repayment is subordinate to all other debt financing of the turnpike system outstanding at the time repayment is due. (2) The department shall publish a proposed change in the toll rate for the use of an existing toll facility, in the manner provided for in s. 120.54, which will provide for public notice and the opportunity for a public hearing before the adoption of the proposed rate change. When the department is evaluating a proposed turnpike toll project under s. 338.223 and has determined that there is a high probability that the project will pass the test of economic feasibility predicated on proposed toll rates, the toll rate that is proposed to be charged after the project is constructed must be adopted during the planning and project development phase of the project, in the manner provided for in s. 120.54, including public notice and the opportunity for a	Tolls must be set to fund tolled system. Toll rate changes require publishing notice and holding a public hearing.

public hearing. For such a new project, the toll rate becomes effective upon the opening of the project to traffic. (3)(a) For the period July 1, 1998, through June 30, 2017, the department shall, to the maximum extent feasible, program sufficient funds in the tentative work program such that the percentage of turnpike toll and bond financed commitments in Miami-Dade County, Broward County, and Palm Beach County as compared to total turnpike toll and bond financed commitments shall be at least 90 percent of the share of net toll collections attributable to users of the turnpike system in Miami-Dade County, Broward County, and Palm Beach County as compared to total net toll collections attributable to users of the turnpike system. This subsection does not apply when the application of such requirements would violate any covenant established in a resolution or trust indenture relating to the issuance of turnpike bonds. The department may at any time for economic considerations establish lower temporary toll rates for a new or existing toll facility for a period not to exceed 1 year, after which the toll rates adopted pursuant to s. 120.54 shall become effective. (b) The department shall also fix, adjust, charge, and collect such amounts needed to cover the costs of administering the different toll collection and payment methods, and types of accounts being offered and used, in the manner provided for in s. 120.54 which will provide for public notice and the opportunity for a public hearing before adoption. Such amounts may stand alone, be incorporated in a toll rate structure, or be a combination of the two. (c) Notwithstanding any other provision of law to the contrary, any prepaid toll account of any kind which has remained inactive for 3 years shall be presumed unclaimed and its disposition shall be handled by the Department of Financial Services in accordance with all applicable provisions of chapter 717 relating to the disposition of unclaimed property, and the prepaid toll account shall be closed by the department. (4) When bonds are outstanding which have been issued to finance or refinance any turnpike project, the tolls and all other revenues derived from the turnpike system and pledged to such bonds shall be set aside as may be provided in the resolution authorizing the issuance of such bonds or the trust agreement securing the same. The tolls or other revenues or other moneys so pledged and thereafter received by the department are immediately subject to the lien of such pledge without any physical delivery thereof or further act. The lien of any such pledge is valid and binding as against all parties having claims of any kind in tort or contract or otherwise against the department irrespective of whether such parties have notice thereof. Neither the resolution nor any trust agreement by which a pledge is created need be filed or recorded except in the records of the department.(6)The use and disposition of revenues pledged to bonds are subject to ss. 338.22-338.241 and such regulations as the resolution authorizing the issuance of the bonds or such trust agreement may provide.	Department must also collect sufficient amounts to cover payment and collection costs. Broad flexibility in establishing this charge.
Wash. Rev. Code 47.56.850 – Transportation commission as state tolling authority: (1) Unless these powers are otherwise delegated by the legislature, the transportation commission is the tolling authority for the state. The tolling authority shall: (a) Set toll rates, establish appropriate exemptions, if any, and make adjustments as conditions warrant on eligible toll facilities; (b) Review toll collection policies, toll operations policies, and toll revenue expenditures on the eligible toll facilities and report annually on this review to the legislature. (2) The tolling authority, in determining toll rates, shall consider the policy guidelines established in RCW 47.56.830.	Toll rates are set by the transportation commission.

(3) Unless otherwise directed by the legislature, in setting and periodically adjusting toll rates, the tolling authority must ensure that toll rates will generate revenue sufficient to: (a) Meet the operating costs of the eligible toll facilities, including necessary maintenance, preservation, renewal, replacement, administration, and toll enforcement by public law enforcement; (b) Meet obligations for the timely payment of debt service on bonds issued for eligible toll facilities, and any other associated financing costs including, but not limited to, required reserves, minimum debt coverage or other appropriate contingency funding, insurance, and compliance with all other financial and other covenants made by the state in the bond proceedings; (c) Meet obligations to reimburse the motor vehicle fund for excise taxes on motor vehicle and special fuels applied to the payment of bonds issued for eligible toll facilities; and (d) Meet any other obligations of the tolling authority to provide its proportionate share of funding contributions for any projects or operations of the eligible toll facilities.	Toll rates must be sufficient to meet statutory obligations.
(4) The established toll rates may include variable pricing, and should be set to optimize system performance, recognizing necessary trade-offs to generate revenue for the purposes specified in subsection (3) of this section. Tolls may vary for type of vehicle, time of day, traffic conditions, or other factors designed to improve performance of the system. (5) In fixing and adjusting toll rates under this section, the only toll revenue to be taken into account must be toll revenue pledged to bonds that includes toll receipts, and the only debt service requirements to be taken into account must be debt service on bonds payable from and secured by toll revenue that includes toll receipts. (6) The legislature pledges to appropriate toll revenue as necessary to carry out the purposes of this section. When the legislature has specifically identified and designated an eligible toll facility and authorized the issuance of bonds for the financing of the eligible toll facility that are payable from and secured by a pledge of toll revenue, the legislature further agrees for the benefit of the owners of outstanding bonds issued by the state for eligible toll facilities to continue in effect and not to impair or withdraw the authorization of the tolling authority to fix and adjust tolls as provided in this section. The state finance committee shall pledge the state's obligation to impose and maintain tolls, together with the application of toll revenue as described in this section, to the owners of any bonds.	Variable pricing specifically allowed.
Ohio Rev. Code 5531.14(B) – Establishment of Tolls**:** In accordance with Chapter 119. of the Revised Code, the director shall establish a plan, schedule, or system of user fees or charges and shall declare the purpose, amount, and duration of the user fees or charges. Any proposal to implement a user fee or other charge under this section may include a plan, schedule, or system of tolls or charges that is subject to adjustment by the director within and in accordance with that plan, schedule, or system. As part of the plan, schedule, or system, the director shall develop a written process for setting user fee rates. In developing the process, the director shall seek and consider public comment. In doing so, the director shall hold at least one public hearing within fifty miles of the location of the toll project for which the written process is developed.	Toll rates set by Director. Development of a written plan must comply with administrative rulemaking requirements.

Table 22: Toll Collection – Statutory Authority with Comments

Flor. Stat. 338.155 – Payment of toll on toll facilities required; exemptions: (1) A person may not use any toll facility without payment of tolls, except employees of the agency operating the toll project when using the toll facility on official state business, state military personnel while on official military business, handicapped persons as provided in this section, persons exempt from toll payment by the authorizing resolution for bonds issued to finance the facility, and persons exempt on a temporary basis where use of such toll facility is required as a detour route. Any law enforcement officer operating a marked official vehicle is exempt from toll payment when on official law enforcement business. Any person operating a fire vehicle when on official business or a rescue vehicle when on official business is exempt from toll payment. Any person participating in the funeral procession of a law enforcement officer or firefighter killed in the line of duty is exempt from toll payment. The secretary or the secretary's designee may suspend the payment of tolls on a toll facility when necessary to assist in emergency evacuation. The failure to pay a prescribed toll constitutes a noncriminal traffic infraction, punishable as a moving violation as provided in s. 318.18. The department may adopt rules relating to the payment, collection, and enforcement of tolls, as authorized in this chapter and chapters 316, 318, 320, and 322, including, but not limited to, rules for the implementation of video or other image billing and variable pricing. With respect to toll facilities managed by the department, the revenues of which are not pledged to repayment of bonds, the department may by rule allow the use of such facilities by public transit vehicles or by vehicles participating in a funeral procession for an active-duty military service member without the payment of tolls.	Payment of toll required. Rulemaking authority for rules related to payment collection and enforcement of tolls.
Flor Stat. 338.161 – Authority of department or toll agencies to advertise and promote electronic toll collection; expanded uses of electronic toll collection system; authority of department to collect tolls, fares, and fees for private and public: (1) The department may incur expenses for paid advertising, marketing, and promotion of toll facilities and electronic toll collection products and services. Promotions may include discounts and free products. (2) The department may receive funds from advertising placed on electronic toll collection products and promotional materials to defray the costs of products and services. (3) The department or any toll agency created by statute may incur expenses to advertise or promote its electronic toll collection system to consumers on or off the turnpike or toll system. (4) If the department or toll agency created by statute finds that it can increase nontoll revenues or add convenience or other value for its customers, the department or toll agency may enter into agreements with a private or public entity allowing the use of its electronic toll collection system to pay parking fees for vehicles equipped with a transponder or similar device. The department or toll agency may initiate feasibility studies of other future uses of its electronic toll collection system and make recommendations to the Legislature to authorize such uses. (5) If the department finds that it can increase nontoll revenues or add convenience or other value for its customers, and if a public or private transportation facility owner agrees that its facility will become interoperable with the department's electronic toll collection and video billing systems, the department may enter into an agreement with the owner of such facility under which the department uses its electronic toll collection and video billing systems to collect and enforce for the owner tolls, fares, administrative fees, and other applicable charges due in connection with use of the	Specific authority to promote electronic toll collection.

owner's facility. The department may modify its rules regarding toll collection procedures and the imposition of charges to be applicable to toll facilities that are not part of the turnpike system or otherwise owned by the department. This subsection does not limit the authority of the department under any other law or under any agreement entered into before July 1, 2012.	
Flor. Stat 338.2216(1)(d) – Florida Turnpike Enterprise; powers and authority: The Florida Turnpike Enterprise shall pursue and implement new technologies and processes in its operations and collection of tolls and the collection of other amounts associated with road and infrastructure usage. Such technologies and processes must include, without limitation, video billing and variable pricing.	FTE must pursue new toll collection technology.
Ohio Rev. Code 5531.141 – Electronic collection of fees: (A) The department of transportation may collect a user fee by utilizing a system of collection that is capable of charging an account holder the appropriate user fee by transmission of information from an electronic toll collection device on a motor vehicle. In addition, for any motor vehicle that does not use an electronic toll collection device, the department may utilize an electronic-monitoring system for user fee collection. (B)(1) If a motor vehicle uses a toll project and the user fee is not paid through an electronic toll collection device or otherwise, the toll project operator first shall use the electronic-monitoring system for the toll project to determine if the registered owner of the motor vehicle has established an account for the payment of the user fee. If such an account has been established, the toll project operator shall charge the account holder the appropriate user fee. If the toll project operator cannot locate an established account, or if the toll project operator locates an established account but the account cannot be charged the appropriate user fee, the toll project operator may send by regular first class mail an invoice for the unpaid user fee. The toll project operator shall include with the invoice the information described in section 5531.143 of the Revised Code. The toll project operator shall send the invoice to the registered owner of the motor vehicle as shown in the records of either of the following: (a) The bureau of motor vehicles; (b) The department, division, bureau, office, or other unit of government of any other state or jurisdiction that is functionally equivalent to the bureau of motor vehicles. (2) With respect to any user fee and any associated administrative fee, the toll project operator, in the toll project operator's sole discretion, may determine not to pursue collection of that user fee or administrative fee or to terminate collection measures in relation to that user fee or administrative fee.	Legislation allowing for electronic toll collection is specific. Includes detailed processes for charging a toll. Process for identifying owner is included in statute.
Ohio Rev. Code 5531.142 – Invoices: (A) A person or entity that receives an invoice under section 5531.141 of the Revised Code or a late notice under division (C) of this section shall do one of the following: (1) Pay the user fee and any administrative fee set forth in the invoice or late notice directly to the toll project operator within thirty-five days after the date of mailing of the invoice or late notice; (2) File with the toll project operator a notice to contest liability for the unpaid user fee within thirty-five days after the date of the mailing of the invoice or late notice by utilizing the form provided with the invoice or late notice under section 5531.143 of the Revised Code; (3) If the registered owner is a motor vehicle leasing dealer or a motor vehicle renting dealer, notify the toll project operator within thirty-five days after the date of mailing	Options available to owner are included in statute. Accommodation is made for leased and rented vehicles.

of the invoice or late notice of the name and address of the person who was the lessee or renter of the motor vehicle at the time the user fee was incurred. A motor vehicle leasing dealer or a motor vehicle renting dealer that receives an invoice or late notice shall not pay a user fee or any administrative fee and subsequently attempt to collect a fee or assess the lessee or renter a charge in excess of the amount actually paid on behalf of the lessee or renter. (B) Upon receipt of the name and address of the lessee or renter of a motor vehicle provided by a motor vehicle leasing dealer or motor vehicle renting dealer under division (A)(3) of this section, the toll project operator shall send an invoice to the lessee or renter of the motor vehicle as described in section 5531.141 of the Revised Code. The toll project operator shall send all subsequent late notices for the unpaid user fees to the lessee or renter, and the motor vehicle renting or leasing dealer has no further liability for unpaid user fees or administrative fees under this chapter. (C) If a registered owner fails to pay or contest an invoice within thirty-five days after the date of mailing of the invoice, the toll project operator may send to the registered owner by regular first class mail a late notice containing the information described in section 5531.143 of the Revised Code. The toll project operator may charge an administrative fee for each late notice, the purpose of which is to enable the toll project operator to recover the expenses of collecting the unpaid user fee. The director of transportation shall establish the amount of the administrative fee by rule.	
Ohio Rev. Code 5531.143 – Contents of invoices: A toll project operator shall include with each invoice and late notice all of the following: (A) The registered owner's name and current known address; (B) Descriptions and amounts of all user fees and administrative fees assessed; (C) A request for payment within thirty-five days after the date of mailing of such invoice or late notice; (D) A warning of the potential consequences for failing to pay the total amount due as indicated in such invoice or late notice, including additional fees and penalties, potential court summons, and inability to renew motor vehicle registrations; (E) Information for disputing the invoice or late notice and a form that a person may use to file a notice to contest liability for a user fee or administrative fee; (F) Contact information for the customer service center for the applicable toll project; and (G) Information about obtaining an electronic toll collection device and establishing an electronic toll collection account.	Form of invoice established by statute.

Table 23: Toll Enforcement – Statutory Authority with Comments

Flor. Stat. 338.155 – Payment of toll on toll facilities required; exemptions: (1) A person may not use any toll facility without payment of tolls, except employees of the agency operating the toll project when using the toll facility on official state business, state military personnel while on official military business, handicapped persons as provided in this section, persons exempt from toll payment by the authorizing resolution for bonds issued to finance the facility, and persons exempt on a temporary basis where use of such toll facility is required as a detour route. Any law enforcement officer operating a marked official vehicle is exempt from toll payment when on official law enforcement business. Any person operating a fire vehicle when	Offense for non-payment established.

on official business or a rescue vehicle when on official business is exempt from toll payment. Any person participating in the funeral procession of a law enforcement officer or firefighter killed in the line of duty is exempt from toll payment. The secretary or the secretary's designee may suspend the payment of tolls on a toll facility when necessary to assist in emergency evacuation. The failure to pay a prescribed toll constitutes a noncriminal traffic infraction, punishable as a moving violation as provided in s. 318.18. The department may adopt rules relating to the payment, collection, and enforcement of tolls, as authorized in this chapter and chapters 316, 318, 320, and 322, including, but not limited to, rules for the implementation of video or other image billing and variable pricing. With respect to toll facilities managed by the department, the revenues of which are not pledged to repayment of bonds, the department may by rule allow the use of such facilities by public transit vehicles or by vehicles participating in a funeral procession for an active-duty military service member without the payment of tolls. (2) Any person driving an automobile or other vehicle belonging to the Department of Military Affairs used for transporting military personnel, stores, and property, when properly identified, shall, together with any such conveyance and military personnel and property of the state in his or her charge, be allowed to pass free through all tollgates and over all toll bridges and ferries in this state. (3) Any handicapped person who has a valid driver license, who operates a vehicle specially equipped for use by the handicapped, and who is certified by a physician licensed under chapter 458 or chapter 459 or by comparable licensing in another state or by the Adjudication Office of the United States Department of Veterans Affairs or its predecessor as being severely physically disabled and having permanent upper limb mobility or dexterity impairments which substantially impair the person's ability to deposit coins in toll baskets, shall be allowed to pass free through all tollgates and over all toll bridges and ferries in this state. A person who meets the requirements of this subsection shall, upon application, be issued a vehicle window sticker by the Department of Transportation. (4) A copy of this section shall be posted at each toll bridge and on each ferry. (5) The Department of Transportation shall provide envelopes for voluntary payments of tolls by those persons exempted from the payment of tolls pursuant to this section. The department shall accept any voluntary payments made by exempt persons. (6) Personal identifying information held by the Department of Transportation, a county, a municipality, or an expressway authority for the purpose of paying, prepaying, or collecting tolls and associated administrative charges due for the use of toll facilities is exempt from s. 119.07(1) and s. 24(a), Art. I of the State Constitution. This exemption applies to such information held by the Department of Transportation, a county, a municipality, or an expressway authority before, on, or after the effective date of the exemption. This subsection is subject to the Open Government Sunset Review Act in accordance with s. 119.15 and shall stand repealed on October 2, 2019, unless reviewed and saved from repeal through reenactment by the Legislature.	Department given broad rulemaking authority.
Flor Stat. 316.1001 – Payment of toll on toll facilities required; penalties: (1) A person may not use any toll facility without payment of tolls, except as provided in s. 338.155. Failure to pay a prescribed toll is a noncriminal traffic infraction, punishable as a moving violation under chapter 318. (2)(a) For the purpose of enforcing this section, any governmental entity, as defined in s. 334.03, that owns or operates a toll facility may, by rule or ordinance, authorize a toll enforcement officer to issue a uniform traffic citation for a violation of this section. Toll enforcement officer means the designee of a governmental entity whose authority is to	Process for issuing citation included in statute.

enforce the payment of tolls. The governmental entity may designate toll enforcement officers pursuant to s. 316.640(1). (b) A citation issued under this subsection may be issued by mailing the citation by first-class mail or by certified mail to the address of the registered owner of the motor vehicle involved in the violation. Mailing the citation to such address constitutes notification. In the case of joint ownership of a motor vehicle, the traffic citation must be mailed to the first name appearing on the registration, unless the first name appearing on the registration is a business organization, in which case the second name appearing on the registration may be used. A citation issued under this paragraph must be mailed to the registered owner of the motor vehicle involved in the violation within 14 days after the date of issuance of the citation. In addition to the citation, notification must be sent to the registered owner of the motor vehicle involved in the violation specifying remedies available under ss. 318.14(12) and 318.18(7). (c) The owner of the motor vehicle involved in the violation is responsible and liable for payment of a citation issued for failure to pay a toll, unless the owner can establish the motor vehicle was, at the time of the violation, in the care, custody, or control of another person. In order to establish such facts, the owner of the motor vehicle is required, within 14 days after the date of issuance of the citation, to furnish to the appropriate governmental entity an affidavit setting forth: 1. The name, address, date of birth, and, if known, the driver license number of the person who leased, rented, or otherwise had the care, custody, or control of the motor vehicle at the time of the alleged violation; or 2. If stolen, the police report indicating that the vehicle was stolen at the time of the alleged violation. Upon receipt of an affidavit the person designated as having care, custody, and control of the motor vehicle at the time of the violation may be issued a citation for failure to pay a required toll. The affidavit shall be admissible in a proceeding pursuant to this section for the purpose of providing that the person identified in the affidavit was in actual care, custody, or control of the motor vehicle. The owner of a leased vehicle for which a citation is issued for failure to pay a toll is not responsible for payment of the citation and is not required to submit an affidavit as specified in this subsection if the motor vehicle involved in the violation is registered in the name of the lessee of such motor vehicle. (d) A written report of a toll enforcement officer to photographic evidence that a required toll was not paid is admissible in any proceeding to enforce this section and raises a rebuttable presumption that the motor vehicle named in the report or shown in the photographic evidence was used in violation of this section. (3) The submission of a false affidavit is a misdemeanor of the second degree. (4) Any governmental entity, including, without limitation, a clerk of court, may provide the department with data that is machine readable by the department's computer system, listing persons who have one or more outstanding violations of this section, with reference to the person's driver license number or vehicle registration number in the case of a business entity. Pursuant to s. 320.03(8), those persons may not be issued a license plate or revalidation sticker for any motor vehicle. (5) Subsections (2)-(4) supplement the enforcement of this section by law enforcement officers, and this section does not prohibit a law enforcement officer from issuing a citation for a violation of this section in accordance with normal traffic enforcement techniques.	Accommodation is made for leased and rented vehicles. Owner must provide proof.
Il. Code 605 10/10 – Powers over Authority affairs, fines, traffic rules and regulations, toll rates, land acquisition: The Authority shall have power:	

(a) To pass resolutions, make by-laws, rules and regulations for the management, regulation and control of its affairs, and to fix tolls, and to make, enact and enforce all needful rules and regulations in connection with the construction, operation, management, care, regulation or protection of its property or any toll highways, constructed or reconstructed hereunder.	Broad authority is included to establish civil fines for non-payment.
(a-5) To fix, assess, and collect civil fines for a vehicle's operation on a toll highway without the required toll having been paid. The Authority may establish by rule a system of civil administrative adjudication to adjudicate only alleged instances of a vehicle's operation on a toll highway without the required toll having been paid, as detected by the Authority's video or photo surveillance system. In cases in which the operator of the vehicle is not the registered vehicle owner, the establishment of ownership of the vehicle creates a rebuttable presumption that the vehicle was being operated by an agent of the registered vehicle owner. If the registered vehicle owner liable for a violation under this Section was not the operator of the vehicle at the time of the violation, the owner may maintain an action for indemnification against the operator in the circuit court. Rules establishing a system of civil administrative adjudication must provide for written notice, by first class mail or other means provided by law, to the address of the registered owner of the cited vehicle as recorded with the Secretary of State or to the lessee of the cited vehicle at the last address known to the lessor of the cited vehicle at the time of the lease, of the alleged violation and an opportunity to be heard on the question of the violation and must provide for the establishment of a toll-free telephone number to receive inquiries concerning alleged violations. The notice shall also inform the registered vehicle owner that failure to contest in the manner and time provided shall be deemed an admission of liability and that a final order of liability may be entered on that admission. A duly authorized agent of the Authority may perform or execute the preparation, certification, affirmation, or mailing of the notice. A notice of violation, sworn or affirmed to or certified by a duly authorized agent of the Authority, or a facsimile of the notice, based upon an inspection of photographs, microphotographs, videotape, or other recorded images produced by a video or photo surveillance system, shall be admitted as prima facie evidence of the correctness of the facts contained in the notice or facsimile. Only civil fines, along with the corresponding outstanding toll, and costs may be imposed by administrative adjudication. A fine may be imposed under this paragraph only if a violation is established by a preponderance of the evidence. Judicial review of all final orders of the Authority under this paragraph shall be conducted in the circuit court of the county in which the administrative decision was rendered in accordance with the Administrative Review Law.1 The Authority may maintain a listing or searchable database on its website of persons or entities that have been issued one or more final orders of liability with a total amount due of more than $1,000 for tolls, fines, unpaid late fees, or administrative costs that remain unpaid after the exhaustion of, or the failure to exhaust, the judicial review procedures under the Administrative Review Law. Each entry may include the person's or entity's name as listed on the final order of liability. Any outstanding toll, fine, additional late payment fine, other sanction, or costs imposed, or part of any fine, other sanction, or costs imposed, remaining unpaid after the exhaustion of, or the failure to exhaust, judicial review procedures under the Administrative Review Law are a debt due and owing the Authority and may be collected in accordance with applicable law. After expiration of the period in which judicial review under the Administrative Review Law may be sought, unless stayed by a court of competent jurisdiction, a final order of the Authority under this subsection (a-5) may be enforced in the same manner as a judgment entered by a court of competent jurisdiction. Notwithstanding any other provision of this Act, the Authority may, with the approval of the Attorney General, retain a law firm or law firms with	Registered owner is responsible for toll but may sue operator to recover fines imposed on owner. Statute requires rules to include certain notice requirements. Unpaid fines are a debt collectable through debt collection procedures.

expertise in the collection of government fines and debts for the purpose of collecting fines, costs, and other moneys due under this subsection (a-5). A system of civil administrative adjudication may also provide for a program of vehicle immobilization, tow, or impoundment for the purpose of facilitating enforcement of any final order or orders of the Authority under this subsection (a-5) that result in a finding or liability for 5 or more violations after expiration of the period in which judicial review under the Administrative Review Law may be sought. The registered vehicle owner of a vehicle immobilized, towed, or impounded for nonpayment of a final order of the Authority under this subsection (a-5) shall have the right to request a hearing before the Authority's civil administrative adjudicatory system to challenge the validity of the immobilization, tow, or impoundment. This hearing, however, shall not constitute a readjudication of the merits of previously adjudicated notices. Judicial review of all final orders of the Authority under this subsection (a-5) shall be conducted in the circuit court of the county in which the administrative decision was rendered in accordance with the Administrative Review Law.	Administrative process may include penalties beyond fines.
No commercial entity that is the lessor of a vehicle under a written lease agreement shall be liable for an administrative notice of violation for toll evasion issued under this subsection (a-5) involving that vehicle during the period of the lease if the lessor provides a copy of the leasing agreement to the Authority within 30 days of the issue date on the notice of violation. The leasing agreement also must contain a provision or addendum informing the lessee that the lessee is liable for payment of all tolls and any fines for toll evasion. Each entity must also post a sign at the leasing counter notifying the lessee of that liability. The copy of the leasing agreement provided to the Authority must contain the name, address, and driver's license number of the lessee, as well as the check-out and return dates and times of the vehicle and the vehicle license plate number and vehicle make and model. As used in this subsection (a-5), “lessor” includes commercial leasing and rental entities but does not include public passenger vehicle entities.	Statute includes accommodation for leased vehicles.

Table 24: Data Practices, Data Retention and Privacy – Statutory Authority with Comments

Il. Code 605 10/19 – Confidentiality of personally identifiable information obtained through electronic toll collection system: (a) For purposes of this Section: “Electronic toll collection system” is a system where a transponder, camera-based vehicle identification system, or other electronic medium is used to deduct payment of a toll from a subscriber's account or to establish an obligation to pay a toll. “Electronic toll collection system user” means any natural person who subscribes to an electronic toll collection system or any natural person who uses a tolled transportation facility that employs the Authority's electronic toll collection system. “Personally identifiable information” means any information that identifies or describes an electronic toll collection system user, including but not limited to travel pattern data, address, telephone number, e-mail address, license plate number, photograph, bank account information, or credit card number. (b) Except as otherwise provided in this Section, the Authority may not sell or otherwise provide to any person or entity personally identifiable information of any electronic toll collection system user that the Authority obtains through the operation of its electronic toll collection system.	
(c) The Authority may, within practical business and cost constraints, store personally identifiable information of an electronic toll collection system user only if the	Limitation on what information may be collected and stored.

information is required to perform account functions such as billing, account settlement, or toll violation enforcement activities. (d) By no later than December 31, 2011, the Authority shall establish a privacy policy regarding the collection and use of personally identifiable information. Upon its adoption, the policy shall be posted on the Authority's website and a copy shall be included with each transponder transmitted to a user. The policy shall include but need not be limited to the following: (1) A description of the types of personally identifiable information collected by the Authority. (2) The categories of third-party persons or entities with whom the Authority may share personally identifiable information and for what purposes that information is shared. (3) The process by which the Authority notifies electronic toll collection system users of material changes to its privacy policy. (4) The process by which an electronic toll collection system user may review and request changes to any of his or her personally identifiable information. (5) The effective date of the privacy policy. (e) This Section does not prohibit the Authority from: (1) providing aggregated traveler information derived from collective data relating to a group or category of electronic toll collection system users from which personally identifiable information has been removed; (2) sharing data with another transportation agency or third-party vendor to comply with interoperability specifications and standards regarding electronic toll collection devices and technologies, provided that the other transportation agency or third-party vendor may not use personally identifiable information obtained under this Section for a purpose other than described in this Section; (3) performing financial, legal and accounting functions such as billing, account settlement, toll violation enforcement, or other activities required to operate and manage its toll collection system; (4) communicating about products and services offered by itself, a business partner, or another public agency; (5) using personally identifiable information in research projects, provided that appropriate confidentiality restrictions are employed to protect against the unauthorized release of such information; (6) releasing personally identifiable information in response to a warrant, subpoena or lawful order from a court of competent jurisdiction; (7) releasing personally identifiable information to law enforcement agencies in the case of an emergency when obtaining a warrant or subpoena would be impractical; and (8) releasing personally identifiable information to the Authority's Inspector General or, at the Inspector General's direction, to law enforcement agencies under paragraphs (5) and (6) of subsection (f) of Section 8.5 of this Act. (f) In any agreement allowing another public entity to use the Authority's toll collection system in a transportation facility, the Authority shall require the other public entity to comply with the requirements of this Section. (g) Personally identifiable information generated through the Authority's toll collection process that reveals the date, time, location or direction of travel by an electronic toll collection system user shall be exempt from release under the Illinois Freedom of Information Act. The exemption in this subsection shall not apply to information that concerns (i) the public duties of public employees and officials; (ii) whether an electronic toll collection system user has paid tolls; (iii) whether the Authority is enforcing toll violation penalties against electronic toll collection users who do not pay tolls; (iv) accidents or other incidents that occur on highways under the jurisdiction of the Authority; or (v) the obligation, receipt, and use of the funds of the Authority. The exemption in this subsection (g) shall not be a limitation or restriction on other	ISTHA required to develop privacy policy. Privacy policy must include certain components. Law recognizes legitimate use and release of certain data.

Freedom of Information Act exemptions applicable to personally identifiable information or private information.	
Flor. Stat. 338.155(6) – Payment of toll on toll facilities required; exemptions: Personal identifying information held by the Department of Transportation, a county, a municipality, or an expressway authority for the purpose of paying, prepaying, or collecting tolls and associated administrative charges due for the use of toll facilities is exempt from s. 119.07(1) and s. 24(a), Art. I of the State Constitution. This exemption applies to such information held by the Department of Transportation, a county, a municipality, or an expressway authority before, on, or after the effective date of the exemption. This subsection is subject to the Open Government Sunset Review Act in accordance with s. 119.15 and shall stand repealed on October 2, 2019, unless reviewed and saved from repeal through reenactment by the Legislature.	Law exempts certain data from the public records laws.