Washington State Department of Transportation

WSDOT Statewide Tolls Program

Toll Operations Benchmarks and Incentives

March, 2009

Prepared for:
Washington State Department
of Transportation (WSDOT)

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PBS&J

Table of Contents

List of Figures

Appendices

I. Introduction

In accordance with the Governor's veto messages in response to Engrossed Substitute House Bill 2878, Section 206 (6) and Section 212 (2), and in cooperation with the Office of Financial Management (OFM), the Washington State Department of Transportation (WSDOT) has contracted with PBS&J to address the following directives:

- Evaluate the cost of toll operations on the Tacoma Narrows Bridge and SR 167 in comparison to other tolled facilities across the country.
- Develop toll operating cost benchmarks based on that evaluation.
- Develop incentives to reduce and control tolling operation costs.

To that end, this report will update and expand upon a report prepared prior to the initial Tacoma Narrows Bridge (TNB) toll operations implementation. The previous report, entitled 'Comparative Analysis of Toll Facility Operational Costs', was dated February 22, 2007. It included analysis of a variety of existing toll agencies' known operating costs in comparison to the projected costs of the start-up TNB toll operation.

Two key points should be kept in mind as this document is reviewed:

- Studies of this type, including the February 2007 report, are based on information from agencies configured in a variety of ways, who report their operations cost information using a range of different methods. There is no "standard" toll agency setup or method of reporting. As a result, a true "apples to apples" comparison is not possible without digging much further into the details of each agency's operation.

  This report includes revenue and operations cost information from each agency's Financial Reports, which are not "normalized" to reflect only those costs typically used for these types of calculations. The report will compare information from these agencies at a general summary level, based on relatively simple calculations that cannot reflect the complexity of these operations.

- At the time of the February 2007 report, WSDOT was preparing to deploy toll operations on a single bridge. Although a variety of other potential toll facilities were under consideration, that study focused on the projected operation of that single facility, selecting agencies for survey that could be expected to have similar characteristics.

  At this point in time, however, WSDOT has progressed beyond the TNB implementation and is in the process of building a tolling program. This program must support multiple facilities (e.g., TNB, SR 167, SR 520, and a variety of potential others), as well as multiple types of toll collection (e.g., manual cash collection, electronic toll collection (ETC), video tolling, HOV / HOT lane tolling). As a result, it is important to begin considering WSDOT's program from a system-wide perspective. This will support the development of standards, policies, procedures, and technologies that enable the variety of necessary operational methods while taking advantage of economies of scale.

II. Study Methodology

Based on the information in the February 2007 report, PBS&J has surveyed several of the agencies included in the previous report. Updated information was requested with regard to:

- General configuration information
- Operations cost information, including statement as a percentage of revenue and/or a cost per transaction
- Operations performance reporting benchmarks in use
- Incentives used to reduce and control operating costs
- Other lessons learned with regard to operating cost management

WSDOT staff has also been surveyed to ensure that current information from the TNB toll facility, SR 167 High-Occupancy Tolling (HOT) pilot, and supporting *Good to Go!*™ back office operations is included. The information collected has been used to develop this updated report, including PBS&J analysis and resulting recommendations for consideration by WSDOT, OFM, and the Legislature.

Per the Governor's veto message, this study has been prepared in cooperation with the Washington State Transportation Commission (the Commission), as well as the TNB Citizens' Advisory Committee (CAC). Preliminary information was provided to both groups during their October 2008 meetings, and a following draft of the final report was provided to them for review and comment. Their input provided was incorporated into the final white paper, for provision to the Legislature during the 2009 Session.

III. Surveyed Agencies

To establish the foundation for this analysis, information has been collected from several of the agencies included in the February 2007 report. Not all previously-included agencies were able to respond within the timeframe for development of this paper.

Note that all initial information has been gathered from publicly-available sources and may be based on different timeframes, operational configurations, and other assumptions, depending on each agency's configuration and reporting methods. As previously noted, these agencies may be organized, operate, and/or report in different manners. The resulting analysis should not be assumed to be precise.

Surveyed agencies include:

A. E-470 Public Highway Authority

E-470 is a 47-mile tolled highway running along the eastern perimeter of the Denver, Colorado, metropolitan area. In addition to serving the Denver metro area, it also provides direct access to Denver International Airport.

The E-470 facilities are overseen by the E-470 Public Highway Authority, which has eight voting member jurisdictions: Adams, Arapahoe, and Douglas counties and the cities of Aurora, Brighton, Commerce City, Thornton, and the town of Parker. Affiliate, non-voting members are the cities of Arvada, Broomfield and Greeley, and

Weld County. Ex-officio members are the Colorado Department of Transportation (CDOT), Denver Regional Council of Governments (DRCOG) and the Regional Transportation District (RTD).

E-470 opened in 1991. Tolls are collected using manual / cash toll collection, automated coin machines (ACMs), and electronic toll collection (ETC) using the EXpressToll™ transponder. The EXpressToll back office / customer service center (CSC), which processes transactions for E-470 and interoperable facilities, is also provided and overseen by the Authority. E-470 is interoperable with Northwest Parkway (NWP) in the Denver area and the facilities of the Colorado Tolling Enterprise (CTE) through the use of EXpressToll. The EXpressToll transponder is Title 21 compliant, which means that it could eventually be interoperable with California toll facilities.

E-470 operations are performed by a contractor – Mile High Toll Services, a consortium established by Parson Brinckerhoff / Alltech. Mile High provides all toll collection operations, including those in the plaza / lane and the back office, under Authority oversight.

E-470 is currently in the process of moving to "cashless" toll collection by phasing out manual / cash and ACM toll collection and adding image-based "License Plate Tolling" to their ETC program. License Plate Tolling with invoices was added to current toll collection methods as of January 1, 2009, and cash / ACM collection will be phased out by July 1, 2009.

B. Central Texas Regional Mobility Authority (CTRMA)

The Central Texas Regional Mobility Authority was established in 2003, with board members from Travis and Williamson Counties in the Austin, Texas, area. CTRMA was the first authority created under new state legislation enabling the creation of regional mobility authorities in Texas.

CTRMA's board includes seven members, three each assigned by County Commissioners from the two forming counties (Travis and Williamson) and a board Chairman appointed by the Governor. The authority is managed by an Executive Director and a staff of fourteen.

CTRMA's first toll facility, US 183A, is an 11 mile tolled highway in northwest Travis County. Plans are underway to expand 183A to the north, and six other toll projects in the Austin area are also currently being pursued.

183A began tolling operations in March 2007, using cash and ETC to collect tolls. CTRMA's facilities are supported by the TxTag™ transponder program developed and operated by the Texas Department of Transportation (TxDOT). CTRMA's facilities are also interoperable with:

- All facilities operated by TxDOT, which use TxTag
- Facilities operated by the North Texas Turnpike Authority (NTTA) in Dallas, which use TollTag
- Facilities operated by the Harris County Toll Road Authority (HCTRA) in Houston, which use EZ Tag

Toll collection operations on US 183A are performed by a contractor – URS Corporation – through a partnering agreement with TxDOT. URS provides manual / cash toll collection, safety

patrols, and facility maintenance services on US 183A, and also provides CSC, toll collection, and other services to TxDOT for the TxTag back office and TxDOT-operated toll facilities in the Austin area. CTRMA's ETC and interoperable transactions are processed by the TxTag CSC, but CTRMA employs a separate contractor – Municipal Services Bureau (MSB) – to collect their toll violations.

CTRMA has also recently completed the process of moving to cashless toll collection. Image-based tolling with invoicing, referred to as Pay-By-Mail, was implemented on US 183A in May 2008. All cash toll collection was phased out on US 183A by December 1, 2008.

C. Bay Area Toll Authority (BATA)

The Bay Area Toll Authority was created by the California Legislature in 1997 to administer the then-$1 base toll on seven of the area's bridges. BATA-operated bridges include:

- Antioch Bridge
- Benicia-Martinez Bridge
- Carquinez Bridge
- Richmond-San Rafael Bridge
- San Francisco-Oakland Bay Bridge
- San Mateo-Hayward Bridge
- Dumbarton Bridge

Today, BATA operates these same seven bridges as part of the Metropolitan Transportation Commission (MTC), the transportation planning, financing, and coordinating agency for the nine-county metropolitan Bay Area created in 1970. BATA's responsibilities were expanded by the Legislature in 2005 to include administration of all toll revenue and joint oversight of the toll bridge construction program with the California Department of Transportation (Caltrans) and the California Transportation Commission. Within this role, BATA funds and oversees long-term capital improvements, rehabilitation, and seismic retrofitting of the seven bridges.

BATA activities are overseen on a monthly basis by an eight-member BATA Oversight Committee. As part of MTC, BATA also reports to the MTC Policy Board, which is made up of nineteen Commissioners. Fourteen commissioners are appointed directly by local elected officials, two members represent regional agencies, and three non-voting members represent federal and state transportation agencies and the federal housing department. MTC and BATA staff includes about 130 personnel headquartered in Oakland, California.

BATA took over administration of tolling on the seven bridges from Caltrans in 1998, and oversight of the FasTrak CSC from Caltrans in 2003. BATA's seven toll bridges employ both manual / cash toll collection and ETC, using the FasTrak® transponder. BATA also operates the FasTrak back office / CSC in San Francisco. Through the FasTrak program, BATA's facilities are interoperable with the Golden Gate Bridge and other toll facilities in California, including those operated by the Transportation Corridor Agencies (TCA), Orange County Transportation Authority (OCTA), and the San Diego Association of Governments (SANDAG).

Caltrans provides toll collection services on all seven bridges under their agreement with BATA. Toll collection staff are Caltrans employees. In the FasTrak back office, BATA employs a

contractor – ACS State and Local Solutions – to perform back office and customer service operations, including image and violations processing.

BATA is in the process of studying the feasibility of video, or license plate, tolling on their facilities. In addition, their violation enforcement system (VES) is currently being replaced, and an RFP is under development for the replacement of their lane-based toll collection system, ATCAS.

D. Golden Gate Bridge, Highway and Transportation District (GGBHTD)

The Golden Gate Bridge (GGB) is operated by one of three operating divisions of the Golden Gate Bridge, Highway and Transportation District (GGBHTD), which also operates Golden Gate Transit and Golden Gate Ferry.

GGBHTD is overseen by a nineteen-member Board of Directors representing the city and county of San Francisco and the counties of Marin, Sonoma, Napa, Mendocino, and Del Norte. Generally speaking, board members are elected members of each county's Board of Supervisors, non-elected members appointed by each county's Board of Supervisors, or appointees of the Mayor of San Francisco.

The Golden Gate Bridge, open to traffic since 1937, is a national landmark and is considered one of the "seven wonders of the modern world". Nonetheless, from a toll operations perspective, it is a 1.7 mile single facility, including bridge approaches. It carries US 101 across the Golden Gate Strait between San Francisco and Marin Counties, with tolls collected southbound into San Francisco only. Up to 11 lanes may be dedicated to southbound tolled traffic during the morning peak, reduced to 9 lanes or less during the reverse commute for the afternoon peak.

GGB tolls are collected using manual / cash toll collection and FasTrak ETC. Toll collection staff are GGBHTD Bridge Division employees. GGB transactions are processed through the FasTrak CSC, under an agreement with BATA. As a result, GGB is interoperable with the same agencies and facilities as BATA.

E. Washington State Department of Transportation (WSDOT)

In addition to the above agencies surveyed, staff from Washington State Toll Operations were also interviewed. This information will be used to establish a basis of comparison with the other agencies.

Although the state of Washington has had toll facilities in the past, it has been decades since tolls were collected until the Tacoma Narrows Bridge (TNB) opened in July 2007. TNB is a one-mile long pair of parallel bridges, owned and operated under contract by WSDOT. These bridges carry SR 16 across the Tacoma Narrows between Tacoma and Gig Harbor. Tolls are collected in the eastbound direction (toward Tacoma) only. Washington State's toll program uses the *Good to Go!* transponder for electronic tolling.

Because WSDOT is a state agency reporting directly to the Governor of Washington, the tolling program is only one segment of the total agency operation. The Toll Operations group includes 9 full-time employees currently stationed in Gig Harbor in support of the TNB operation. Additional planning and development efforts for WSDOT's tolling program are carried out in the Seattle and Olympia offices, in coordination with other state functions.

Since the TNB opening, the SR 167 High-Occupancy Tolling (HOT) Lanes pilot has been added to WSDOT's program. This pilot began operation in May, 2008, on a nine-mile segment of SR 167 between Renton and Auburn. Tolls are collected electronically in both directions in the high-occupancy lanes only, based on a pricing formula related to traffic congestion. SR 167 is also supported out of the TNB back office in Gig Harbor.

WSDOT's TNB, SR 167, and back office operations are staffed under contract with TransCore, who also provides the TNB systems. Because no other tolling entities currently exist within Washington State, no toll-related interoperability requirements exist.

IV. Analysis

In order to establish the types and ranges of operation across the study agencies, it is necessary to isolate several factors for side-by-side comparison. The following sections will attempt to provide this focus on relevant key factors, including general organizational and operational structure, ETC penetration, operating costs as a percentage of toll revenue, toll collection operating costs per transaction, and number of customer service staff per customer account.

Note that, in the case of CTRMA, a full year's data has not been reported in a Financial Statement at this point. As a result, the financial calculations included in this analysis are instead based on the projected revenue and operations costs for a full year's operation, as noted in the overview of their Annual Report.

A. Agency Comparison

As illustrated in Figure 1 below, the agencies currently under consideration vary significantly in their organization and operational structures.

WSDOT reflects some characteristics, in comparison to the other agencies and based on current circumstances, that could provide a fertile environment for toll program establishment:

- As a state agency, WSDOT is able to draw on state resources to plan, establish, and manage the ongoing toll operation in the overall statewide transportation context. However, because WSDOT as an agency is not focused solely on tolling, this factor could be counterproductive if other agency issues draw resources away from the tolling program.

- As an Executive Agency of the state, WSDOT reports directly to the Governor's office, enabling a strong focus on program issues when required. As noted in the previous item, however, this factor could also hamper program development in certain circumstances.

- The lack of other tolling agencies in the Washington area allows WSDOT the opportunity to establish a strong and sustainable tolling program from the start. With proactive and thoughtful action on WSDOT's part now, there is no downside to this point.

It should be noted that the agencies previously selected for the 2007 study were included because their circumstances at the time appeared to be similar in some aspect to WSDOT. However, it is clear based on the comparison in Figure 1 that WSDOT's program is growing at a rate not matched by the others. This may be, in part, because the other agencies don't have full control over the toll facilities in their areas, as illustrated by their interoperability requirements. Nonetheless, this is another indication that the optimal time for WSDOT to act is now.

	Toll Agency				
	WSDOT	**E-470**	**CTRMA**	**BATA**	**GGB**
Tolling Authority / Agency					
Type	State Department of Transportation	Public Highway Authority	Regional Mobility Authority	Regional Tolling Authority	Regional Transportation Authority
Oversight	Executive Agency	Board of Directors	RMA Oversight Board	MTC Policy Board	Board of Directors
Oversight Membership / Assignment	Direct Oversight by Governor's Office; Other Agency Involvement at Governor's Direction	8 County Commissioners and City Mayors; 3 Ex-Officio Directors; 4 Affiliate Directors	6 Member Appointments by each County's Commissioners; Chairman Appointed by the Governor	14 Members Appointed by Local Elected Officials; 2 Members Regional Agencies; 3 non-voting Members State / Federal	19 Members representing 5 Counties and City of San Francisco; Elected Officials, Appointees, and State / Federal
Agency Staffing	9 dedicated Toll Operations staff; Toll Planning / Development Staff integrated into other Agency offices	47 toll-dedicated Agency staff, including 13 Toll Operations, 12 Facility Maint, 10 IT	14 toll-dedicated Agency staff	25 toll-dedicated Agency staff	Number of staff not provided; toll-dedicated staffing aligned in a single Agency division
Toll Facilities					
Facilities	Tacoma Narrows Bridge, SR 167 HOT Lanes	E-470	US 183A	Seven Bridges	Golden Gate Bridge
Facility Type(s)	TNB - Suburban Bridge; SR 167 - Commuter HOT lanes	Tolled Urban / Suburban Highway	Tolled Urban / Suburban Highway	Urban / Suburban Commuter and Rural Toll Bridges	Urban Commuter Bridge
Tolling Type(s)	Manual, ETC, ORT, HOT; Future - Image-Based	Manual, ACM, ETC, ORT; Future - Adding Image-Based, Eliminating Cash	Manual, ETC, ORT, Image-Based; Future - Eliminating Cash	Manual, ETC, ORT; Future - Considering Image-Based	Cash, ETC
Tolled Length in Miles	TNB - 1 mile; SR 167 - 9 miles	47 miles	11 miles	7 bridges totaling 26 miles	1.7 miles
Toll Rate for 2-axle Vehicle	TNB - $4 Cash / $2.75 ETC; SR 167 - dynamic from $0.50 to $9.00 based on congestion	Single point tolls from $0.50 to $0.75 ramps, $1.75 to $2.50 mainline plazas	Single point tolls $0.50 to $1.50; Discount for ETC, Premium for Pay-By-Mail	$4.00, free passage for HOV during certain hours	$6.00 Cash / $5.00 ETC; Free passage for HOV during certain hours
Annual Tolled Traffic Volume	TNB - 14,300,000; SR 167 - 150,000 (6 months)	54,100,000	18,000,000	120,000,000	19,800,000
Percent ETC Transactions	69% (TNB only)	68%	75%	49%	53%
ETC Promotion Incentives	Marketing; Transponder Giveaways; ETC Discounts	Marketing; Transponder "Loaned" to Customer; ETC Discounts; Retail sign-up; Rewards program in partnership with local businesses	Joint Marketing with TxDOT / TxTag; Free Transponders; Free Facility Trial Period; ETC Discounts; Community Involvement; Extensive Promotional Events	Marketing; FasTrak website; Retail transponder sales; Waive deposit for first 3 credit card-backed transponders	ETC Discounts
Lane Operations Staffing	TNB Contracted - TransCore; SR 167 - N/A	Contracted - Mile High Toll Services	Contracted - URS Corp	Interagency - Caltrans	In-House Staff
Number of Staff	47 Contract Staff	89 Contract Staff - will be eliminated by move to Cashless tolling	Not provided	75 Contract staff	Not provided
Back Office / CSC					
ETC Program	*Good to Go!* ™	EXpressToll™	TxTag®	FasTrak®	FasTrak®
Interoperability	None required at present	Denver-area NWP and CTE facilities	TxDOT / TxTag, NTTA / TollTag, and HCTRA / EZ Tag	GGB, TCA, OCTA, and SANDAG facilities	BATA, TCA, OCTA, and SANDAG facilities
ETC Accounts	108,000	271,000	n/a	799,000	n/a
Operations Staffing	TNB / SR 167 Contracted - TransCore	Contracted - Mile High Toll Services	Interagency Back Office - TxDOT; Contracted Violations - MSB	Contracted - ACS	Interagency - BATA
Number of Staff	28 Contract Staff, including IT	36 Contract Staff, without IT - +7 with move to Cashless tolling	n/a	135 Contract Staff	n/a
Financial					
Annual Toll Revenue	$30,900,000	$94,400,000	$15,000,000	$422,000,000	$85,000,000
Annual Toll Operations Cost	$11,700,000	$36,700,000	$8,100,000	$101,000,000	$40,000,000

Figure 1: Agency Comparison Chart

B. Percentage of Electronic Toll Transactions

The percentage of ETC transactions on any given facility is a good indication of the managing agency's ability to use technology to manage operations costs. As illustrated in Figure 2 below, WSDOT compares favorably with the other agencies in terms of ETC penetration. The only agency in this study with a higher penetration rate is CTRMA.

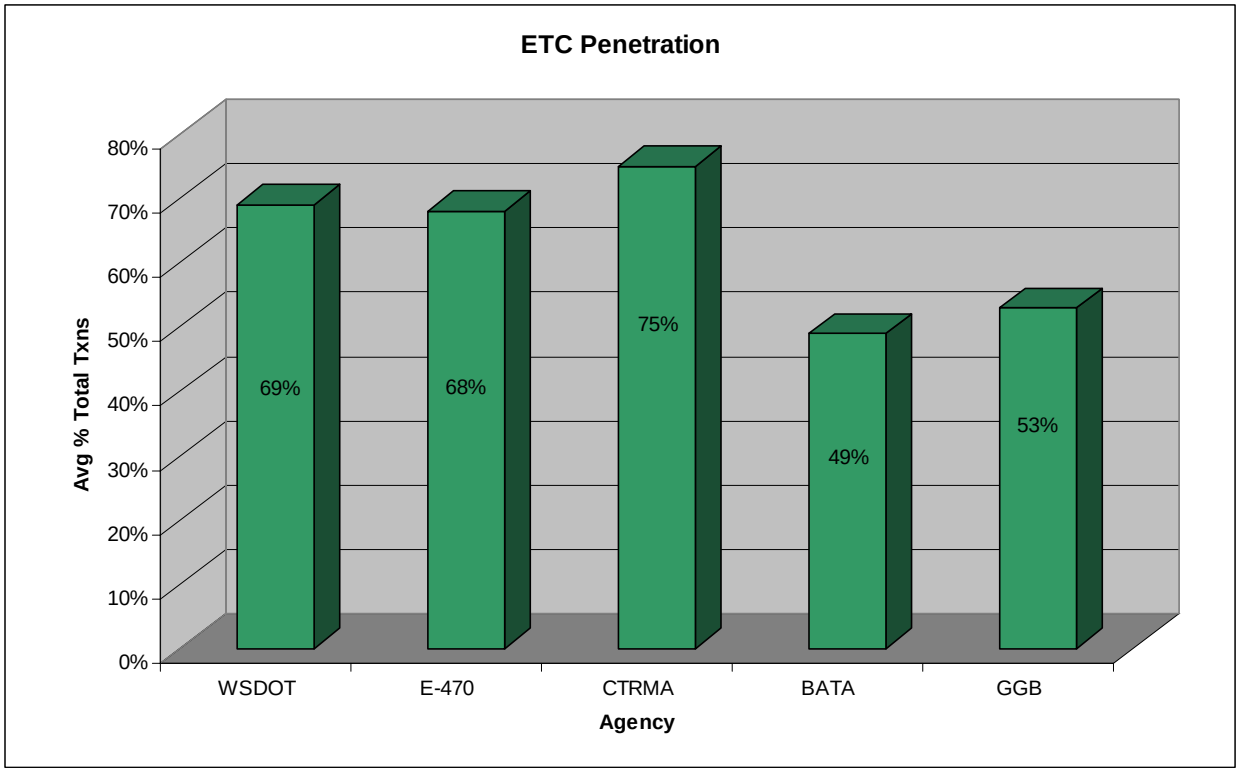

Figure 2: Percentage of ETC Transactions

It is important to remember that the 2007 WSDOT report forecasted 55% ETC penetration on the soon-to-be-opened Tacoma Narrows Bridge. From the beginning, however, WSDOT's ETC percentages have consistently been in the 65% to 75% range, with some peak periods hitting 80%. This is a reflection of the success of the initial transponder distribution program and associated marketing efforts. WSDOT's *Good to Go!* program continues to return high ETC penetration rates.

One factor that played out in favor of both WSDOT and CTRMA, as new start-up tolling agencies, was the use of sticker tags. These newer technology transponders are smaller, cheaper, and ostensibly nicer-looking than the traditional "box" transponders in use at many older tolling agencies. As a result, they can be given away or discounted for promotional events, sold to customers at a more reasonable price (e.g., $8 to $10, as opposed to the $25 to $30 box tags), and promoted as an attractive alternative to the box tags many other agency's customers must velcro to their windshields.

However, sticker tags also have a downside – they are more difficult to use for high-occupancy

vehicle / tolling (HOV/HOT) applications, because they cannot be removed and replaced or turned off and on as needed by occasional high-occupancy drivers. WSDOT is exploring alternatives for their HOV/HOT facilities, to offset this difficulty.

CTRMA's high ETC penetration rate is the result of a combination of circumstances, several of which may be emulated by other agencies to improve their ETC rates. For example:

- CTRMA's initial roadway opening included a phase-in of toll collection. Drivers were allowed to use the road for free for one month, ETC customers were given a second month free, and then a permanent ETC discount was provided. As a result, more customers than expected signed up for ETC, boosting CTRMA's ETC rates to unexpected levels even after full tolling was in place.

- The agency has focused considerable attention on community involvement and marketing promotions for both their new facility and the TxTag ETC program, even though it was provided by TxDOT. For example, CTRMA joined forces with local Girl Scout troops to give the troops bonus payments if local ETC customers signed up for TxTag through a special promotional program. More recently, CTRMA is distributing lottery style scratch-off tickets for free credit on an ETC account to educate the public on their move to cashless tolling.

- TxTag transponders have been provided for free to TxTag ETC customers since the beginning of TxDOT's program – no purchase, no deposit for credit card-backed accounts, and no monthly fee. This has in turn benefited CTRMA, as their 183A-area customer base overlaps considerably with TxDOT's Central Texas Turnpike customer base.

Based on industry general ETC levels, it has been postulated that ETC use will plateau at no higher than 70 to 80% in any operation continuing to collect cash tolls. The remainder of drivers will continue to pay cash and/or violate unless those options are no longer available. In fact, ETC usage rates have settled at much lower than 70% in many areas where no new methods are employed to entice customers to ETC. This hypothesis is the driving factor behind the policy move by many agencies to cashless tolling, as well as the related move to supplement ETC with video tolling as a replacement for cash. The combination is creating a "perfect storm" of circumstances that will contribute to higher use of ETC over time.

ETC and video tolling, also referred to as "cashless tolling" or "all-electronic tolling" (AET) contribute to other agency goals, as well. For example, the use of ETC and video tolling contribute to congestion relief and environmental justice. ETC has typically been tied to congestion relief, as it reduces the need for vehicles to line up at booths to pay. Video tolling is being employed as a substitute when cash tolling is eliminated, to ensure that low-income customers (as well as other types of customers) have a means to pay without getting a violation. Video tolling will also contribute to congestion relief, as customers who would have waited in line to pay cash will now move through the plaza at higher speeds and pay an invoice later.

In addition to these benefits, video tolling is an important "stepping stone" in moving cash customers to ETC. Removal of the cash option creates a situation where every driver is automatically a customer, and those receiving invoices are much closer to electronic tolling than

they were as cashpayers. As a result, the move to ETC is considerably less difficult, and ETC rates should begin to occupy some part of the percentage of customers previously made up of cashpayers and violators.

On the TNB, the use of cash tolling has created situations on weekends and holidays where cash-paying traffic backs up from the toll booth lanes into the ETC lanes, blocking all traffic crossing the bridge toward Tacoma. Thanksgiving 2007, in particular, developed into a situation that made the news, as a high volume of holiday drivers without transponders crossed the bridge. The use of video tolling to replace cash might not completely alleviate that circumstance, but the speedier passage of non-ETC customers could only improve it.

WSDOT used similar strategies to CTRMA during the build-up to the TNB opening, and as a result, WSDOT's ETC penetration rate remains at or near the theoretical ETC plateau. As long as appropriate strategies are applied prior to the opening of new facilities to develop local customer bases, WSDOT's ETC rate may be expected to improve further with the expansion of cashless ETC and video tolling into and around the Seattle area.

C. Operating Costs as a Percentage of Toll Revenue

In the evaluation of toll operations costs, one method of measuring results is the comparison of operating costs to overall toll revenues, as illustrated in Figure 3 below.

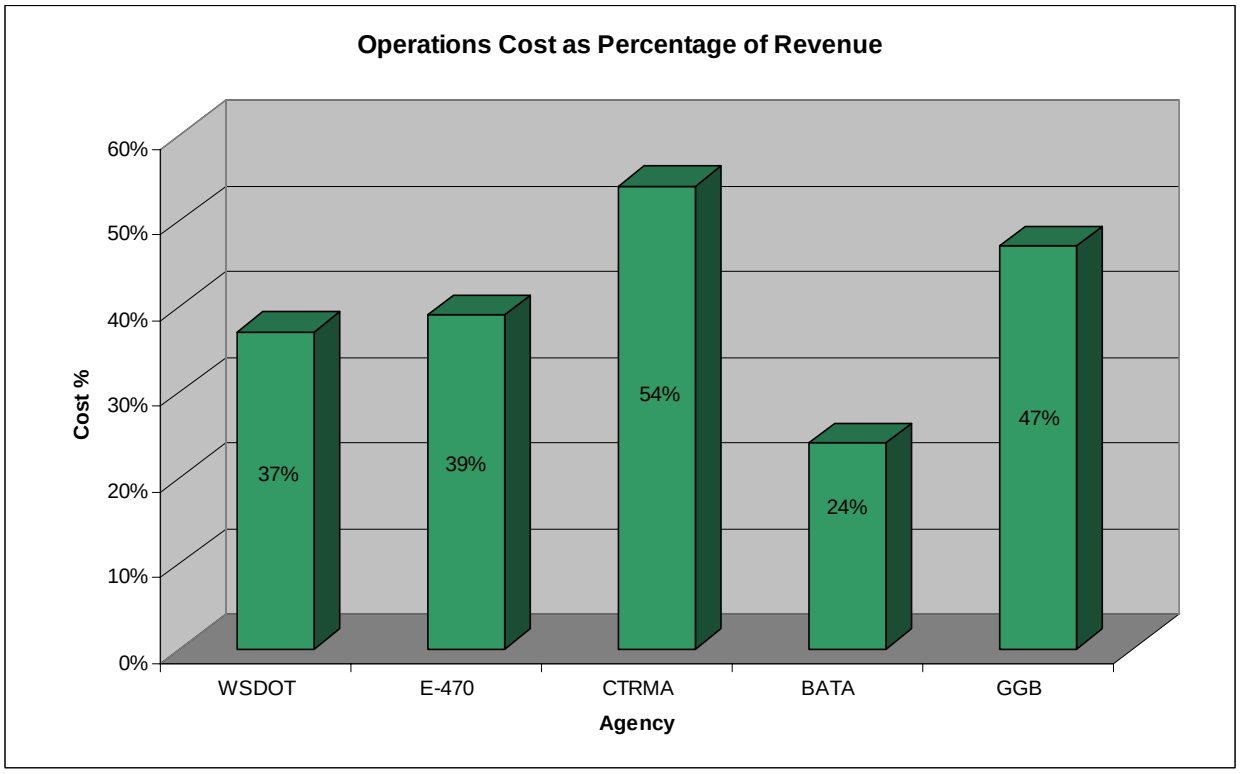

Figure 3: Toll Operating Costs as a Percentage of Revenue

The information used for this comparison comes primarily from the Annual Reports and associated Financial Statements of each of the study agencies. Consequently, this analysis may not conform to the reported operations costs-to-revenue ratio typically reported by these toll agencies, which generally falls in the 10 to 20% range. Agency operations directors typically base their calculations on their tolling-focused operations budget rather than the broader operations expense categories reported in their Financial Statements.

For example, a similar analysis provided in the February 2007 report included the 16% operations cost forecast for WSDOT. The WSDOT percentage was compared to 14% for E-470, 16% for BATA, and 15% for GGB. These percentages were all based on “normalized” operations costs, which includes only those costs specifically included in the toll operations budget for each agency, and re-aligned in an attempt to match across agencies as closely as possible. This analysis did not ensure that operations functions included were consistent, and all agencies surveyed show relatively consistent higher percentages under the calculation used for this paper.

For the purposes of this analysis, a simple calculation – dividing the reported operations expenses by the revenue – was used for consistency. However, because different operational

functions may have been included in the reported expenses of the different agencies, this does not ensure completely consistent results.

The level of detail necessary to break down the operations costs category is not generally spelled out in agency Financial Statements. As a result, it is not clear what operational functions have been included. For example, some agencies' financial reporting may include maintenance of the facility or bridge itself, while others do not. Financial items like bond financing expenses, amortization, and depreciation may be considered operating costs by some agencies, while others leave those in the non-operational category. A variety of other examples were provided in the February 2007 report, which is included as Appendix A to this document. As noted earlier in this document and the previous report, an "apples-to-apples" comparison of operating costs for multiple toll agencies is not possible without going to much greater levels of detail than this evaluation requires.

For the purposes of this study, a general comparison forms the basis for a "reasonable range" of toll operating costs. Based on the resulting range, shown in Figure 3, WSDOT's operating costs are about mid-range in comparison to the other agencies. Several key considerations should be made in reviewing this data:

- The agency with the highest operations cost percentage is CTRMA. This may be the result of their relative newness to the toll industry, with initial start-up only last year. However, WSDOT's first facility TNB start-up was last year, as well. CTRMA is also a newly-authorized type of organization, a Texas regional mobility authority, with limited in-house staff, both of which may have compounded the potential for high start-up costs in comparison to revenue. Lastly, CTRMA's forecasted revenue and costs were used for this analysis, since a full year's data was not readily available. Their forecasts may not be as accurate as the actual revenue and cost information used for the other agencies.

- BATA reflects a lower relative operations cost than the other agencies. This may be due to the operational functions included in their reported operations expenses. It may also be the result of BATA's ongoing transition of operational functions from Caltrans into the BATA organization and reporting structure.

- The Golden Gate Bridge percentage shown appears to be relatively high for an established tolling agency. However, it is possible that some part of the facility costs are included in the reported expenses. In the case of a bridge like the Golden Gate, those costs tend to be higher than your typical tolled highway facility. WSDOT's TNB may also fall into that category at some point, as well, but as a new bridge, maintenance costs are relatively low. Also, WSDOT is a state agency and is not focused on the operation of a single bridge.

D. Toll Collection Operating Cost per Toll Transaction

A similar method of measuring toll operations cost efficiency is the comparison of operations costs to toll transaction volumes. In this case, dividing the total reported operations cost by the reported number of transactions in the same time period results in a cost per transaction.

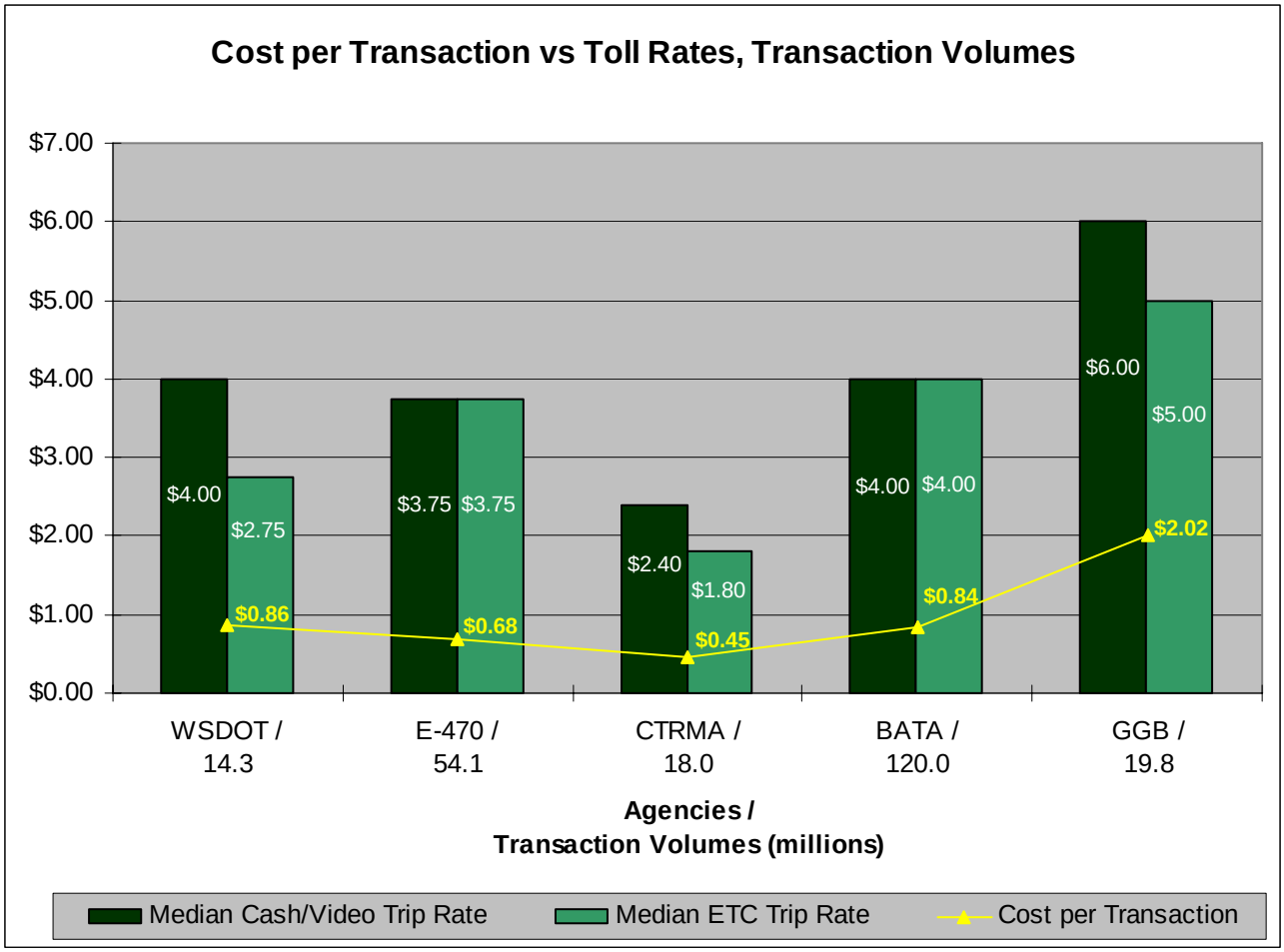

Figure 4: Operating Cost per Toll Transaction

As noted in the previous section, the calculation used for this comparison was not based on normalized operations costs. As a result, all agencies' costs per transaction are higher than those typically reported. For example, in the February 2007 report, WSDOT's cost per transaction was forecast to be $0.49. E-470's actual cost per transaction was $0.23, BATA's was $0.29, and GGB's was $0.62. All of the costs reflected by the yellow line and data points in Figure 4 above are proportionately higher based on the type of calculation used here.

However, the cost per transaction appears disproportionately high for Golden Gate Bridge, and conversely low for CTRMA. Because this calculation drops the reported revenue from the equation, it is strictly a division of the operations costs across the reported transactions.

- The ratio of costs and revenue for Golden Gate was also higher than most of the other agencies. With the same operations cost compared to a relatively low number of transactions for this single facility, the imbalance becomes significantly larger. Their lower ETC penetration rate may exaggerate this effect, as cash transactions cost more to process. In addition, operations cost figures for GGB may include systems maintenance costs.

- This effect is not displayed by BATA, even though their ETC penetration rate is low, because their operating cost to revenue ratio is also low.

- With CTRMA, the opposite effect occurs. Their relatively high ratio of costs to revenue is de-emphasized here by their high (estimated) transaction count. This effect can be credited, at least in part, to their high rate of ETC transactions, which cost relatively less than cash transactions. This further illustrates the impact of ETC on toll operations costs.

- WSDOT's cost per transaction appears higher than most of the others, with the exception of GGB. This is partly due to the inclusion of start-up costs in the first year financial report, which are exaggerated in this calculation without the offsetting effect of revenue. These high start-up costs are a function of the high ETC penetration and popularity of the program, along with the variable priced contract that was in place with the vendor at the time. This contract was renegotiated into a fixed price contract in April 2008. The reduced costs reflected in this renegotiated contract are not fully reflected in the cost per transaction reported here, but should normalize after a full year of operation to better reflect the actual costs per transaction.

As a result of this inherent variability, cost per transaction is only a reliable indicator of toll operations efficiency if it is studied in the context of other measures, including ETC penetration and operations cost to revenue comparisons. Most important, though, is a good understanding of the operations functions included in the reported costs.

The cost per transaction in Figure 4 is shown in contrast to the median ETC and cash/video trip rates, illustrated by the two vertical bars for each agency. The median trip rate was used, rather than the average single-point toll rate, to provide a better indication of the typical cost of a trip either across the bridge through a single tolling point, or down a typical roadway segment with several tolling points. Rates for both ETC and cash were included to reflect agencies both with and without ETC discounts. The video rate was used in lieu of a cash rate for CTRMA, since they have added video and eliminated cash at the remaining plazas.

Although GGB reflects a trend similar to the other agencies, it is outside the typical range in every case, as it has been on every comparison so far. Consequently, it was not included in the following comparative analysis.

A clear trend is reflected when comparing each agency's cost per transaction to toll rates. All show a clear correlation between the cost per transaction as 18 to 25% of both the ETC and cash/video toll rate, with one exception – WSDOT's ETC rate. WSDOT's $0.86 estimated cost per transaction is 31% of the $2.75 discounted ETC rate. As reported above, this is a function of the high start-up costs associated with high ETC penetration and the previous variable priced contract with the vendor, which may skew this number.

E. Toll Collection Operating Cost Breakdown by Tolling Type

In evaluating cost per transaction for facilities that collect via both ETC and cash, it may also be helpful to consider the related breakdown of cost per transaction. This breakdown can indicate the relative efficiency of each collection method.

Comparison to other agencies at this level was not possible, as this level of cost detail is not typically reported within industry financial statements. Even if other agencies were willing to provide relevant information at that level of detail, the resulting comparison would be even more arbitrary than the single cost to collect number unless a detailed alignment of all costs using similar categorization and assumptions was developed. As such, this section does not include a breakdown of ETC and cash costs for the other agencies in the study. Although the level of information necessary to do a comprehensive analysis within WSDOT was not readily accessible, a general breakdown of WSDOT's costs across ETC and cash was provided by making a number of assumptions regarding the assignment of costs.

In order to establish the ETC / cash cost breakdown, the assumptions and generalizations listed in Figure 5 below were made to divide costs for all functions across collection methods. These include a fairly general assignment of overhead costs to appropriate categories in lieu of detailed tracking of specific tasks (e.g., logging and reporting on the subject of each customer support call), which would be too costly for the level of benefit to be achieved.

Function	ETC	Cash	Basis of Assumption
Labor			
Toll Collection	0%	100%	Dedicated to cash collection
Customer Service	90%	10%	Majority related to ETC, acct mgmt
Accounting	60%	40%	Based on revenue volumes
Maintenance	40%	60%	Based on number of lanes of each type
IT Support	50%	50%	Divided evenly across ETC and cash
Management	50%	50%	Divided evenly across ETC and cash
Misc Support	50%	50%	Divided evenly across ETC and cash
Expenses			
Facility (not including capital)	50%	50%	Divided evenly across ETC and cash
Facility Maintenance	40%	60%	Based on number of lanes of each type
Traffic Control	40%	60%	Based on number of lanes of each type
Printing	90%	10%	Majority related to ETC, acct mgmt
Audit	50%	50%	Divided evenly across ETC and cash
Excise Taxes	50%	50%	Divided evenly across ETC and cash
Other Expenses	50%	50%	Divided evenly across ETC and cash

Figure 5: Cost Breakdown Assumptions

The following costs are not included in this calculation:

- Capital costs to construct the TNB facility
- One-time transponder giveaway program costs used to build the initial TNB customer base
- Appropriated cost items outside the vendor contract, such as credit card fees, postage, and transponder procurements
- Costs related to violations processing and court handling beyond the image review and violation notice production, printing, and mailing costs included in the vendor contract
- SR 167 HOT Lane Pilot costs, which do not include cash toll collection
- WSDOT oversight costs, which would have to be divided across TNB and SR 167 facilities

Based on these assumptions, the estimated annual costs of WSDOT's future toll operation were assigned to ETC and/or cash collection categories. Monthly forecasted costs were included, both for clarification and as a double-check. The resulting totals, including contractor overhead and fees, were then divided by the estimated annual traffic assigned to ETC (70%) or cash (30%), based on historical data. For clarity, forecasted video toll / violation volumes are not broken out, but left within each category.

It is important to note that the following calculations assume a combined ETC and cash operation similar to TNB. These transaction costs will be significantly different for an ETC-only or cash-only operation, since economies of scale would not be realized. The addition of video tolling, changes to the violations process, and other modifications will result in further revision to these numbers. As a result, the estimated costs per transaction indicated below should be considered for the illustrative purposes of this example, not to be applied to future toll implementations with different configurations and impacts.

This calculation is illustrated in Figure 6 below:

	Total	ETC	Cash
Total Labor	$4,725,357	$2,091,935	$2,633,422
Total Expenses	$1,425,400	$730,080	$695,320
Total Fee	$922,614	$423,302	$499,311
Annual Cost Total	$7,073,370	$3,245,317	$3,828,053
Monthly Cost Total	$589,448	$270,443	$319,004
Estimated Annual Traffic	14,270,720	9,989,504	4,281,216
Extended Cost / Transaction	$0.50	**$0.32**	**$0.89**

Figure 6: ETC / Cash Percentage Breakdown

F. Number of Customer Accounts per Customer Service Staff

A measure sometimes used for back office operations is the ratio of customer accounts to back office staff. This measure indicates the customer load handled by each staff member, and can indicate when a back office or customer service center is over- or under-staffed.

Only three of the agencies surveyed maintain their own back office, as indicated in Figure 7 below.

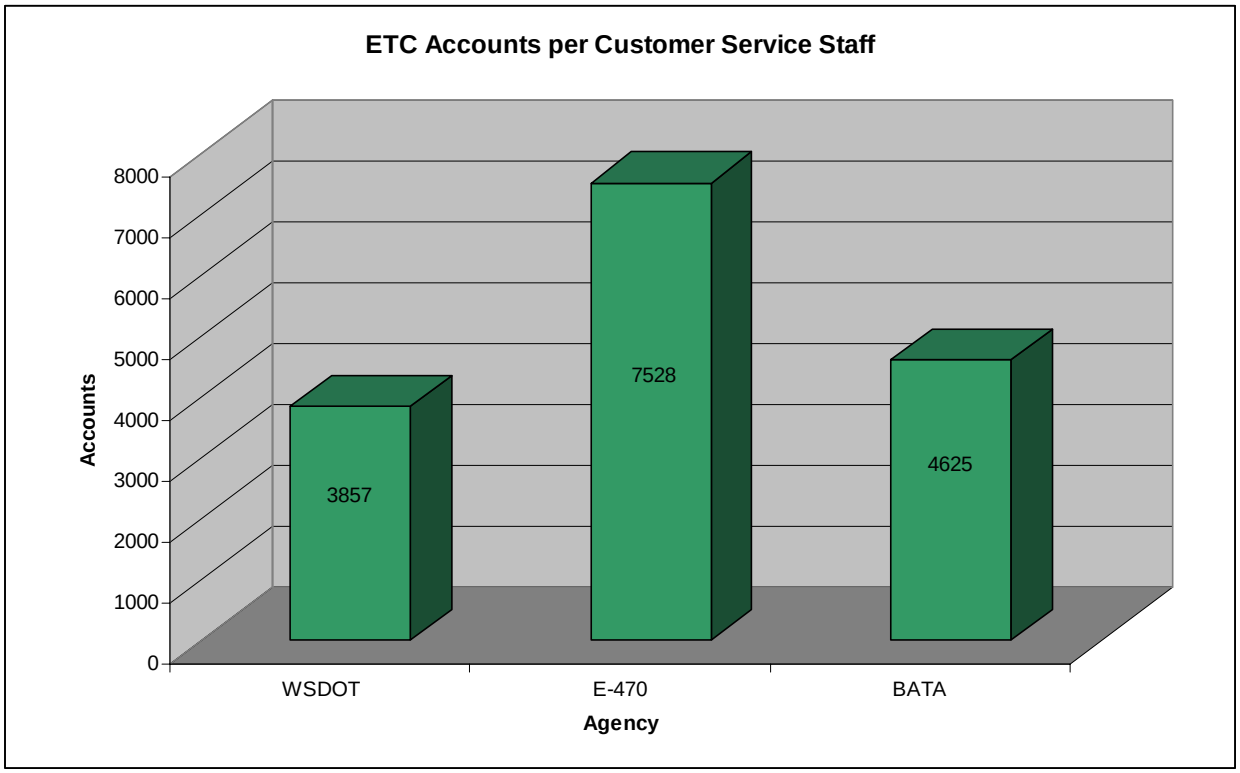

Figure 7: ETC Accounts per CS Staff

Like other measures, the consistency of this item across agencies depends on the business functions supported by staff included in the count. For example, one agency's back office staffing count may include IT systems administration or support personnel, while another agency's may not. In addition, the number of accounts may include different types of accounts (e.g., ETC, non-revenue, video tolling, and/or violation accounts), depending on the system in use.

Based on the ratios shown in Figure 7 WSDOT's existing contracted back office staff is supporting less accounts per person than the other two agencies. Follow-up should be done, however, to be sure that the same functions and account types were included in the basis of these calculations.

G. Division of Agency vs. Contracted Staff

An examination of back office staff ratios may indicate the health of the staffing within the back office. But, it is also important that adequate agency staffing is available to oversee the contract and direct the efforts of the contractor.

Figure 8 below reflects the contractor-to-agency ratios reflected by the data collected for this study. As always, the consistency of the numbers used to calculate these ratios drive the consistency of the results.

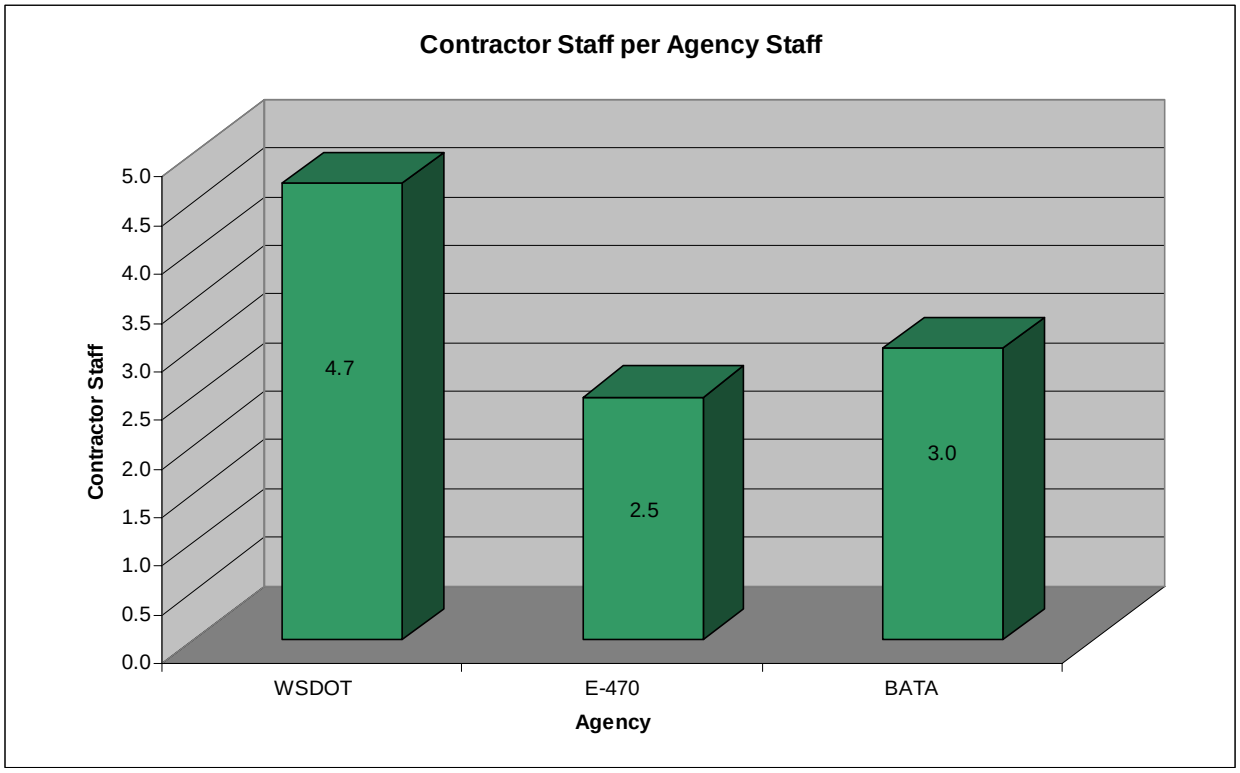

Figure 8: Contractor Staff per Agency Staff

Based on the graph shown in Figure 8, WSDOT toll operations staff are managing more contractor personnel per agency staff member than the other agencies. While follow-up should be done to ensure the consistency of the functions represented by these staffing counts, it is important to note that WSDOT's ratio of agency to contractor staff is considerably higher than that of the other two agencies, nearly double E-470's.

This could indicate that WSDOT's Toll Operations staff, who oversee the contracted TransCore plaza/lane and back office personnel, contracts, and operational functions, are lacking the resources they need to do an effective job. This is reinforced by general analysis of Toll Operations staff duties, which appear to include some back office operational tasks in addition to their contractor oversight functions, their standard agency functions, participation in the planning and development of the ongoing tolls program, and the considerable time they spend working with the Transportation Commission and Citizens' Advisory Committee for toll rate-setting purposes.

If this is the case, it could be the result of budget cuts and agency staffing reductions undertaken in the last year, combined with the renegotiation of the TransCore contract and the build-up of contractor staff to support TNB and SR 167 operations. Regardless of the cause, however, it is important to ensure that agency resources are adequate to oversee the operational and systems contracts necessary for plaza / lane toll operations and back office support functions. Otherwise, contractor performance may not meet requirements, impacting both the agency and the public. This will be increasingly critical as WSDOT's toll program expands to other facilities, the required back office and customer service support are undertaken by a new contractor, and the current back office functionality is transitioned into the new back office.

V. Toll Operations Cost Management

As each toll agency attempts to better manage their ongoing operations costs, a variety of cost management tools and techniques have been developed. The following sections will overview some of the methods reported by surveyed agencies.

A. Cost Reporting Benchmarks

One of the mandates of the Governor's veto message was the establishment of benchmarks for reporting toll operations costs. Based on discussions with surveyed agencies, these benchmarks fall into two categories: operations performance measures used to evaluate the effectiveness of the operations contractor or in-house staff, and higher-level reporting benchmarks used to report up to agency management.

1. Operations Performance Measures

Most toll agencies currently in operation, particularly those contracting out their operations, have developed a list of operational performance measures. This is especially true of agencies that contract out their toll collection and/or back office functions, as these performance measures may impact contractor payments.

E-470, for example, uses a standard list of performance measures updated and reviewed every two weeks. Most measures are consistently monitored on an ongoing basis. Some special-focus measures may be phased out, adjusted, or replaced as other areas of concern are recognized. The agency's work teams strive to attain these goals during each bi-weekly reporting period. Work teams that meet or exceed their goals or stretch goals earn a merit compensation bonus for that period.

The current E-470 performance report includes worksheets focusing on the following areas:

- Operations Maintenance AVI Status. The uptime percentage of AVI equipment of each area of the road. Each technician has a responsibility to attain their goals during each bi-weekly pay period.

- Image Reject Status. The current goal is to reduce the rejected violation image count each successive pay period until new cameras are installed.

- Human Resources Metrics. Designed to measure effectiveness of the contractor's human resources efforts. In particular, these metrics will be used to manage the change in workforce during the transition to Cashless Tolling beginning on January 1, 2009.

- Customer Service Center, Communications Center and State Farm Safety Patrol. These metrics indicate the efficiency and effectiveness of these customer functions, including response times, talk times, mystery audit passing rates, logging accuracy, and attendance rates. Pay-period goals are defined for each work group.

- Operations Performance Criteria. Specific performance metrics for mainline toll plaza staffs, including transaction times, money handling, images reviewed, image backup rates, and cost per transaction.

- Balanced Scorecard. A summary-level compilation of all contractor work area accomplishments. This approach aligns with E-470's implementation of Lean / Six Sigma techniques, discussed in a following section. Statistics are also graphed to watch for trends.

To this same end, WSDOT's contract with TransCore, the current operations vendor for TNB and the *Good to Go!* back office, includes required measures for both systems and operations. These measures are comparable to those in use by many toll agencies.

WSDOT toll operations staff monitors these metrics on a monthly basis, using reports delivered by the contractor and supplemented by ad hoc data collection as needed. Where applicable, damages may be applied to contractor payments when required measures are not met.

2. Oversight Reporting Benchmarks

The Governor's veto message with regard to Section 206(6) particularly focused on the development of reporting benchmarks for WSDOT's toll operation. In support of that objective, surveyed agencies were requested to provide information regarding their management reporting practices.

General observation of the toll industry in this regard indicates that few agencies consistently monitor and report key indicators to their management. The few who do report up tend not to capture and maintain full documentation of their measures, with very few exceptions. This is true for a variety of reasons that have nothing to do with hiding anything. In fact, it is more typical that continually understaffed agencies must focus first on keeping the program operational, reporting to management only as requested for specific purposes that vary from one occasion to the next.

E-470 is one of the few that consistently capture, document, and deliver information to agency management on a regularly scheduled basis. They provide an updated version of their detailed contractor performance measures, referenced above, to their management every two weeks. The results are discussed in a management meeting bi-weekly, including actions planned to alleviate any observed shortcomings.

Neither CTRMA nor BATA report any particular performance measures regularly to their oversight boards, except as requested. Board reporting instead focuses on forward-focused planning, development, and contracting approvals, as well as specific areas of concern at any given time.

WSDOT does not currently report any particular measures up to management on a regular basis. Because WSDOT is a start-up agency with only a short performance history and a growing slate of facilities under development, oversight reporting tends to focus more on forward planning and development and related issues. This report will assist WSDOT in identifying key measures to report up on a regular basis, to establish a foundation for ongoing performance monitoring at a high level.

3. Benchmark Recommendations

Several benchmarks should be employed by WSDOT for management reporting and monitoring over time:

- ETC Penetration Rate: This measure is a good reflection of the number of drivers making use of the agency's ETC program. Simple numbers, like the number of customer accounts and the number of transponders issued, may reflect the program's success to a point, but this measure indicates whether drivers are actually using their transponders. Taken further, this also reflects how well the agency is convincing customers to use ETC, which is the most cost-effective method of toll collection.

  WSDOT's initial high ETC market penetration for the *Good to Go!* transponder program should not be taken for granted. As new facilities are added to the program, transaction volumes will increase. These increases may be dramatic, in the case of commuter facilities like the SR 520 Bridge implementation, I-405 Express Lanes, and others. The increase in transaction volumes will dilute this calculation, resulting in an overall drop in ETC penetration across the program. This potential drop should be monitored and managed proactively through the use of location-specific public education and transponder distribution efforts. This will ensure that the highest percentage of customers possible continue to use ETC.

- Cost to Collect Tolls, reported as Operating Costs as a Percentage of Toll Revenue and Operating Cost per Toll Transaction: Both are good overall program measures, and although they will reflect similar impacts, the different perspectives of each will be of value. It will be important to monitor these benchmarks over time, based on consistent revenue and cost function reporting.

  The first measure directly reflects the amount of toll income being spent to collect tolls, while the second is a more abstract, but similar, calculation often used in the toll industry. Efforts to improve operational efficiency should result in both of these measures dropping, if they are successful. Conversely, the implementation of a new project, a toll increase, addition of a new method of tolling, system modifications affecting business processes, new business policies causing systems inefficiencies, changes in marketing strategy, and a variety of other factors can impact these numbers. Consistent monitoring over time will allow WSDOT to mature their processes to the point that they can interpret, forecast, and potentially prevent these impacts before they occur.

  Where necessary for increased focused, either or both of the above can be broken down by including specific functions in the operating cost calculation. For example, if systems maintenance costs are a concern, Systems Maintenance Costs as a Percentage of Toll Revenue can be calculated and monitored over time. This is more effective than just a review of systems maintenance costs over time, as it puts them in context of the revenue actually earned. This breakdown technique takes monitoring down a level without resorting to detailed measures like systems availability percentages, the percent of calls answered within XX seconds, the time to clear a roadway incident, or other detailed performance metrics.

- Customer Satisfaction Level, based upon regular, voluntary customer surveys. The above points are quantifiable measures of program success, but it is important to ensure that the quality of WSDOT's operation is just as good. The vendor should be required to provide multiple mechanisms for customers to provide their feedback. Customer surveys should be simple and high-level, without attempting to get into too much detail – customer reactions should reflect their emotional response to the level of service they are receiving, to be balanced against quantifiable measures for the full picture.

All of the measures above should be monitored consistently over time, comparing WSDOT's performance to itself, rather than to other agencies. Since each agency may operate and report differently, the comparison of these measures will not be useful without significant additional effort to break down and "normalize" the reported details prior to calculating the results. However, when tracked over time for a single agency based on consistent surveys and reporting, the impacts of a variety of events will become identifiable. These impacts can then be used in performance monitoring and corrective actions, as well as proactive forecasting and decision support for future program additions and changes.

B. Cost Control / Reduction Incentives

The second mandate associated with the Governor's veto message was the development of incentives to reduce toll operating costs. These may fall into three categories:

- Customer incentives: Programs or initiatives that will motivate customers to use the most cost-effective means of paying their tolls.

- Contractor incentives: Contract or internal initiatives that will motivate the operations contractor to improve the cost-effectiveness of their operation.

- Agency incentives: Internal agency initiatives that will improve the cost-efficiency of the agency's operations-supporting business practices.

1. Customer Incentives

Customer incentives noted by the surveyed agencies include:

- Programs aimed at increasing ETC Penetration

  The most often-stated customer incentives are those aimed at increasing ETC penetration, which in this case is defined as the percentage of transactions paid using ETC. Since ETC is generally the easiest and most cost-effective means of paying a toll, converting customers to ETC would not appear to be a hard sell. Nonetheless, a consistent percentage of customers continue to pay cash and/or violate, rather than set up and fund an ETC account and put a transponder on their vehicle. Consequently, agency efforts to convert customers to ETC should be ongoing.

  This is important because ETC is also the most cost-effective method of collecting a toll, saving the agency money as ETC penetration increases. For example, the theoretical

scenario defined by Figure 9 below reflects the relationship between ETC penetration and operations costs.

	Transaction Volume	Variables			Total	% Chg
		Type	ETC	Cash		
Current Estimated Monthly	1,000,000	Penetration	**75%**	25%	$462,500	n/a
		Txn Volume	750,000	250,000		
		Cost / Txn	$0.32	$0.89		
		Cost	$240,000	$222,500		
		Toll Rate	$2.75	$4.00		
		Gross Rev	$2,062,500	$1,000,000	$3,062,500	
		Net Revenue	$1,822,500	$777,500	$2,600,000	
Estimated 5% ETC Increase	1,000,000	Penetration	**80%**	20%	$434,000	**-6.2%**
		Txn Volume	800,000	200,000		
		Cost / Txn	$0.32	$0.89		
		Cost	$256,000	$178,000		
		Toll Rate	$2.75	$4.00		
		Gross Rev	$2,200,000	$800,000	$3,000,000	**-2.0%**
		Net Revenue	$1,944,000	$622,000	$2,566,000	**-1.3%**
Estimated 5% ETC Increase	1,000,000	Penetration	**85%**	15%	$405,500	**-6.6%**
		Txn Volume	850,000	150,000		
		Cost / Txn	$0.32	$0.89		
		Cost	$272,000	$133,500		
		Toll Rate	$2.75	$4.00		
		Gross Rev	$2,337,500	$600,000	$2,937,500	**-2.1%**
		Net Revenue	$2,065,500	$466,500	$2,532,000	**-1.3%**

Figure 9: ETC Penetration Impact Example

In the example above, ETC penetration is increased in 5% increments to illustrate the potential impact on total operations costs. Note that although the general numbers used here are similar to WSDOT's program numbers, this is a high-level example not intended to forecast WSDOT program results.

This example is oversimplified because it isolates operations costs, not taking into consideration other potential impacts of increased ETC penetration. For example, the ETC cost per transaction should decrease somewhat as the volume of ETC transactions increases, due to economies of scale. A full financial model would be required to estimate the entire effect of ETC penetration increases, but this example does reflect the potential reduction in operations costs as transactions move from cash to ETC.

The relationship between toll revenue and operations costs is also impacted by increased ETC penetration. Because the TNB ETC rate is over 30% lower than the cash rate, increases in ETC transactions without volume or rate increases would actually result in less revenue generated. This loss would be offset by either a considerable increase in transaction volumes or an increase to the ETC toll rate. A situation-specific

financial model would more accurately forecast the potential impacts of ETC penetration increases and other changes.

This is an important distinction to make as WSDOT's tolling program expands into highly-populated areas. Putting additional effort into the expansion of ETC on the TNB would clearly not be worth the additional cost, since it would actually result in decreased revenue. However, Figure 10 below shows the impact of the same model with a simultaneous doubling of transaction volumes.

	Transaction Volume	Variables			Total	% Chg
		Type	ETC	Cash		
Current Estimated Monthly	1,000,000	Penetration	**75%**	25%	$462,500	n/a
		Txn Volume	750,000	250,000		
		Cost / Txn	$0.32	$0.89		
		Cost	$240,000	$222,500		
		Toll Rate	$2.75	$4.00		
		Gross Rev	$2,062,500	$1,000,000	$3,062,500	
		Net Revenue	$1,822,500	$777,500	$2,600,000	
Estimated 5% ETC Increase	**2,000,000**	Penetration	**80%**	20%	$868,000	**87.7%**
		Txn Volume	1,600,000	400,000		
		Cost / Txn	$0.32	$0.89		
		Cost	$512,000	$356,000		
		Toll Rate	$2.75	$4.00		
		Gross Rev	$4,400,000	$1,600,000	$6,000,000	**95.9%**
		Net Revenue	$3,888,000	$1,244,000	$5,132,000	**97.4%**

Figure 10: ETC plus Volume Increase Example

An increase in ETC penetration of 80%, combined with a 100% increase in total transaction volume, has a very different impact on the overall operations cost and revenue. Although operations costs would also increase to nearly double, in line with the increased transaction volumes, net revenue is also increased by nearly 98%. This example better indicates what would happen if ETC penetration was increased as new WSDOT facilities, such as SR 520, come on-line and substantially increase transaction volumes.

Rather than just focusing on increasing ETC penetration across the program as facilities are added, WSDOT will need to also focus on avoiding "dilution" of the program ETC penetration rates. For example, if a new facility is added to the program but the ETC customer base is not carefully built up, the lower penetration rate on the new facility could drag down the overall ETC rate for the program, creating a situation where current facilities subsidize the costs of new facilities for some period of time, and potentially costing WSDOT revenue overall.

A variety of mechanisms exist for building ETC participation, including the following examples cited by surveyed agencies:

- Public outreach and education programs – Although additional ETC-related public education aimed at the TNB customer base would probably not benefit WSDOT, such programs will be critical to preventing overall ETC dilution as each new facility is added to the tolls program. Such programs typically include special events (e.g., ball game giveaways, festival booths, etc.), print, radio, and tv advertisements, mail inserts for targeted audiences, billboards, and other methods of bringing each new customer base to an appropriate level of comfort with the new technology.

- Transponder giveaways – Many agencies, particularly those using the cheaper sticker tag, have decided that the potential increase in customer base was worth the cost of giving away transponders for a limited time. Any marketing study related to a new facility should include consideration of giveaway options, to determine whether the potential benefit is greater than the cost.

- Geometric or operational changes in the lane / plaza – Some agencies have determined that rearranging plaza lanes or realigning approach lanes to make ETC lanes more accessible has resulted in increased use of those lanes. Since ETC increases are not needed on the TNB facility and the general layout of the TNB plaza is straightforward, this is not necessarily an option that WSDOT should pursue there. And, because other facilities will be new, optimization of ETC lane access can be taken into account during design.

- Improvements to the customer service operation (e.g., more functions available on the web) – Agencies have reported that making it easier for customers to sign up for ETC by phone or on the web has resulted in a noticeable increase in participation. In addition, increasing benefits associated with ETC participation and web account management, such as access to transaction and account data not provided to other account types, partnership with other businesses in discount programs, and similar "registered customer" benefits, as well as making the public aware of those benefits, has also increased ETC participation.

- ETC Conversion Programs - Conversion programs, also known by some agencies as "Sinners to Saints" programs, are in use by many agencies across the toll industry. The basis of a conversion program is providing proactive opportunities for cash customers, video toll customers, and violators to convert to ETC, which is cheaper for the agency to collect and should also be more convenient for the customer. Incentives should be provided where possible to promote conversion.

  For example, waiving video toll or violation fees and reducing toll amounts to the ETC rate if the video toll customer or violator opened and funded a new ETC account would act as incentives. As a result, a former violator who was costing the agency time and money might become a good customer. This opportunity should be extended at every possible point throughout the process.

  Secondary benefits of conversion programs include a potential reduction in "accidental" violators taken to court, and a viable means of converting even habitual violators to ETC. Since the non-habitual violator would have the option of paying their tolls after the fact without court action and related severe penalties, complaints

in this area should decrease. In advance of the current court prosecution steps, "deals" might also be struck with habitual violators that would remove them from the growing violator lists and earn the agency some portion of the tolls and fees that they might not otherwise have collected at all. This is not to say that violators should not be penalized and prosecuted to the fullest extent of the law, but this approach narrows down that prosecution to those that willfully ignore all opportunities to avoid it.

- Cash-Payer Conversions and Surveys – Offering cash-paying drivers the option of converting to ETC and/or completing a brief questionnaire or survey handed to them at the toll booth has also been shown to increase awareness of the ETC program. It is well known that a certain percentage of the driving public will continue to resist the idea of having a transponder mounted on their vehicle. However, if cash-payer surveys can assist the agency in identifying the reasons for that resistance, perhaps some portion of it can be overcome.

- Credit Card Fee Management:

  In order to drive down costs related to credit card processing, E-470 and their contractor put extra effort into identifying accounts with frequent replenishments. These customers are then contacted, with the goal of increasing their replenishment amount and cutting the number and frequency of replenishments required. Since E-470 already requires a minimum $35 replenishment to get the most impact for their credit card fees, this effort tends to target those who have remained at the minimum $35 replenishment level, but whose credit cards are being hit more often than monthly due to frequent toll facility use.

  WSDOT is pursuing a similar incentive, by having the system identify customers with frequent replenishment and re-balance their replenishment amount to equal approximately one month's average toll usage. This method is commonly used by other toll agencies, as well. Since credit card fees can amount to 2 to 4% of total credit card transactions processed, the impact of this effort can be significant.

  In WSDOT's case, because credit card fees are paid from appropriated funds rather than toll revenue, they directly impact the agency's toll operations budget, taking a larger percentage of the static budget whenever customer credit card use increases. Because credit card payment is a more efficient means of payment than cash or check, this negative impact to the agency's operations budget is counterproductive.

- Other Operational Improvements

  WSDOT has pursued a variety of less visible improvements that reduce operating costs, including closing accounts with negative balances, moving to quarterly mailed statements with fees in place of free monthly mailed statements, and moving more customer functions to the web.

2. Contractor Incentives

Overall, contractor incentives tend to revolve around performance-based contracting. Under this method, contractors are charged with producing a defined result, and measurable and

achievable metrics are used to monitor their success. This is different than a contract that pays a contractor for their hours worked or deliverables produced, regardless of the quality. Most toll agency contracts now focus on performance metrics.

Other contractor incentives include:

- E-470's Lean / Six Sigma Implementation

  In the interest of improving their overall agency performance, E-470 incorporated Lean / Six Sigma concepts in 2005. Lean / Six Sigma concepts were originally developed in support of manufacturing processes, but were extended into service industries several years ago, and are now commonly accepted in customer service industry practice.

  Lean / Six Sigma focuses on business process improvements from a detailed step level. It includes definition of customer value, removal of waste, and maximizing process flow efficiency. Metrics include quality, cost, delivery, safety, and morale, among others.

  E-470 underwent an extensive effort to build these concepts into their every-day operation, involving contractor and agency personnel. Staff from first-line managers up have been trained to use the tools, which revolve around process time and a balanced scorecard approach. As a result, E-470's Black and Green Belt Trained leaders have reduced toll operations-related costs by 18% since 2005.

  Although it is unclear at this point whether such an effort would benefit WSDOT, expansion of the toll program and incorporation of additional procedures and performance measures might benefit from consideration of Lean / Six Sigma principles. This is particularly true when evaluating new vendors for the statewide program.

- E-470 Performance Measures

  Through consistent monitoring of operational performance measures as described earlier in this paper, E-470 and their operations contractor, Mile High Toll Services, have improved in a variety of areas. For example, they have driven down staffing costs, expanded revenue returns based on image review, improved camera performance, and in general, become more efficient. Their measures go hand-in-hand with their Lean / Six Sigma approach, as described above.

3. Agency Incentives

Key agency incentives mentioned by surveyed agencies include the following:

- "Cashless" tolling - The most frequently mentioned agency initiative mentioned is the elimination of operations costs associated with cash toll collection. For example:

  - Based on observation of other agency conversions to / implementation of cashless tolling, E-470 determined that they could best serve the driving public and manage their operations cost by getting rid of the toll booths and manual collection. This is the basis of their "Cashless Tolling" project, which began January 1, 2009. In order to provide an option for customers without transponders, they are incorporating

"License Plate Tolling" based on license plate images and invoicing. Their cashless conversion will be complete by July 1, 2009.

- Similar to E-470, CTRMA reached the conclusion that their operations and their customer service would be improved through the use of cashless tolling. They have already deployed Pay-By-Mail image-based tolling in May 2008, and completed their conversion to cashless tolling December 1, 2008.

- BATA has not chosen to pursue cashless tolling at this point, but is investigating the addition of video or image-based tolling. Although this move might not immediately reduce toll collection operations costs, it is expected to reduce congestion, improve safety, move current violators closer to electronic tolling, and eventually shift cash customers to more electronic methods of tolling and away from cash.

- A variety of other toll agencies around the U.S. are also pursuing or studying various forms of cashless or all-electronic tolling, including TxDOT, CTRMA, and NTTA in Texas, NCTA in North Carolina, and several IAG agencies in the northeast. Most, if not all, are making use of license plate / video tolling as a supplement to ETC, since the cash option is being eliminated.

- WSDOT is also planning to incorporate video tolling into the SR 520 bridge project, since bridge geometry is not likely to support development of cash toll plazas. This effort is expected to result in a safe and efficient toll facility, with high throughput levels that will minimize potential congestion. In addition, video tolling will provide for environmental justice considerations that have typically been addressed by the availability of cash tolling in the past.

  If video tolling is incorporated along with SR 520, consideration should be given to adding it to the TNB operation, as well. More detailed financial modeling should be performed to estimate the specific impacts of such a change to the existing TNB operation, as opposed to operating TNB and SR 520 using different procedures. Consistency from the customer perspective is important to ensure acceptance.

- Alignment of toll operating expenses with toll revenue - The handling of operational costs and revenue is the topic of frequent conversation among agencies. For example, an authority dedicated specifically to tolling is typically self-funded, with toll revenues (following debt service) channeled back into the operations budget to cover expenses. With state agencies, it is far more common to see toll program operational expenses funded out of the agency's appropriated budget, separate from toll revenues, which may be channeled into supporting the overall agency budget and/or other business areas. This creates a conflict that limits the ability of the tolling organization to grow and be successful.

  State agencies, especially departments of transportation, do not typically include business functions that operate on a retail-like model. For instance, a grocery store pays for the cost to manage inventory and staffing, leakage due to shoplifting and spoilage, and revenue collection work efforts directly from its profits. A transportation agency,

however, usually builds things like highways using appropriated state tax funding, and does not receive revenue from those highways. Consequently, transportation agencies don't tend to manage in the same manner as a revenue-producing business.

In agencies where the toll operation is not clearly self-funding, it is too easy for agency managers and legislators to look at toll revenue as an independent source of income for the state, while attempting to minimize the level of funding necessary to collect and manage those revenues. As a result, operational efficiency may be undermined by lack of funding and support because operations costs naturally increase in proportion to revenue generated, although at a lower rate of increase if the operation is successful.

It is this effect that has driven some states to establish their tolling program as a separate "agency" or "enterprise", independent of the state transportation agency. In many cases, concerns over the ability of the agency to fund toll operations directly from revenue earned has lead to complete separation.

A second concern driving this type of separation is the difficulty of managing a dynamic, customer-driven toll operation under a two-year biennial budgeting cycle, as is typically used for state government. The impact of each operational change on customer and program dynamics can drive operations costs and revenue in directions not easily predicted in two-year increments, particularly with startup facilities.

To be very specific, toll revenues should be directed first to required debt servicing, second to adequately fund toll operations and related expenses using a more dynamic budgeting and funding model than the two-year state budgeting cycle, and lastly to other agency initiatives.

VI. Recommendations

Although each agency has its own focus and specific concerns, overall cost control and reduction is an overarching theme across the industry. This is true because of the current economic climate, but more than that, it is necessary because tolling is a business. The operation of a business requires constant monitoring and improvement to remain effective, competitive, and beneficial to the customer.

To that end, it is proposed that the State of Washington consider implementation of the following recommendations:

1) Maintain and build ETC penetration as the State's toll program expands.

a. Fund and implement a substantial public outreach and education campaign to prevent the dilution of WSDOT's ETC penetration rates as more toll facilities are added. This effort should include targeted activities in the area of each new toll facility, focused on building up ETC participation in the potential customer base for that facility. Special promotional events, tv, radio, and print promotions, community involvement, specific customer incentives like giveaways and "registered customer" benefits, targeted mailings and inserts, and toll plaza handouts should be considered for inclusion.

   Funding will be required specifically for public outreach to support this objective. In particular, the funding of transponder giveaways or discounts would require considerable budgetary consideration under the current appropriated funding model, to avoid negatively impacting the toll operation itself.

b. Implement an ETC Conversion program to provide opportunities for conversion of violators, video tolling customers, and cash paying customers to ETC. This program should include easy online and phone account setup or conversion, based on information included directly on video toll invoices, violation notices, and cash lane handouts. If toll rates are set so that they can be used as incentives, drawing attention to the amount of money each type of driver could be saving serves as an effective incentive in itself.

   Such a program might also require revision of WSDOT's current violations process to include steps prior to issuance of the violation citation by WSP. Because current legislation outlines this process in some detail, revisions to statute would likely be required to enable a revised violations process.

c. Deploy cashless toll collection using ETC plus video tolling. Pursue goals related to maintaining and increasing the ETC penetration rate across the program, relieving congestion, and compensating for environment justice issues caused by cash elimination.

   In line with the previous recommendation (1b), the conversion to all-electronic tolling should include revisions to WSDOT's existing violations process. Preliminary steps should include video toll invoicing, collections, and possibly an

in-house administrative hearing process either prior to or instead of issuance of a violation citation, followed by appropriate court action. All of the above will provide WSDOT with better control over the revenue outstanding after cash and ETC payments are processed. These interim steps will also support implementation of an ETC conversion program, as described earlier.

2) Make optimal use of contracts and contractor staffing wherever possible.

a. Move as many functions as possible to the contractor, while still maintaining agency checks and balances.

b. Require the contractor to manage all facets of the program in accordance with a well-defined set of performance measures monitored by WSDOT.

c. Improve ratios of Agency to Contractor staff and Contractor staff to Customer Accounts through direct attention to these areas during the new statewide back office procurement.

d. Pursue performance-based contracting. Collect performance measures and identify "best practices" from around the industry for use in the WSDOT operation.

e. Monitor performance measures and apply consequences consistently.

3) Capture and report on the recommended benchmarks consistently over time, as indicators of ETC program success and resulting cost control.

a. Include, at a minimum:
   i. ETC Penetration Rate, by overall program and individual facility
   ii. Cost to Collect Tolls as a Percentage of Toll Revenue
   iii. Cost to Collect Tolls as an Operations Cost per Transaction
   iv. Customer Satisfaction Level

b. Monitor benchmark trends to learn impacts of program changes and mature the tolls organization. Use this information to proactively predict the effect of program changes on the operation and make adjustments that will prevent unwanted impacts.

   Specifically observe and document positive and negative impacts of both planned and unplanned changes to the program to all areas of the operation and supporting systems. Although this sounds obvious, documenting impacts is one of the most frequently disregarded areas of operation. As a result, the information is not available when similar changes are planned, and lessons that could have been learned the first time are repeated.

c. Report this information up to WSDOT management and other impacted organizations on a regularly scheduled basis. This establishes a basis for consistent and proactive management.

d. Support WSDOT with adequate resources to effectively capture, monitor, and report on performance-related information, in addition to their agency and contractor oversight duties. Underfunding of agency positions can significantly impact their effectiveness and increase "crisis management", preventing the agency from maturing in the management of its toll program.

4) Manage the State's toll program as a self-funding operation, with additional revenues, if any, channeled into other state functions only after the operation is adequately funded.

a. Remove items like transponder procurement and distribution costs and credit card fees from WSDOT's appropriated budget, to avoid penalizing the operation for success in promoting the most efficient payment methods - ETC and credit card use. Instead, fund items like these from toll revenues, so that higher levels of collected revenue fund a successful operation.

It is important to identify operational expenses that increase with the success of the program (e.g., transponder procurements) and ensure that these expenses are funded in a manner that does not limit success. As previously discussed, this effort benefits from a more dynamic budgeting and funding model than the typical state agency two-year budget cycle. Direct toll revenues first to debt servicing, second to adequately funding toll operations, and lastly to other agency initiatives.

5) Identify operational processes that can be improved at a detailed level to reduce and/or control costs. For example:

a. Encourage credit card use as a reliable method of customer payment, but manage credit card fees in direct proportion to their use.

b. Establish policies that prevent abuse of functions established for customer convenience. For example, impose a minimum amount limit on account replenishments over the web.

c. Encourage the use of ACH for customer account replenishments, to take advantage of the lower bank fees for this service.

d. Monitor and manage mailing costs by using electronic means of communication (e.g., website, email) whenever possible.

e. Encourage customer self-service by moving as many functions as practical to the website and the automated phone system.