



**Washington State
Department of Transportation**

WSDOT Statewide Tolls Program

Toll Operations Benchmarks and Incentives

January, 2009

Prepared for:
Washington State Department
of Transportation (WSDOT)

Prepared by:



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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!*TM 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.

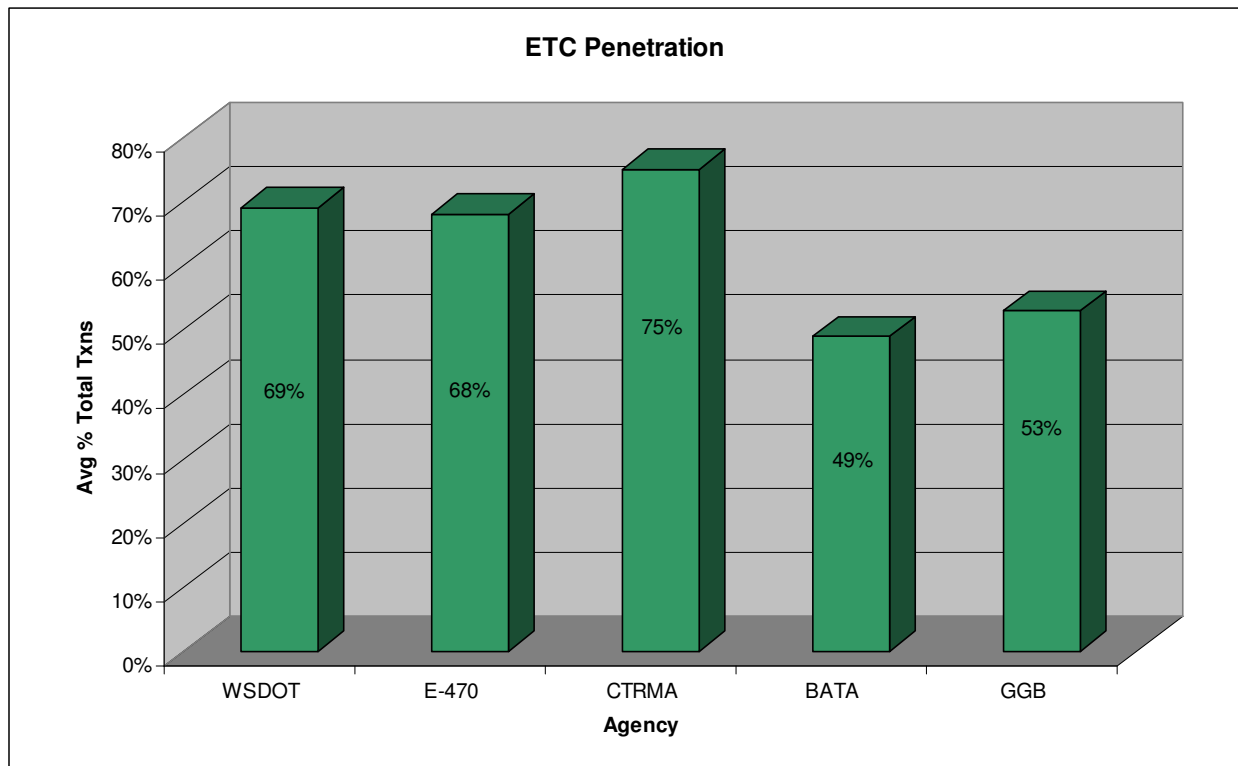


Figure 2: Percentage of ETC Transactions

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.

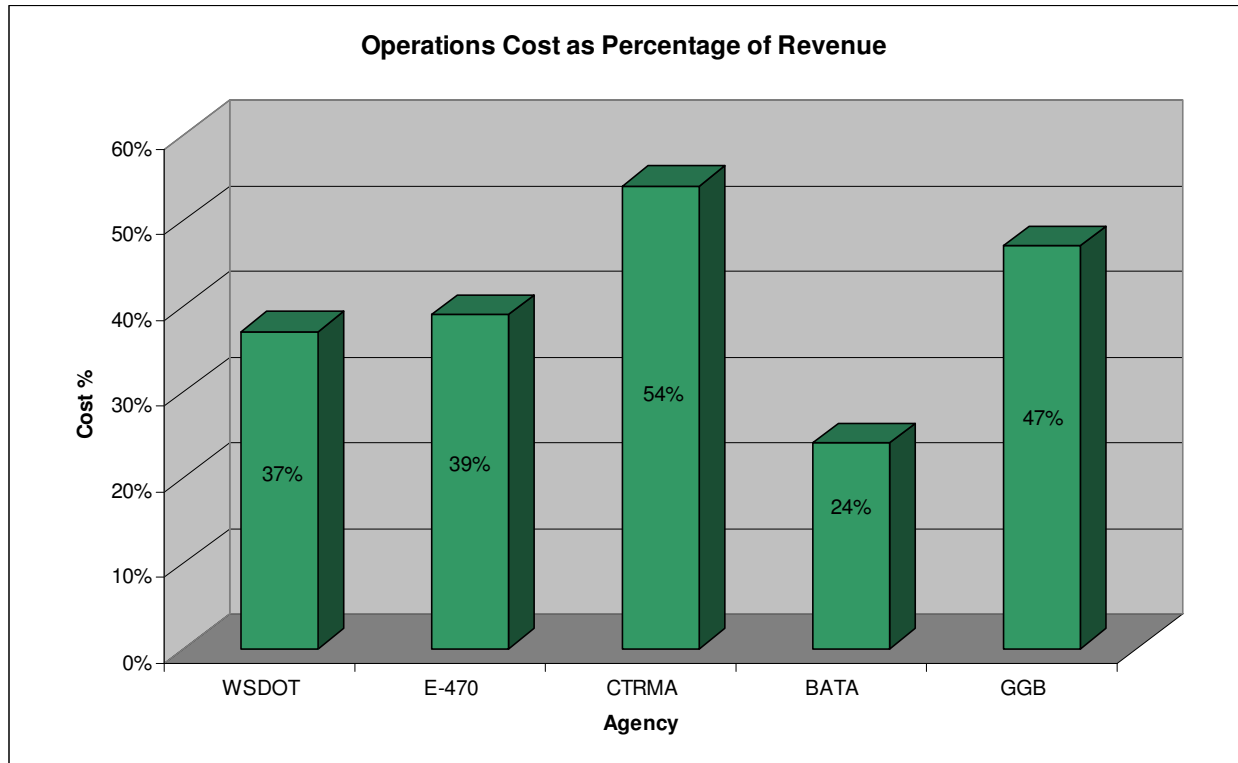


Figure 3: Toll Operating Costs as a Percentage of Revenue

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.

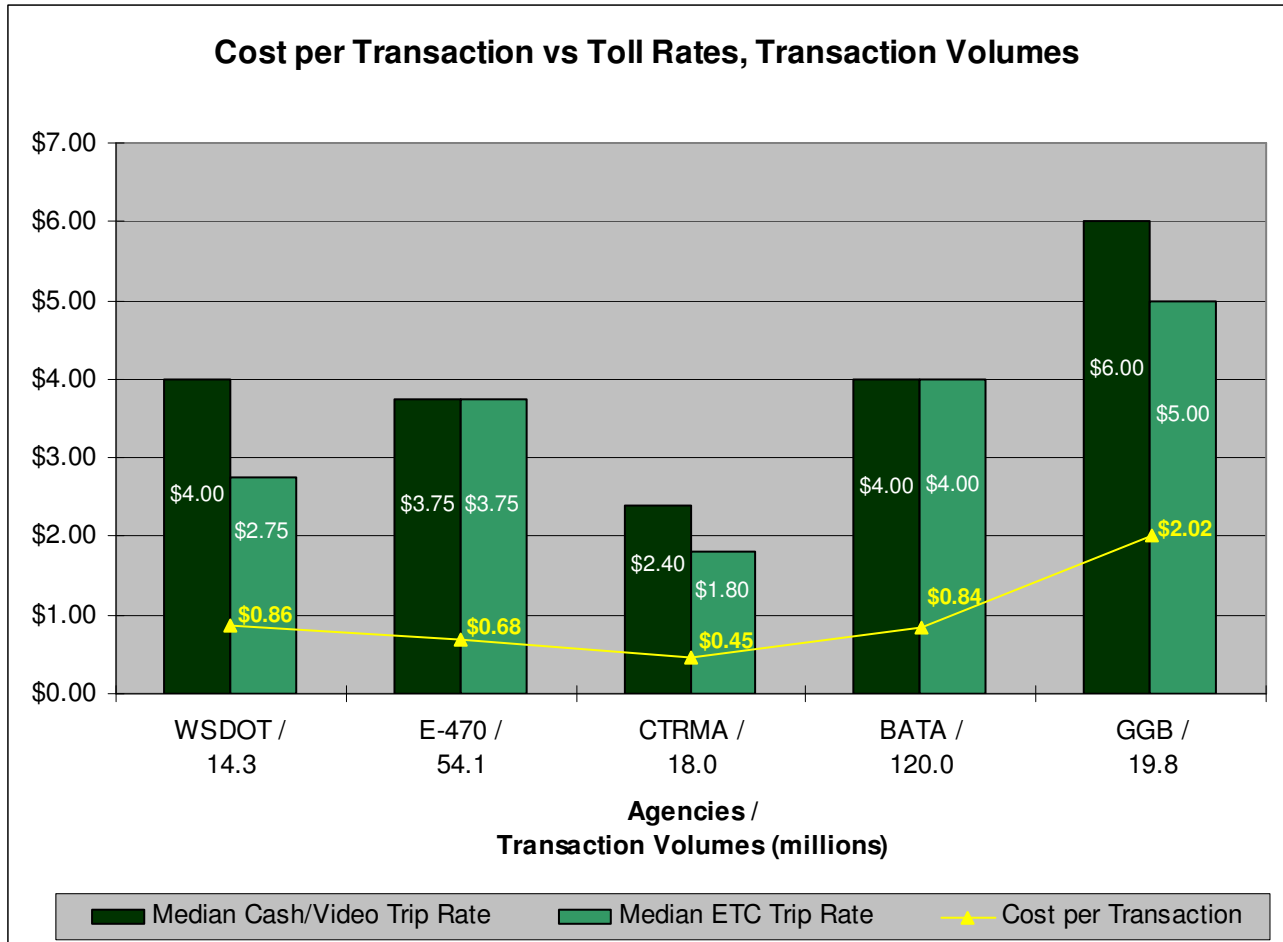


Figure 4: Operating Cost per Toll Transaction

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. Because this level of information was readily available within WSDOT, however, a general breakdown of WSDOT's costs across ETC and cash is provided.

In order to establish an ETC / cash cost breakdown, a variety of assumptions and generalizations must be made regarding the division of 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.

In WSDOT's case, the assumptions listed in Figure 5 below were used to develop this cost breakdown.

| <u>Function</u> | <u>ETC</u> | <u>Cash</u> | <u>Basis of Assumption</u> |
|----------------------------------|------------|-------------|---------------------------------------|
| 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.

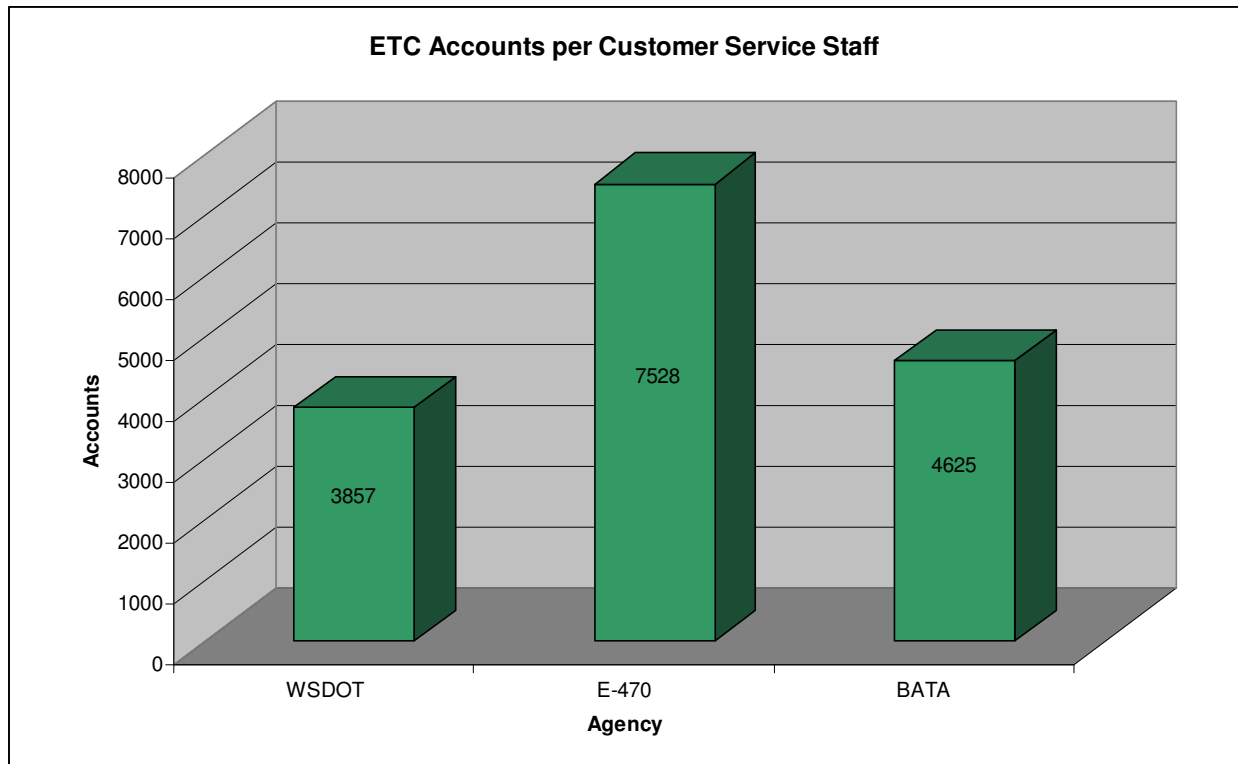


Figure 7: ETC Accounts per CS Staff

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.

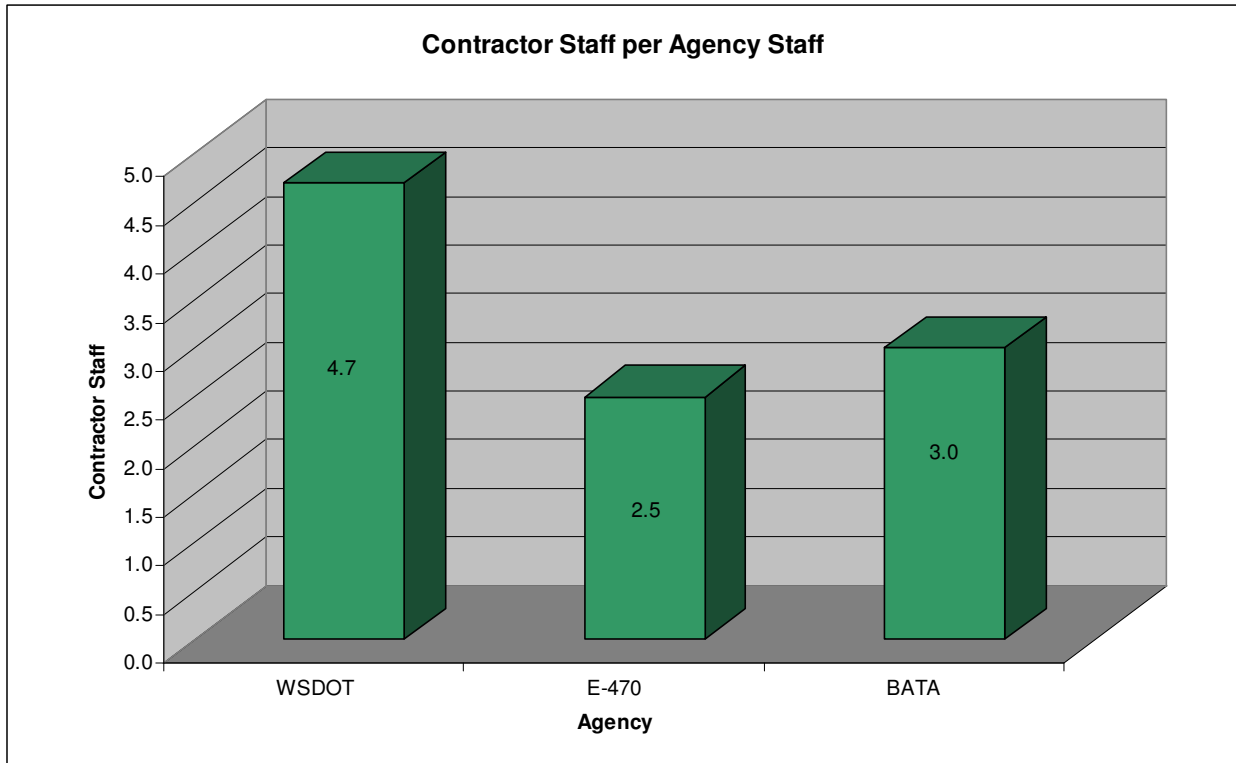


Figure 8: Contractor Staff per Agency Staff

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. Exhibit P to the TransCore contract, which includes these measures, is attached to this document as Appendix B. 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 contractor performance measures, referenced above, to their management every two weeks. As seen in Appendix B, this document is fairly detailed. 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 a drop in ETC penetration. 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 |
| | | Net Revenue | \$1,944,000 | \$622,000 | | | \$2,566,000 |
| 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 |
| | | Net Revenue | \$2,065,500 | \$466,500 | | | \$2,532,000 |

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.

**WSDOT Statewide Tolls Program
Toll Operations Benchmarks
and Incentives**

Appendix A

**Comparative Analysis of
Toll Facility Operational Costs**

February, 2007



**Washington State
Department of Transportation**

Washington State Department of Transportation

**COMPARATIVE ANALYSIS OF TOLL FACILITY
OPERATIONAL COSTS**

REPORT

FEBRUARY 22, 2007



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APPENDIX A: DATA SOURCES

1. INTRODUCTION

When the new Tacoma Narrows Bridge (TNB) opens in 2007, it will offer both electronic and manual toll collection. An operations contractor will provide the staff to manually collect tolls, operate the customer service center, process violations, and maintain the new electronic toll collection system. Washington State Department of Transportation (WSDOT) will primarily be responsible for setting policies and procedures, providing public communications, and ensuring that the contractual obligations are met.

As Tacoma Narrows will be the first toll facility in Washington to deploy Electronic Toll Collection (ETC), this report compares the cost of operating other contracted, ETC-equipped toll facilities across the country and provides information regarding their oversight role and organization.

This report examines the range of operations cost data collected from other toll facilities similar to TNB, and offers some conclusions regarding how the planned TNB oversight functions and costs compare to other facilities.

1.1 Methodology

Operational cost data was gathered for toll facilities that have similarities in scope and function to Tacoma Narrows Bridge. Criteria for determining which toll facilities were to be researched required that all or part of toll collection and customer services operations are performed by a contractor, and that ETC be deployed at the facility.

Annual reports for each facility were reviewed. The variations in toll facilities and data included in the annual reports necessitated that this review be followed by requests for additional, specific operations cost information. Detailed cost information is not typically provided in an annual report. Each agency was contacted to collect information at a level that would be useful for comparison to operational costs at TNB.

No toll facility is an exact "match" for comparison to TNB. There is a great range in the size and scope of toll facilities and how they are operated, including what expenses are considered "operations" costs and how the configuration of the facility affects these costs. These variations to be considered include:

- **Magnitude and Type of Facility:** Volume of traffic, number of toll lanes, and the amount of the toll charged vary widely, and directly affect the amount of revenue collected. Whether a facility is a bridge or toll road (which can be many miles long, with multiple entry/exit points) is also a fundamental difference that must be considered. Since operations costs are often presented as a percentage of toll revenue, the magnitude of the facility is a major factor.
- **Method of Toll Collection:** Beyond the type and size of facility, there are a number of variations that occur at the operational level, starting with how tolls are collected. Some facilities, like TNB, staff tollbooths or use Automated Coin Machines (ACM) for toll collection in addition to their ETC program. Others facilities offer ETC only. As the industry has shown that it generally costs less to collect a toll electronically versus manually, the number of ETC versus manual transactions is a consideration for analyzing operations costs.
- **Division of Responsibilities:** The types of responsibilities assigned to the contractor(s) and those that remain with the agency vary by agreement, and clearly

affect the budgeted operations expenditures of the agency. A public/private franchise or concession agreement may call for a private company to design, build, finance and operate the facility. Other agreements might call for the agency to provide bridge/roadway maintenance, management, and oversight, while the contractor provides only customer service. The level of management, and associated oversight costs, will depend on the type of agreement and service conditions in the contract.

- **Violations:** The number of people who fail to pay the required toll, as a percentage of transactions, varies widely among facilities, and the cost to process and collect on these violations also varies depending on the violation processing software's level of automation, the jurisdiction's collection laws, and the extent to which ETC has been adopted by the populations.
- **Availability of Customer Web Site and IVR:** The level of service offered by the facility's Web site or Interactive Voice Response (IVR) system, in terms of providing customers "self service" for regular account queries, transponder distribution, and payments, reduces the need and cost for human customer service representatives.
- **Accounting Variations:** Some toll authorities include costs such as amortization, depreciation, and advertising/marketing as part of operations, while others account for them as separate budget items. These differences again impact the percentage of revenue used for operations to appear much higher.
- **Maintenance:** Maintenance costs must be differentiated at two levels: physical facility maintenance (i.e., of the roadway/bridge) versus maintenance of the toll system and equipment. Some agencies may choose to roll both types of cost into a single "maintenance costs" line item. As physical facility maintenance for TNB will be provided by WSDOT, physical maintenance costs needed to be separated from toll system maintenance for this comparison. In addition, variations in the lifecycle and reliability of technologies deployed also affect the cost of maintenance. Finally, periodic or extraordinary maintenance or rehabilitation may also result in disproportionately high maintenance costs for a given year. For these reasons, facility maintenance is not included in cost data for this comparison.
- **Bond Covenants:** The terms of repayment for the bonds on a toll facility will vary, and may restrict the types of costs that may be paid from toll revenue.

Therefore, the inherent challenge in this exercise is to minimize "apples to oranges" comparisons. By identifying a series of metrics, the dissimilar systems may be analyzed.

Metrics that have been identified to date include:

- **Magnitude of Toll Facility:** These factors would include the number of toll lanes, traffic volumes, transactions, customer accounts, and tolled roadway miles.
- **Facility Characteristics:** Facility considerations include open versus closed toll facility, method of toll collection, level of automation, and maintenance requirements.
- **Contracted Services:** A description of the organizational structure and oversight services provided by the public sector, as well as the scope of services provided by the contractor.
- **Financial:** Annual revenues and toll rates for comparison to the overall magnitude of the toll facility.

- **Impact of Violations:** The annual number of violations, collection rate, staffing requirements and the impact to operations costs.
- **Customer Services:** The volume of customer service requests and associated staffing requirements.

2. TOLL FACILITY COMPARISON

With consideration to the challenges described above, the following toll facilities are included in this analysis:

- **E-470**, Denver CO: E-470 is a 47-mile toll road along the eastern perimeter of Denver, and offers a timesaving route to the Denver Airport. The E-470 Public Highway Authority manages E-470. Payment may be made using manual toll collection booths, Automated Coin Machines or the EXpressToll transponder.
- **Golden Gate Bridge (GGB)**, San Francisco CA: The Golden Gate Bridge is overseen by the Golden Gate Bridge, Highway and Transportation District. Unlike the other Bay Bridges, GGB staff includes manual toll collectors. GGB participates in the FasTrak electronic toll collection program.
- **Tobin Bridge**, Boston MA: The Tobin Bridge connects the Charlestown section of Boston with Chelsea, and is part of the Massachusetts Turnpike. The bridge is maintained by MASSPORT. ETC has been deployed via the FAST LANE program, which is administered by the Massachusetts Turnpike Authority (MTA).
- **Central Texas Regional Mobility Authority (CTRMA)**,¹ Austin TX: The CTRMA opened its first toll road, 183-A, in November 2006. CTRMA will be the oversight agency for this all-ETC facility. The Texas Department of Transportation (TxDOT) will provide ETC operations via a contractor.
- **Bay Bridges**, San Francisco Bay Area CA: The Bay Area Toll Authority (BATA) is the agency that administers toll collection on the seven state-owned bridges in the region. In addition, BATA operates the customer service centers for customers with transponders under the FasTrak program. Caltrans owns, operates, and maintains these bridges, including providing manual toll collection.
- **Transportation Corridor Agencies (TCA)**, Orange County CA: TCA (also known as "The Toll Roads") consists of two separate toll authorities that oversee the Foothills/Eastern and San Joaquin Hills toll roads. The Toll Roads accept cash and the FasTrak ETC transponder for payment.
- **SR 91 Expressway**, Orange County CA: SR 91 is a ten-mile toll road that was the world's first all ETC toll facility. SR 91 is owned and operated by the Orange County Transportation Authority (OCTA), which purchased the road from a private concessionaire in 2003. OCTA operates the customer service center for SR 91. Violations processing is contracted. SR 91 only accepts FasTrak transponders for payment.

¹ As 183-A has only been open for a few months, this report uses engineering estimates provided by CTRMA for operations costs.

Washington State Department of Transportation
 COMPARATIVE ANALYSIS OF TOLL FACILITY OPERATIONAL COSTS

- **Causeway Bridge**, New Orleans LA: The Greater New Orleans Expressway Commission (GNOEC) is the controlling body of the Causeway Bridge, the longest bridge in the world. Tolls are collected both manually and electronically.

The following table summarizes the division of responsibilities between contractors and public agencies at these facilities.

| | Services Provided by Contractor | Services Provided by Agency |
|---------------------------|--|--|
| E-470 | All toll collection, customer service, violations processing, auditing, and courtesy patrols. | Toll oversight, roadway maintenance. |
| Caltrans Bridges | All ETC operations. | Manual toll collection, bridge maintenance. Oversight provided by BATA. |
| Golden Gate Bridge | All ETC operations. | Bridge maintenance, manual toll collection. Oversight by BATA. |
| Tobin Bridge | Contractor provides hardware/software maintenance for ETC only. | MASSPORT provides bridge maintenance and oversight. Massachusetts Turnpike Authority provides toll collection. |
| CTRMA 183-A | Customer Service Center, Violation Processing (under an interagency agreement). Preventative and predictive and corrective maintenance for the toll collection system. | The TTA Division of TxDOT administers the Customer Service Center (CSC) and the Violation Processing Center (VPC). Some on-site toll collection enforcement is provided. The CTRMA Director of Operations administers maintenance. |
| TCA | Call center, toll payment enforcement, Customer Service Center, facility management, incident response. | Accounting, administration, financial and operations oversight. |
| SR 91 | Enforcement, call center, customer service, facility management, incident response. | Manage contract, set toll policy and pricing, manage external service agreements, financial management, implement corridor improvements. |
| The Causeway | Electronic toll collection. | Manual toll collection, oversight. |

The following table presents key operations data for each facility named above. The purpose of this table is to provide a side-by-side comparison of the different facilities.

| COMPARISON OF FACILITIES | | | | | | | |
|---|------------------|------------------|--------------------|--------------|--------------|-------------------|-------------------|
| FACILITIES | E-470 | Caltrans Bridges | Golden Gate Bridge | Tobin Bridge | CTRMA | TCA | SR 91 |
| Facility Characteristics | | | | | | | |
| Type of Structure | Toll road | Seven bridges | Bridge | Bridge | Toll road | Four toll roads | Toll road |
| Location | Denver, CO | Bay Area, CA | San Francisco, CA | Boston, MA | Austin, TX | Orange County, CA | Orange County, CA |
| Number of Toll Collection Locations | 31 | 65 | 14 | 7 | 4 | N/A | 4 |
| Miles of Toll Road | 47 | 26.3 | 1.7 | 2.75 | 4.5 | 51 | 10 |
| Annual Traffic Volume | N/A | 135,000,000 | 20,000,000 | 9,000,000 | | 109,500,000 | 11,200,000 |
| Toll Characteristics | | | | | | | |
| Typical Toll Paid by 2-Axle Vehicle* | \$1.00 - \$11.75 | \$3.00 | \$4.00 | \$3.00 | N/A | \$3.00 | \$1.10 - \$7.75 |
| Annual Number of Toll Transactions | 51,488,900 | 133,596,000 | 20,654,000 | 9,000,000 | 10,993,435 | 94,038,882 | 11,169,000 |
| Percent Electronic Toll Collection | 67% | 77% | 60% | 42% | N/A | 70% | 100% |
| Percent Manual Toll Collection | 33% | 23% | 40% | 68% | N/A | 30% | 0% |
| Number of Electronic Toll Collection Accounts | 199,563 | 170,000 | 65,200 | N/A | N/A | 310,957 | 116,000 |
| Number of Transponders Issued | 360,570 | 240,000 | 83,000 | N/A | N/A | 558,930 | 180,000 |
| Toll Operations Staffing | | | | | | | |
| Number of Customer Service Staff | 41 | N/A | N/A | N/A | N/A | 170 | 30 |
| Number of Toll Collector Staff | 89 | 260 | 100 | 19 | N/A | N/A | All ETC |
| Financial Data | | | | | | | |
| Annual Revenue from Toll Payments | \$84,499,000 | \$265,362,000 | \$84,419,500 | \$28,000,000 | \$11,599,000 | \$168,000,000 | \$32,375,471 |
| Annual Toll Collection Operations Cost | \$11,589,800 | \$38,931,390 | \$15,479,000 | \$4,500,000 | \$3,162,495 | \$27,593,000 | \$5,146,526 |
| Annual Toll System Maintenance Cost | \$1,575,400 | \$2,972,514 | \$12,088,000 | \$2,500,000 | \$3,487,800 | \$10,300,000 | \$2,525,000 |

*Rate for ETC or average toll collected

Notes:

- a) Tobin Bridge is part of the Interagency Group cooperative toll consortium. Individual statistics for "just" Tobin Bridge cannot be known.
- b) Operations and Maintenance costs for Tobin Bridge are low because the bridge has no violations processing costs and only contracts for hardware/software maintenance.
- c) E-470 has numerous toll collection points, so the toll paid varies by miles driven.
- d) CTRMA's toll road, 183-A. All numbers are projected estimates for 2009.

Section 3: Findings, presents a comparison and analysis of this collected data.

3. FINDINGS

There is a great range in the size and scope of toll facilities, average tolls, and how they are operated, including what expenses are considered “toll collection” costs and how the toll collection methods and practices affects these costs. These variations include:

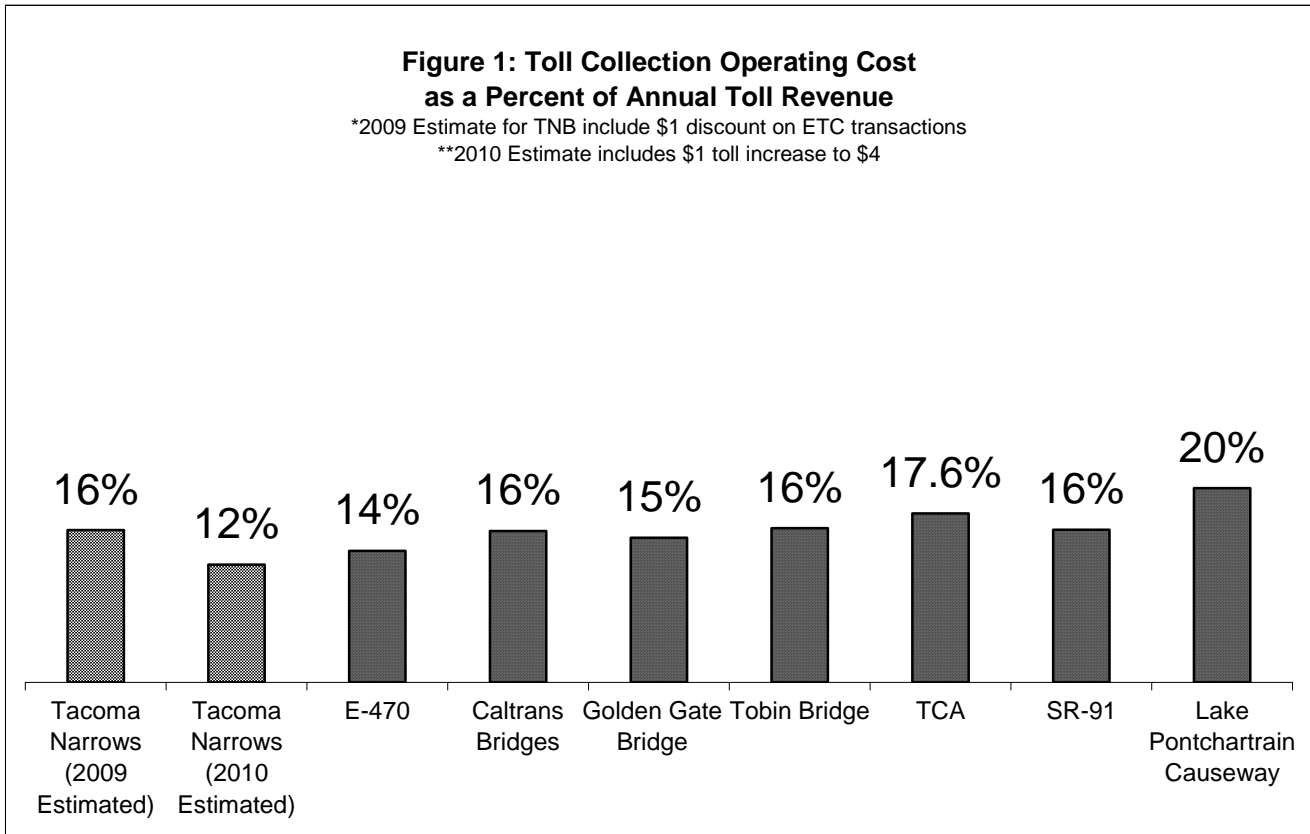
- Size of Facility
- Type (road, tunnel, bridge) of Facility
- Percent of Electronic Toll Transactions
- Division of Responsibilities between Contractor(s) and Agency
- Number of Violators and Cost to Collect
- Availability of Automated ETC Customer Account Access via Internet and Telephone
- Variations in Facility Bond Covenants
- Variations in Accounting Practices

This section presents comparisons of the data collected from the various facilities.

3.1 Toll Collection Operating Cost As a Percentage of Annual Toll Revenue

For the purpose of this exercise, toll collection operating costs were defined as “the cost to collect tolls”, including staff and consumables for Manual Toll Collection, Customer Service costs for ETC, and violation enforcements. Operating costs also include agency contract administration and oversight. Service patrols and incident response were not included. Although operating costs are generally provided in annual reports, it was necessary to follow up with agencies to ensure that the cost provided in the report was inclusive of the costs described above.

The following chart shows the percentage of toll revenue that is spent on operating costs, including the budgeted cost for Tacoma Narrows Bridge over the life of the operations contract.

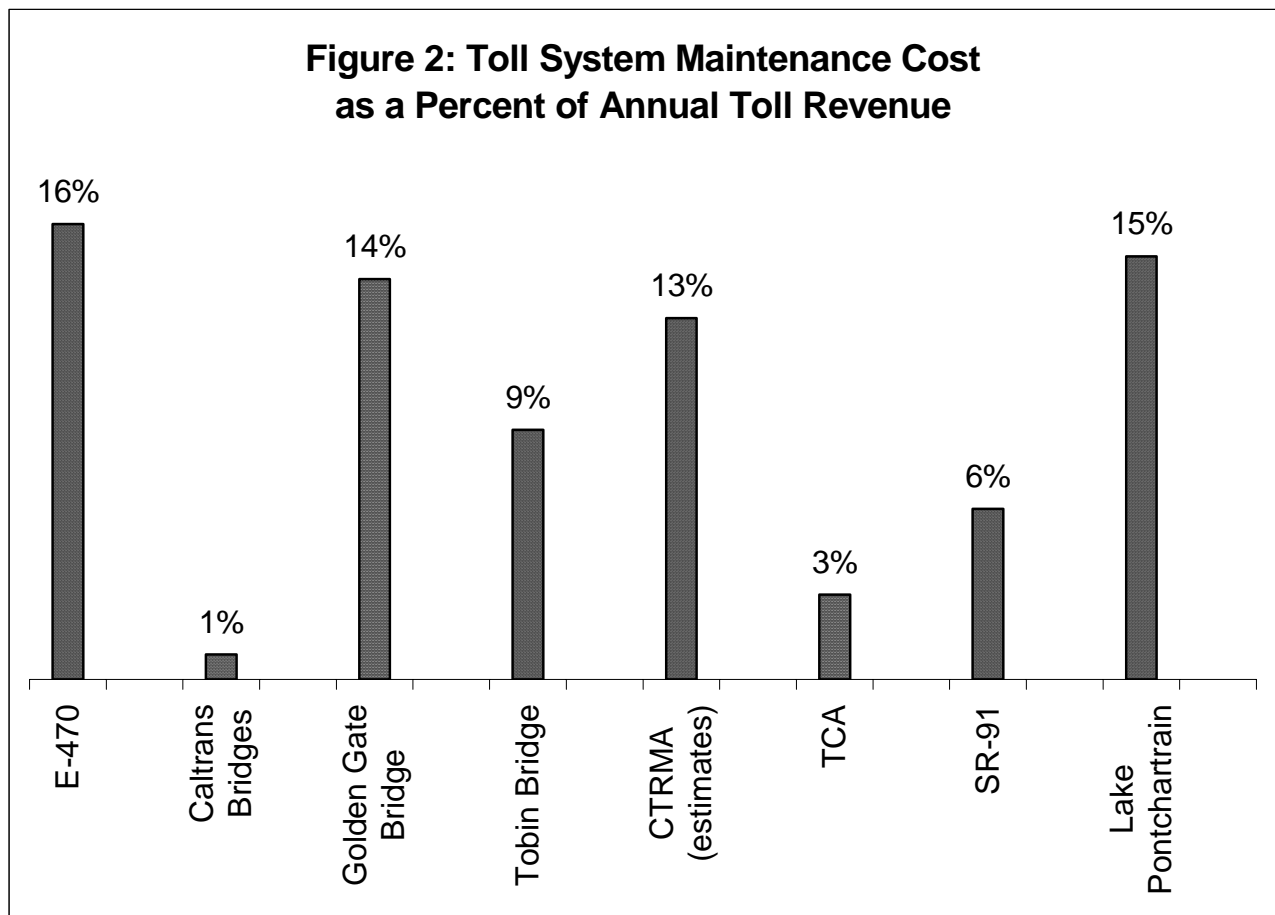


When comparing toll collection costs, it might be expected that those facilities with a higher ETC percentages would also have a lower overall cost. However, Figure 1 shows a fairly close range when comparing toll collection costs as a percentage of annual toll revenue. This highlights the impact of different toll collection practices and facility characteristics. For example, the seven Caltrans-operated bridges in the San Francisco Bay Area are operationally very different from the Tobin Bridge in Boston. But the toll collection cost percentages are quite close. The Caltrans bridges have heavy traffic, high toll rates, and a lower percentage of ETC use, whereas the Tobin Bridge is a smaller operation with moderate ETC use. Tobin Bridge uses gated toll lanes, effectively eliminating violations and the associated collection costs. SR 91 in Orange County is a 100%-ETC facility (no toll booths), yet the high rate of violations erodes the operational cost savings that might otherwise be seen. The slight increase in toll collection cost for the Transportation Corridor Agencies (TCA) in Orange County is due to large size and many manual toll collection points.

3.2 Toll System Maintenance Costs as a Percentage of Annual Toll Revenue

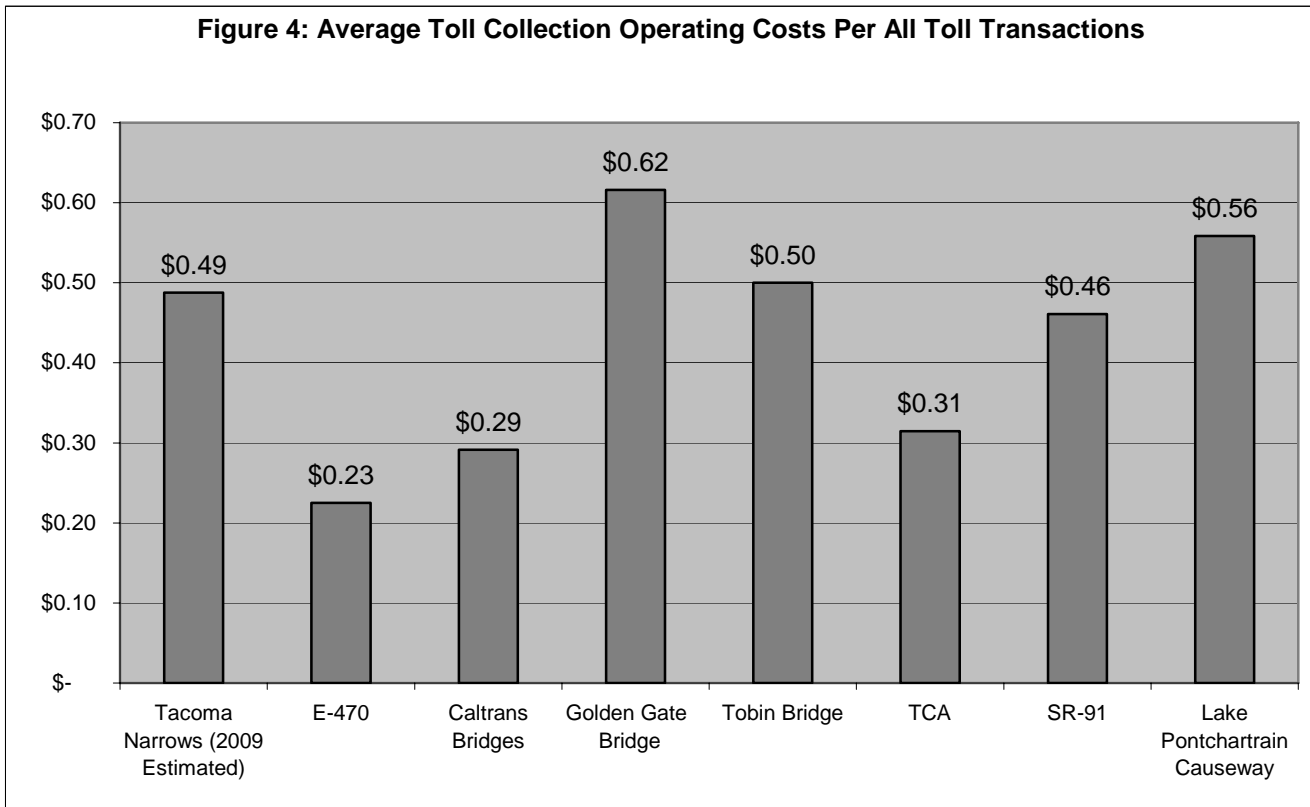
The maintenance costs data collected for this exercise include maintenance of toll system hardware, software, lane equipment, and communications. They also include salary costs for IT staff that troubleshoot and maintain the toll system. Costs for road signs, facility maintenance, trash pickup, landscaping, etc., are not included. For TNB, toll systems maintenance is included in the toll operations contract and is not a separate cost item.

The following chart shows the percentage of annual toll revenue that is budgeted for toll system maintenance costs at various other facilities.



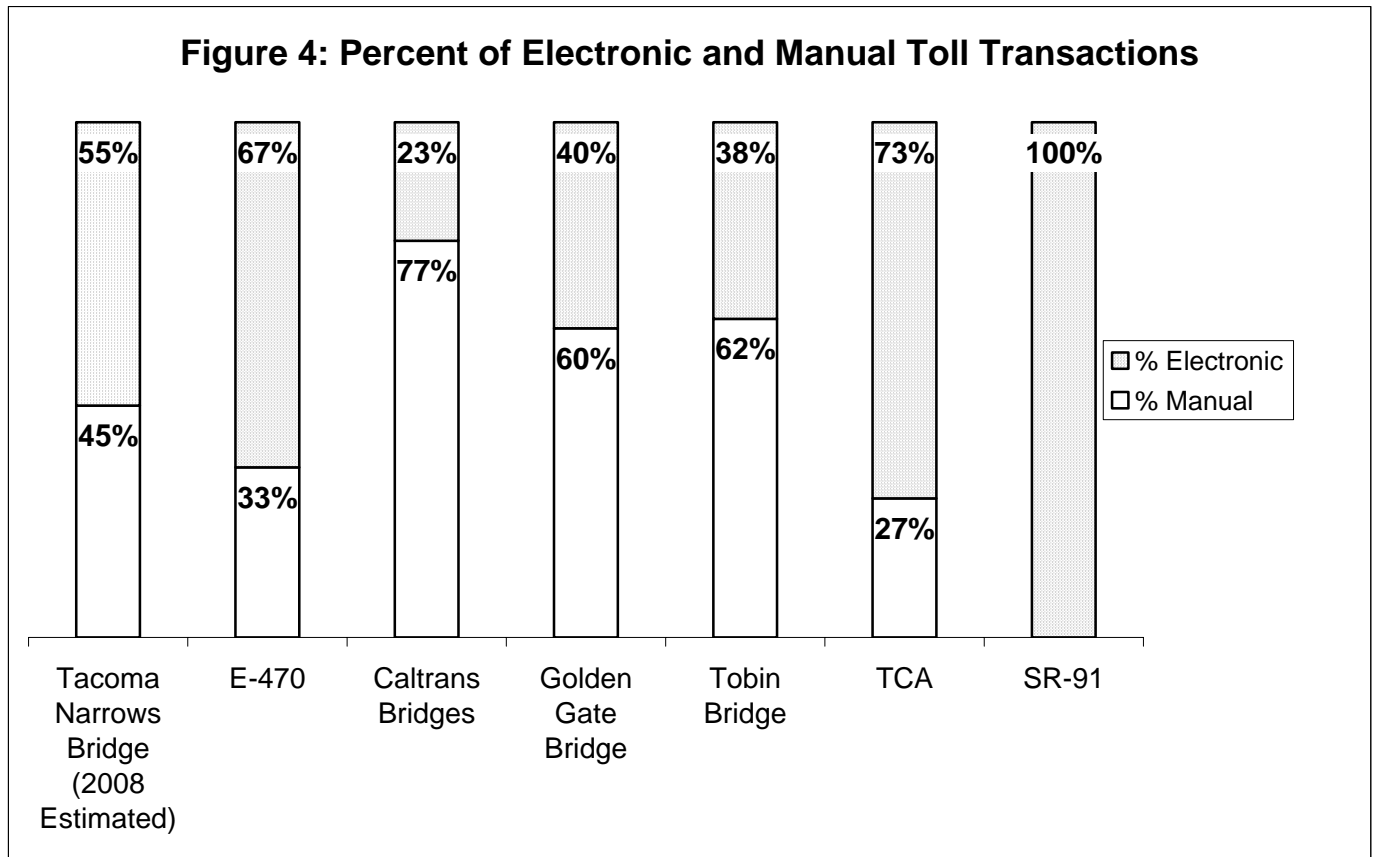
3.3 Average Toll Collection Operating Cost Per All Toll Transactions

The following chart shows the average cost of operations that comes from a single toll transaction. This cost was calculated by comparing the annual cost of operations, as defined above, with the total annual number (ETC and manual) of toll transactions. The relatively high cost per transaction at Golden Gate may be due to the large percentage of manual toll transactions at the facility (shown in Figure 4). For TNB, manual toll transactions and the relatively low number of annual transactions, compared to other facilities, are cost factors.



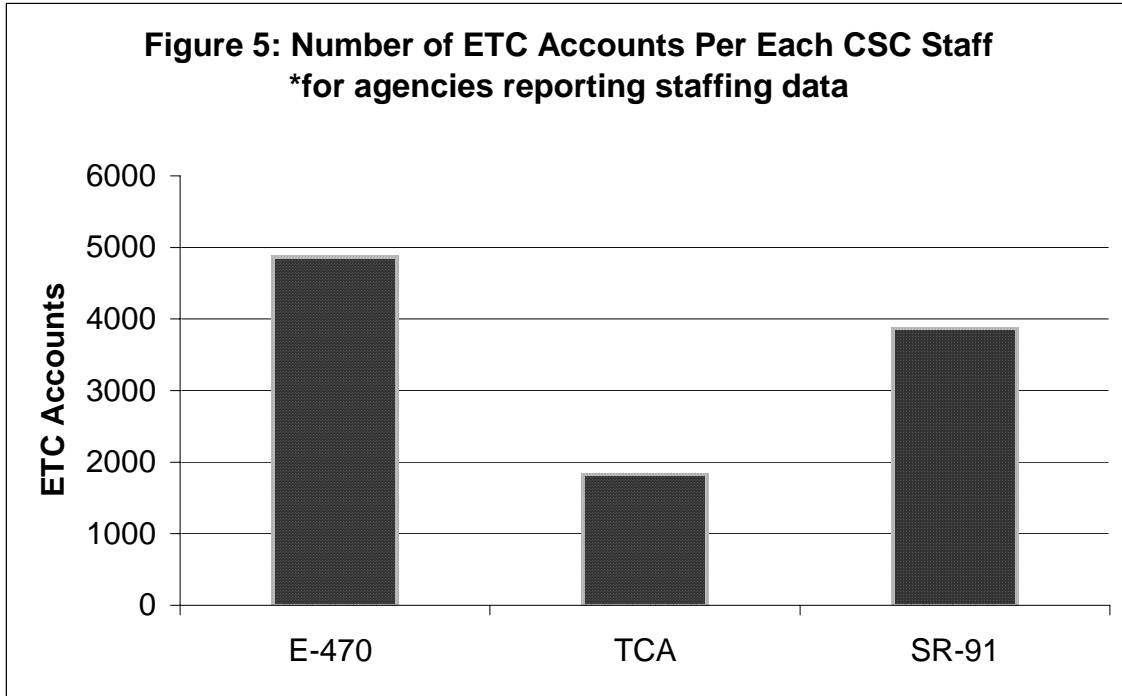
3.4 Percent of Electronic and Manual Toll Transactions

The following chart displays the division of total toll transactions between manual and ETC transactions. Driver use of electronic toll collection is higher on commuter oriented facilities such as E-470 in Denver and Transportation Corridor Agencies (TCA) in Orange County, CA. SR 91 in Orange County only allows electronic toll collection. The mix of commuter and infrequent users is shown in the California toll facilities and on the Tobin Bridge in Boston.



3.5 Number of Customer Service Staff Per Number of Accounts

Facilities were surveyed on the number of customer service staff and the number of active ETC accounts to determine the relative staffing requirements based upon the size of the facility. Customer service staff may apply payments, open and close accounts, distribute transponders, provide account assistance, and process violations. Although some authorities have separate staff categories for violations processing and customer service, others simply assign staff duties based upon the day’s workload.



3.6 Organization of Oversight Agencies

The Washington State Department of Transportation has been particularly strong in emphasizing agency accountability and financial transparency in public works projects, with very positive results. With construction nearing completion, the reintroduction of highway tolling will shift public scrutiny from construction to accountability of the toll collection operation. Although a contractor will be operating the ETC system, physically collecting the tolls and interfacing with the public at customer service centers, the public will not be directly cognizant of this private entity. Instead the public will see WSDOT as the “face” behind each positive or negative experience. In addition, the handling of public funds and storing of individual personal information (including credit card information as part of ETC accounts) requires a level of hands-on management by WSDOT as the party ultimately responsible for this new toll facility.

In order to safeguard the substantial public investment in the new bridge itself, the revenues collected (required by law to be used strictly for the repayment of the bridge construction costs, minus operations and maintenance costs), and the public goodwill towards WSDOT as an agency, WSDOT staff must oversee contractor operations, ensure proper financial procedures are followed, market the *Good To Go!* program, and other oversight functions.

Toll operational and financial oversight is a common function of all agencies at other facilities. All of the facilities contacted for this research effort had some public agency oversight role that varied in accordance with the range of functions performed by the contractor, and were organized into various divisions to meet these obligations. Some examples include:

- **E-470:** The E-470 Public Highway Authority is organized into divisions for Toll Operations, Roadway and Lane Management, Engineering, Finance, and Information Technology. Within these divisions, the agency's oversight functions include accounting and finance support, bank verification, managing investor and legislative relations, payroll, internal auditing, traffic/revenue reviews, ETC marketing, technical support, and public relations.
- **Transportation Corridor Agencies:** At TCA, the agency divisions include Communications and Public Affairs, Finance/Administration, Toll Operations, and Engineering and Environmental Planning. Key functions include financial oversight and budgeting, project management, information technology, and customer service and toll compliance (violations) oversight.
- **SR 91:** As a division of Orange County Transportation Authority (OCTA), SR 91-specific functions include management, auditing, marketing and administration.

E-470, TCA, and SR 91 are all facilities where the breadth of contractor services is similar to TNB. In reviewing the organizational structure and roles and responsibilities of these agencies in overseeing contractor operations, the following functions have been identified that are applicable to TNB and that are needed as tolling commences and TNB begins day-to-day operations.

Toll Operations Management: Overall responsibility for the safe and efficient management of the tolled roadway, including interfacing with other WSDOT divisions, such as maintenance, the Olympic Region Traffic Management Center, and other toll projects; as well as being a key point of contact for the contractor's management team. Other responsibilities may include:

- Management and administration of the toll operations contract
- Performance monitoring and reporting of contractor services
- Performance monitoring and reporting of toll operations services
- Long and short term planning – identification or approval of major initiatives, such as marketing plans, incentive programs, etc.
- Response to requests for information by WSDOT executive staff, OFM, OST, the Governor's office, and elected officials
- Ensuring that that operations comply with state laws for safety, enforcement, and bond repayment
- Preparation, administration, approval, and management of all operating and capital budget expenditures
- Oversight of daily revenue collection and reconciliation reporting
- Oversight of security initiatives

- Coordination with bridge maintenance and supervision of other toll operations oversight staff
- Coordination with engineering consultants, contractors and outside agencies for special projects

IT Systems Maintenance: This function includes oversight of the contractor's servicing of the toll system hardware and software, including upgrades and replacement of equipment under the system warranty.

- Monitoring of toll system hardware and software maintenance activities and comparison of system upgrades against contract requirements
- Software application problem identification, documentation, and working with the contractor to resolve
- Monitoring of system hardware and equipment maintenance and resolution of any issues arising from the contractor's maintenance performance
- Intermittent operation of equipment to test its functionality
- Oversight of system hardware and equipment inventory, including spare parts
- Oversight and administration of network security

Facility Operations: The WSDOT Toll Operations manager and support staff ensures proper toll facility operations:

- Coordination and monitoring of daily toll collections in collaboration with the contractor
- Review (and possibly development) of operating manuals, plans and procedures to improve toll operations, customer service, violation processing, financial audits, traffic control and security measures
- Coordination of traffic activities with the bridge maintenance unit, contractors and other agencies
- Coordination with WSDOT and Washington State Patrol incident response
- Management of violation enforcement processing quality, fairness, policies and procedures and maintaining liaison with Pierce County Court System, Washington State Patrol, and the Administrative Office of the Courts
- Monitoring and response to complaints or questions concerning the toll operations especially customer service and violation processing
- Assistance with the preparation, administration and monitoring of the annual operating budgets
- Coordination of TNB operations with other WSDOT tolling projects

Marketing: The *Good To Go!* ETC program is the statewide ETC program for other future toll facilities implemented in Washington. Therefore, branding and marketing of *Good To Go!* is a WSDOT function. Activities include:

- Oversight and approval of the use of *Good To Go!* and WSDOT logos by the contractor
- Review of promotional materials prepared by the contractor
- Development of an overall marketing plan for *Good To Go!*
- Development of potential ETC customer incentive plans and oversight of contractor implementation
- Coordination with other Washington toll facilities for local promotion of *Good To Go!*

Finance: Financial functions include the management, utilization and development of systems and techniques to audit and analyze toll system revenue and traffic data, including:

- Assistance with the preparation, administration and monitoring of the annual operating and capital budgets
- Conduct of periodic audits of toll revenue transactions including reconciliation with TRAINS
- Analysis of financial reports and progress
- Management and oversight of the development of toll collection, revenue auditing and traffic analysis system enhancements
- Preparation of monthly reports for any system report problems
- Administration of the operations and maintenance contract, including renewals
- Preparation of independent toll system revenue reports
- Identification and reporting of revenue data errors and discrepancies

General Administration: Other functions that are provided by WSDOT include:

- Provision of public information
- Management of special projects and events
- Day to day administrative support and payroll

This review of toll agency oversight functions and organization has demonstrated that there are many commonalities in the roles and responsibilities that agencies undertake in the management of toll facilities, despite the many variations that can be seen in the size and scope of the those facilities. The range of common key oversight functions performed by agency staff includes overall management, contractor operations oversight (including customer service and violations processing), reporting and finance, technical support, and marketing.

3.7 Conclusions

Overall, this exercise confirmed the difficulties of comparing costs to operate vastly different facilities that may only share the single common characteristic of tolls. However, the estimated toll collection costs for Tacoma Narrows Bridge are within the industry range for such costs, particularly considering the relatively small size of the facility. TNB has estimated 12-16% for operations and administration of tolls over the life of the operations contract, which is within the range found for the other facilities researched. Administration costs are more varied depending on the size and age of the toll system.

TNB has estimated an initial 55% penetration rate for *Good To Go!*. Although a somewhat higher rate than other bridges, this is certainly not an unreachable goal, considering the high levels of local and commuter traffic in the area, and the likelihood of an initial ETC discount. Public surveys have indicated that many residents make frequent trips across the bridge, even several times per day. Most of these residents will use *Good To Go!*

All agencies have toll operations staff that provide auditing and oversight of the operations contractor, including performing independent reviews of revenue and violations reports, budgeting, and marketing, as well as the other functions described in Section 3.2. As other toll projects, including the SR 167 HOT Lanes are likely to follow TNB, WSDOT will also need oversight staff to ensure the integration of these facilities.

APPENDIX A

DATA SOURCES

Washington State Department of Transportation
 COMPARATIVE ANALYSIS OF TOLL FACILITY OPERATIONAL COSTS

Toll Operations Costs – Data Sources

| Facility | Primary Data Source | Notes on Operations Costs | Notes on Maintenance Costs |
|---------------------------|--|--|--|
| E-470 | 2005-06 Budget E-470 Staff | Cost for Operations Contract and salaries. Includes direct cost, does not include animal removal and litter, from 2005-06 budget | Includes IT salaries, select software, toll system hardware maintenance. |
| Caltrans Bridges | Annual Report BATA Staff | Includes toll accounting, manual toll collection from Caltrans, plus CSC operations | Includes toll equipment maintenance and IT support. |
| Golden Gate Bridge | 2003/04 Annual Report | From Annual Report. | From Annual Report. |
| Tobin Bridge | Tobin Bridge staff. | Includes administration, toll collector salaries, direct costs and payment to MTA for ETC. | Toll system and hardware maintenance. |
| CTRMA | General Engineering Contractor estimate. | Estimated for first year of operations. | Estimated for first year of operations. |
| TCA | FY '05 Annual Report 2006 Budget | 2006 Budgeted Operations Costs, incl. Toll Ops Admin | 2006 Budgeted Maintenance Costs |
| SR-91 | OCTA Staff, based on 2006 budget | 2006 Budgeted Costs | 2006 Budgeted Costs |
| Lake Pontchartrain | 2004/05 Budget | Cost of operating services plus toll collector salaries | Includes a few misc. items like A/C and plumbing supplies for which separate costs were not available. |

**WSDOT Statewide Tolls Program
Toll Operations Benchmarks
and Incentives**

Appendix B

TransCore Contract Exhibit P

**TCAAS Accuracy and Availability Performance
Guarantees, Testing Provisions and Other
Performance Standards**

EXHIBIT P

TCAAS Accuracy and Availability Performance Guarantees, Testing Provisions and Other Performance Standards

1. Accuracy Performance Guarantees

The following subsections describe the Accuracy Performance Guarantees with respect to certain accuracy requirements. In addition to other requirements specified in the Agreement and in Exhibit A, Scope of Services, Contractor shall operate and maintain the TCAAS so that the performance of Contractor and the TCAAS complies with the following performance guarantees during operations.

1.1 System Accuracy. Contractor hereby guarantees that the accuracy for toll transaction creation and transmission (the "System Accuracy") shall be no less than 99.5% under Normal Operating Conditions, for vehicles subject to a toll and traveling at speeds of 0 to 100 miles per hour. The System Accuracy percentage shall be calculated as the ratio of the total number of correct transactions that arrive at the Plaza/Host and CSC (if applicable) systems to the total number of vehicles in the Accuracy Performance Test for System Accuracy. A correct transaction shall occur if the correct date, time, location, toll and payment source (where payment source is either a correct ETC account number, a correct record of toll payment, or a legible license plate image) can be determined through normal operational processes and the transaction is correctly recorded.

1.2 ETC Accuracy. Contractor hereby guarantees that the accuracy for vehicle transponder identification and account association (the "ETC Accuracy") shall be no less than 99.5% under Normal Operating Conditions, for vehicles subject to a toll and traveling at speeds of 0 to 100 miles per hour. The ETC Accuracy percentage shall be calculated as the ratio of the total number of correct ETC reads (limited to no more than one read per transponder per transaction) to the total number of ETC vehicles in the Accuracy Performance Test for ETC Accuracy.

1.3 Classification Accuracy. Contractor hereby guarantees that the accuracy for each vehicle classification (the "Classification Accuracy") shall be no less than 99.5% for all vehicle classes under Normal Operating Conditions, for vehicles traveling at speeds of 0 to 40 miles per hour in a manual toll lane and 0 to 100 miles per hour in an express toll lane. The Classification Accuracy percentage shall be calculated as the ratio of the total number of correct classifications made by the vehicle classification system to the total number of vehicles in the test for Classification Accuracy.

1.4 Violation Image Accuracy. Contractor hereby guarantees that, under Normal Operating Conditions, the violation enforcement system of the TCAAS shall accurately capture and record a legible image of the rear license plate of violating vehicles on the Transportation Facilities with respect to no less than

85% of such violating vehicles, regardless of weather, lighting, sun glint and glare, vehicle location, speed or headway (the “Violation Image Accuracy Guaranty”). Such percentage (the “Violation Image Accuracy Percentage”) shall be calculated on the basis of the ratio of (i) the total number of legible violation images recorded during the Accuracy Performance Test (limited to no more than one image per violation), to (ii) the total number of violations occurring during the Accuracy Performance Test as determined from TCAAS Data. Illegible images resulting from damaged, missing, improperly mounted or obscured (such as by dirt, snow, license plate frame or cover, towing hitch, or other similar objects) license plates shall be excluded from such computation, by excluding the violation from both the numerator and denominator of the Violation Image Accuracy Percentage.

2. Availability Performance Guarantees

The following subsections describe the Availability Performance Guarantees with respect to certain TCAAS availability requirements. In addition to other requirements specified in the Agreement and in Exhibit A, Scope of Services, Contractor shall operate and maintain the TCAAS so that the performance of Contractor and the TCAAS complies with the following availability performance guarantees during operations.

2.1 Lane Availability Guaranty. Contractor hereby guarantees that the toll collection lanes (both manual and express) on the Transportation Facilities shall be fully functional and operational no less than 99% of the times such lanes are required to be in operation pursuant to the Operating Traffic Management Plan, Business Rules and Standard Operating Procedures (the “Lane Availability Guaranty”). Such percentage (the “Lane Availability Percentage”) shall be calculated for each monthly period with respect to all lanes in the aggregate on the basis of the ratio of (i) the sum of the total number of actual required hours each lane was fully functional and operational during such period, to (ii) the sum of the total number of operating hours for all the lanes (aggregated on a lane by lane basis) required for such month under the Operating Traffic Management Plan and Standard Operating Procedures. For purposes of the foregoing, a lane shall be considered to be “fully functional and operational” if the lane is open to traffic and the TCAAS subsystem for such lane is fully operational, capable of performing all toll collection and recording functions and not operating in a manner that causes customer inconvenience or delays. A lane shall not be considered to be fully functional and operational when the TCAAS subsystem for such lane is operating in a degraded mode; however, for purposes of calculating the Lane Availability Percentage, there shall be excluded from the numerator and denominator periods of scheduled maintenance and scheduled downtime as provided in the Business Rules and Standard Operating Procedures (which provide permissible hours when the Contractor may close (A) ETC-only lanes and (B) manual lanes to rectify operating problems), and any period when Contractor is prevented from operating a lane due to Force Majeure or due to any direction

given by WSDOT which does not result from Contractor's failure to perform or breach of its obligations under the Contract Documents.

2.2 Computer System Availability Guaranty. Contractor hereby guarantees that all TCAAS computer subsystems required for the operation of the Customer Service Centers shall be fully functional and operational no less than 99% of the time such subsystems are required to be in operation pursuant to the Standard Operating Procedures (the "Computer System Availability Guaranty"). Such percentage (the "Computer System Availability Percentage") shall be calculated for each monthly period on the basis of the ratio of (i) the total number of actual required hours all such subsystems, on a cumulative basis, were fully functional and operational during such period, to (ii) the total number of operating hours required for all such subsystems, on a cumulative basis, for such month under the Standard Operating Procedures. For purposes hereof, the TCAAS computer subsystems required for the operation of the Customer Service Center shall be considered to be "fully functional and operational" if each such subsystem is capable of normal operation and is functioning in accordance with its intended use. In calculating the Computer System Availability Percentage, however, there shall be excluded from the numerator and denominator periods of scheduled maintenance and scheduled inaccessibility as provided in the Standard Operating Procedures, and any period when Contractor is prevented from operating any such subsystem due to Force Majeure or due to any direction given by WSDOT which does not result from Contractor's failure to perform or breach of its obligations under the Contract Documents.

3. Testing Provisions for Accuracy and Availability Performance Tests

3.1 Timing and Frequency of Tests. During the first six months of each 12-month period following the Performance Guarantees Commencement Date, Contractor shall conduct at least one complete set of Accuracy and Availability Performance Tests, at its cost, to demonstrate that the TCAAS complies with each of the Performance Guarantees for System Accuracy, ETC Accuracy, and Classification Accuracy. Contractor shall conduct and complete the first such set of Accuracy and Availability Performance Tests no later than the date one year following the Performance Guarantees Commencement Date. At WSDOT's option and expense, WSDOT may require at any time and from time to time more frequent Accuracy and Availability Performance Tests with respect to all or any portion of the TCAAS. Contractor shall conduct the Accuracy and Availability Performance Tests over a consecutive 14-day period under Normal Operating Conditions to verify actual performance during revenue operations. Contractor, at its cost, may conduct more frequent Performance Tests at any time and from time to time to attempt to demonstrate improved performance of the TCAAS.

3.2 Compliance with Performance Testing Plan. Contractor shall measure and report on compliance with the Accuracy and Availability Performance Guarantees for System Accuracy, ETC Accuracy and Classification Accuracy in accordance

with the Performance Testing Plan (described in Section 4.1.6 of Exhibit A), as approved by WSDOT, and the testing provisions and procedures of this Section 3.

3.3 Procedures for Performance Testing. Contractor shall be responsible for all equipment, simulators, supplies, services and special facilities required to conduct the Accuracy and Availability Performance Tests, and Contractor's normal operating personnel shall operate the TCAAS during each Accuracy and Availability Performance Test. Contractor shall deliver to WSDOT advance written notice of all Performance Tests; and WSDOT shall be entitled to witness and monitor such tests in accordance with the provisions of this Exhibit P. No Performance Tests shall be scheduled or conducted without the prior written approval of WSDOT. Within 15 days after completion of each Performance Test, Contractor shall compile the test results, prepare a test report containing the test results and submit the test report to WSDOT. The test report results shall be subject to the written approval of WSDOT.

3.4 Test Objectives. The Accuracy and Availability Performance Tests shall be a comprehensive set of performance tests under Normal Operating Conditions designed to demonstrate compliance with the Accuracy and Availability Performance Guarantees of the TCAAS for a sustained period of time during revenue operations. The Accuracy and Availability Performance Tests shall verify, at a minimum, the Accuracy and Availability Performance Guarantees.

3.5 Pre-Test Conditions. As a condition to starting the Accuracy and Availability Performance Tests, Contractor shall complete the following work with respect to the TCAAS, and when Contractor has done so, Contractor shall so notify WSDOT in writing:

- (a) Contractor shall submit for WSDOT approval/acceptance all required documentation, and Contractor shall obtain WSDOT approval of the Performance Testing Plan (and any subsequent updates) prior to commencing the Accuracy and Availability Performance Tests;
- (b) Contractor shall establish and identify configuration baselines for all software and hardware installed for the TCAAS to be used for the duration of the Accuracy and Availability Performance Tests;
- (c) Contractor shall develop a detailed schedule of testing, which identifies specific tests that Contractor intends to conduct and the start and stop dates;
- (d) Contractor shall submit to WSDOT a Notice of Start of Accuracy and Availability Performance Tests no less than 14 days before the scheduled start of testing.

3.6 Test Approach and Execution

- (a) Contractor shall conduct the Accuracy and Availability Performance Tests under Normal Operating Conditions. Contractor shall not use test environments or specialized configurations of the TCAAS, except as allowed herein.
- (b) Contractor shall use the operational configuration of the TCAAS for the duration of the Accuracy and Availability Performance Tests. Such configuration shall include changes that would normally result from normal operations. All components, equipment, software, networks, operating environments, and systems shall be fully installed, integrated, operationally configured, and on-line with the rest of the TCAAS for the duration of the Accuracy and Availability Performance Tests. Contractor shall not alter or change any version of hardware or software for the duration of the Accuracy and Availability Performance Tests. Contractor may make minor adjustments, or conduct maintenance replacements with identical equipment, consistent with normal maintenance practice.
- (c) The software installed for the Accuracy and Availability Performance Tests shall be the latest operational version of the software at the start of the test period. Such software shall be the software from the Acceptance Tests or the most recent approved Accuracy and Availability Performance Tests, including any agreed-upon changes, whichever is latest. Prior to the start of the Accuracy and Availability Performance Tests, Contractor shall identify to WSDOT the software changes that have occurred between the version used for the later of the Acceptance Tests or the most recent approved Accuracy and Availability Performance Tests and the version installed for the Accuracy and Availability Performance Tests. The version of software shall be locked-down for the duration of the Accuracy and Availability Performance Tests.
- (d) Contractor shall provide WSDOT 72 hours notice before any testing (in addition to the notice required under Section 2.2(d) above). Such notice shall indicate the specific tests that Contractor intends to conduct and the date, time, and approximate duration of each test.
- (e) Contractor shall conduct the Accuracy and Availability Performance Tests in the presence of a witness designated by WSDOT unless WSDOT provides to Contractor written permission to conduct such tests without a witness. WSDOT shall not unreasonably delay or impede testing if it is unable to provide a witness.

- (f) Contractor shall execute the Accuracy and Availability Performance Tests using the test procedures as approved by WSDOT. A test shall be successfully completed when Contractor properly executes all steps of the test and achieves the stated success criteria for the test. For failures that result from an error in the test procedure itself, Contractor shall revise the procedure and re-run the test.
- (g) In case of a failure of equipment or software that prevents further testing, Contractor shall repair or replace the equipment or software as necessary and resume testing. Repairs or replacements that affect the configuration baseline or the results of another test shall cause a restart of any tests necessary to measure the impact on other components and success criteria.
- (h) If any portion of the Accuracy and Availability Performance Tests is interrupted, Contractor and WSDOT shall meet and concur whether the Accuracy and Availability Performance Tests should be resumed or re-started.
- (i) Omissions, errors, or failures during testing shall remain the responsibility of the Contractor regardless of acceptance of a test or the test report by WSDOT.
- (j) Testing shall be representative of (i) the actual mixes of cars and trucks of various classes, and (ii) the actual behaviors as seen on the roadway during Normal Operating Conditions. (REPEATING AGAIN)

3.7 Verification of Accuracy and Availability Performance Guarantees. As a part of the Accuracy and Availability Performance Tests, Contractor shall demonstrate to WSDOT that the TCAAS achieves under Normal Operating Conditions the accuracy and availability Performance requirements described in the Accuracy and Availability Performance Guarantees.

3.8 System Accuracy, ETC Accuracy, and Classification Accuracy Testing. Contractor shall conduct such performance tests utilizing video recording (on a sampled basis) of actual live traffic under Normal Operating Conditions for a statistically significant sample (95% Confidence Level) of traffic in accordance with the following provisions:

- (a) Vehicle Classes and Types - Contractor shall use actual vehicles from the following six vehicle classes in proportion to actual observed distribution (or suitable substitute as approved by WSDOT) of vehicle classes. A vehicle is any motorized conveyance, including a motorized vehicle/trailer combination, legally authorized to travel on the highways within the State of

Washington.

Class 2 – 2 axles (w/ tires contacting the road surface)

Class 3 – 3 axles (w/ tires contacting the road surface)

Class 4 – 4 axles (w/ tires contacting the road surface)

Class 5 – 5 axles (w/ tires contacting the road surface)

Class 6 – 6 axles (w/ tires contacting the road surface)

Class 7+ – 7 or more axles (w/ tires contacting the road surface)

- (b) Payment Methods – The data sample shall include a representative sample of payment methods, which shall include violations, cash (as applicable), credit card (as applicable), smart card (if applicable), and electronic toll collection.
- (c) Test Size – The calculations for System Accuracy, Classification Accuracy, and ETC Accuracy shall be based on a statistically significant sample (95% Confidence Level) of vehicles distributed evenly across the manual and express toll lanes in proportion to actual traffic volumes observed.
- (d) Test Scenarios – Contractor shall video record live traffic in all lanes at various times of the day for the duration of the Performance Tests. The minimum duration of any video recording session shall be two hours, and Contractor shall use all data collected on the video in the data sample. Contractor may exclude from the video data sample vehicles or transactions which are described as follows:
- Vehicles traveling on the shoulder;
 - Vehicles traveling in the wrong direction;
 - Vehicles traveling closer than ten feet in the express toll lanes when traveling at 45 m.p.h. or greater;
 - Vehicles (including motorcycles) sharing a lane laterally; and
 - Failures resulting from successive violations in the same lane within the time parameters described in the Acceptance Tests.
- (e) Additional Exclusions – The following additional exclusions apply to ETC Accuracy calculations only:

- Vehicles with a non-mounted or improperly mounted transponder (e.g., placed on dashboard or seat, placed behind windshield decals, held in hand, etc.); and
- Vehicles with multiple transponders.

3.9 Test Analysis and Reporting. At the conclusion of any set of Accuracy and Availability Performance Tests, Contractor shall analyze the results of the testing to determine if the TCAAS achieved the test objectives and success criteria, including whether the TCAAS achieved the Accuracy and Availability Performance Guarantees. Contractor shall prepare a test report (as described in Exhibit A) for review and approval by WSDOT. The test report shall quantify the actual measured performance value as a percentage per the definitions in the Accuracy and Availability Performance Guarantees. The performance value calculated shall apply from the date of completion of the Accuracy and Availability Performance Tests forward until superseded by completion of a subsequent set of Accuracy and Availability Performance Tests that yields a performance value, as documented in such a test report approved by WSDOT, meeting or exceeding the Accuracy and Availability Performance Guarantees. Such performance value shall be deemed a shortfall in performance if it is below the performance value indicated in the Accuracy and Availability Performance Guarantees.

4. Operations Performance Standards

The following chart sets forth other operating performance standards and requirements under the Contract Documents (“Operating Performance Standards”) that the Contractor is required to measure and report upon to WSDOT as provided in Section 10.7 of the Agreement.

| Item # | Area | Description | Reporting Method |
|--------|---|---|--|
| 1. | Administration - Training | A training plan and curriculum for all contractor staff shall be updated annually; training manual and training activities for new and existing staff shall be updated quarterly. | Annual Report |
| 2. | Administration – New Hire Staff Checks | Conduct screening of new staff according to WSDOT approved hiring policy | Audited by Contractor and reported monthly |
| 3. | Administration – Existing Staff Security Audits | Conduct quarterly security audits of existing staffing according to WSDOT approved security audit procedures | Audited by Contractor and reported monthly |
| 4. | Administration – Policies and Procedures | Maintain the current Standard Operating Procedures on a quarterly basis | Quarterly Report |
| 5. | Manual Toll Collection Measurement | Manual Toll Collection Queue as defined in separate procedure | Audited by Contractor and reported monthly |

| | | | |
|-----|------------------------------------|---|---|
| 6. | Customer Service–Incoming Calls | The average duration of an interactive voice responsive (IVR) call should be measured based on reports from the IVR system that document the scenario(s) selected by individual customers. | Monthly Report - System |
| 7. | Customer Service–Incoming Calls | The IVR system will be available 99% of the time | Monthly Report - System |
| 8. | Customer Service–Incoming Calls | The abandoned call rate will be no more than 3% per month | Monthly Report - System |
| 9. | Customer Service–Incoming Calls | 80% of monthly calls placed by the IVR system into a CSR queue will be answered by a CSR within 30 seconds | Monthly Report - System |
| 10. | Customer Service–Incoming Calls | 95% of monthly calls placed by the IVR system into a CSR queue will be answered by a CSR within two minutes. | Monthly Report - System |
| 11. | Customer Service–Incoming Calls | CSRs should strive for one call resolution. If a call cannot be resolved within one call, the CSR needs to follow a documented escalation procedure that ensures the customer's request will be resolved as quickly as possible and that the customer is informed about the progress of resolution. | Monthly Report using manual procedure |
| 12. | Customer Service – Website | The web site will be available 95% of the time | Monthly Report - System |
| 13. | Finance - Revenue Management | All cash and check payments deposited and corresponding system entries recorded within one business day (per the Business Rules) | Audited by Contractor and reported monthly |
| 14. | Finance–Reconciliation and Control | All toll collector and CSR end of day procedures and deposit will be completed at the shift end (tour of duty) () | Audited by Contractor and reported monthly |
| 15. | Finance– Refunds | Process all refunds within five days after the waiting period for transaction processing (per Business Rules) | Audited by Contractor and reported monthly |
| 16. | Account Management- Replenishment | Request credit card replenishment within one business day of reaching replenishment threshold OR issue replenishment notice to manual account customers within three days of reaching replenishment threshold. | Audited by Contractor and reported monthly |
| 17. | Account Management– Chargebacks | Complete investigation of all credit card chargebacks (dispute) within three business days of report from credit card processor | Audited by Contractor and reported monthly |
| 18. | Customer Service–Order Fulfillment | Distribute tag kits within three business days of receipt of application | Audited by Contractor and reported monthly |
| 19. | Customer Service–Walk-In | Walk-in customers shall not wait in line longer than five minutes (to take effect after Pre-Tolling Commencement Period) | Monthly Report using manual procedure of spot audit |
| 20. | Customer Service–Inquiries | Respond to and follow- up on inquiries from the public (customer and non-customer) within two business days (average) | Audited by Contractor and reported monthly |
| 21. | Customer Statements | All customer statements mailed within three business days of end of statement cycle | Monthly Report |
| 22. | | | |

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| 23. | Violation Processing | 98% of images reviewed and processed to DOL within two business days from image capture in the lane. | Monthly Report |
| 24. | Violation Processing | License plate data entered correctly for 99.9% of images on first review. | Audited by Contractor and reported monthly |
| 25. | Violation Processing | Violation notices shall be sent by the third business day from receiving information from DOL | Monthly Report |
| 26. | Violation Processing | 98% of violation appeals appropriately processed within two business days of receipt per Business Rules | Audited by Contractor and reported monthly |
| 27. | Reports – Normal | All reports delivered on time. Performance standard is not met if more than three standard reports are late during the month, OR any one report is more than two weeks late. Standard Daily and Weekly reports shall be provided on the next business day. | Audited by Contractor and reported monthly |
| 28. | Reports – Annual Financial Report | Annual financial audit report will be provided in the approved form and format on the required date. | Annual Report |
| 29. | Transaction Processing | 99.95% of all transactions processed within 24 hours from arrival at CSC. | Monthly Report |
| 30. | System Performance | System access query time shall be five seconds or less for retrieving customer account information. | Monthly Report |