Strategic Plan for the Electronic Toll Collection System– FasTrak on the San Francisco Bay Area State-Owned Toll Bridges

Executive Summary

Prepared by:
Traffic Technologies, Inc.

Prepared for:
Bay Area Toll Authority (BATA)
California Department of Transportation (Caltrans)

February 2003

Introduction

This report summarizes the findings and recommendations of the utilization and operational analysis of the electronic toll collection (ETC) – FasTrak - system on the seven state-owned bridges in the Bay Area. The report contains six sections as follows:

I. Current ETC Utilization
II. Comparative Analysis of ETC Systems
III. Lane Configurations at Toll Plazas (ETC Dedicated Lanes)
IV. Toll Rate Discounts for ETC Use
V. Marketing Plan
VI. Action Plan

At present, there are a total of 68 toll lanes (3 of these lanes are HOV bypass that currently have no toll collection functionality) on the seven state-owned toll bridges in the Bay Area. As of November 2000, all lanes have been equipped with ETC equipment. At present, there is one lane dedicated for ETC use on each of the bridges. All other lanes are always operated in mixed mode (cash and ETC), except at the Bay, Carquinez, and San Mateo Bridges which have dedicated HOV during weekday peak periods.

Caltrans currently contracts with WorldCom for the operations of the ETC customer service center (CSC). That contract expires on December 31, 2003. At present, BATA, Caltrans and the Golden Gate Bridge, Highway & Transit District (GGBHTD) are collaboratively working on a process to issue a competitive bid for a regional ETC customer service center to provide ETC customer service operations for the state-owned bridges and the Golden Gate Bridge.

I. Current ETC Utilization

Based on the review, some key findings regarding current ETC use on the state-owned bridges are summarized, as follows:

- Currently, ETC utilization on all of the state-owned Bay Area bridges averages about 23% of total (all day) traffic. During peak periods, ETC utilization is about 28% of peak period traffic.

- Comparing the second quarter of FY 2002-03 to the second quarter of the previous year, FasTrak usage during peak periods on the state-owned bridges has increased by almost 5%.

- In total, the ETC system accounts for about 2.5 million transactions per month.

- As of December 2002, there are a total of approximately 170,000 Fastrak accounts for the state-owned bridges. At present, the CSC is processing about 3,500 new accounts per month, which has been relatively stable over the past several months.

- Approximately 241,000 transponders have been issued since the inception of FasTrak on the state-owned bridges.

- Average peak period vehicle throughput for the dedicated lanes is approximately 1,000 vehicles per hour compared to about 400 vehicles per hour in the staffed lanes.

- The San Francisco-Oakland Bay Bridge has a high percentage of ETC usage in the non-ETC dedicated lanes compared to the other state-owned bridges mostly because there is limited access to the one ETC dedicated lane on the facility. The high use of ETC in non-dedicated lanes indicates that an additional ETC dedicated lane during the peak periods is warranted on the Bay Bridge.

- The violation rate (e.g. vehicles using ETC dedicated lanes without a transponder, lane equipment not reading transponders, etc.) for the ETC system on the state-owned bridges is about 1.3% of total traffic

Table 1 depicts ETC utilization as a percent of total traffic for each of the state-owned Bay Area Bridges and Table 2 shows average daily transactions by method of payment for the first quarter of FY 2002-03.

Table 1
Peak Period ETC Utilization
(September - December 2002)

	Peak Period			
Facility	**ETC Dedicated Lane**	**ETC Mixed Mode Lanes**	**Total Peak ETC Use (% of peak traffic)**	**All Day ETC Use (% of all day traffic)**
Antioch Bridge Peak Hour (3PM - 7PM):	17%	1%	18%	17%
Bay Bridge Morning Peak Hour (5AM - 10AM):	15%	11%	26%	20%
Bay Bridge Evening Peak Hour (3PM – 7PM):	15%	10%	25%	20%
Benicia Bridge Peak Hour (3PM - 7PM):	28%	1%	29%	25%
Carquinez Bridge Peak Hour (3PM – 7PM):	27%	1%	28%	22%
Dumbarton Bridge Peak Hour (6AM – 10AM):	37%	1%	38%	25%
Richmond-San Rafael Bridge Peak Hour (6AM - 10AM):	29%	1%	21%	32%
San Mateo-Hayward Bridge Peak Hour (6AM – 10AM):	26%	4%	30%	22%
Grand Total	22%	6%	28%	23%

Table 2
Average Daily Transactions
(July-September 2002)

Facility	HOV	ETC	Cash/Other	Total
Antioch	462	1,059	5,361	6,882
Bay Bridge	16,146	26,404	98,642	141,192
Benicia	1,846	12,233	37,566	51,645
Carquinez	4,588	13,409	46,109	64,106
Dumbarton	5,485	9,162	24,060	38,707
Richmond	1,514	11,394	25,178	38,086
San Mateo	5,053	9,166	30,479	44,699
Total	**35,094**	**82,827**	**267,396**	**385,316**

II. Comparative Analysis of ETC Systems

This section provides a review of electronic toll collection procedures and practices in a variety of functional areas from five toll agencies in the United States (Metropolitan Transit Authority – Bridges and Tunnels (MTA), Port Authority of New York/New Jersey (PANYNJ), Delaware River Port Authority (DRPA), Golden Gate Bridge (GGB), and Massachusetts Turnpike Authority (MassPike). The data provided offers a comparison of important program elements for comparison with the ETC system on the state-owned bridges. The following are some of the key conclusions of the comparison:

- The ETC market share for the state-owned bridges in the Bay Area is significantly less than the other agencies surveyed. Peak hour ETC use exceeds 50 percent (50%) at all other agencies surveyed. There appears to be a clear opportunity for continued growth of the ETC utilization rate for the state-owned bridges.

- The state-owned Bay Area bridges have the lowest utilization of dedicated ETC lanes. Also, the state-owned bridges do not have the equipment (e.g. signage) to vary between dedicated/mixed use lanes as many of the other toll agencies have employed.

- The state-owned Bay Area bridges currently do not offer discounts for ETC use, unlike the other toll agencies surveyed.

- The state-owned Bay Area bridges have the lowest toll rates of the other toll agencies surveyed.

- ETC violation rates on the state-owned bridges are consistent with the violation rates on the facilities of the agencies surveyed. It should be noted, as shown in the table below, that the violation rate for the MTA in New York is zero because they utilize gates at the toll plazas, which do not allow vehicles without ETC transponders to pass through ETC designated lanes.

- The on-going operating cost of ETC operations for the state-owned bridges is similar to the agencies used in the comparison.

Table 3 below shows a comparison of the ETC system on the state-owned bridges in the Bay Area to other agencies on a number of key elements.

Table 3
ETC System - Comparative Analysis

	MTA-NY	**PANY/NJ**	**DRPA-Penn. & NJ**	**GGB**	**MassPike**	**Caltrans**
Annual Revenues from Tolls	$915,112,000	$646,548,000	$173,629,000	$58,313,000	$188,488,000	$265,362,000 (includes seismic surcharge)
Annual Traffic –Toll Direction	255,173,000	119,725,000	50.878,000	20,654,000	181,443,000	133,596,000
Toll Rates (two-axle vehicles)	$3.00–cash $2.70-ETC	$6.00–cash $5.00-ETC (peak) $4.00-ETC (off-peak)	$3.00-cash $2.70-ETC	$5.00-cash $4.00-ETC		$2.00-cash and ETC
Avg. ETC Utilization (all day)	67%	63%	39%	37%	42%	23%
Avg. ETC Utilization (peak hour)	75%	70%	55%	63%	67%	28%
No. of ETC Accounts	1,434,732	415,000	98,500	65,102	306,000	170,000
No. of Transponders Issued	3,006,000	630,000	172,500	83,000	450,500	240,000
No. of Toll Lanes	204	74	45	11	155	65
Percent of Toll Lanes Dedicated to ETC Use (maximum)	61%	57%	44%	36%	37%	11%
Violation Rates in All Lanes (violators as a % of total traffic)	0%	1.9%	2.5%	2.4%	1.3%	1.3%

III. Lane Configurations at Toll Plazas (ETC Dedicated Lanes)

This section develops a plan for the placement of additional ETC dedicated lanes at each of the state-owned bridges in order to achieve the maximum vehicular throughput. Based on current traffic conditions and patterns and to foster increased utilization of ETC, it is recommended that short-term (6 to 18 month) and medium-term (18 to 36 month) revisions to current lane configurations be implemented to add dedicated ETC lanes to the state-owned bridges in the Bay Area. A summary of the specific recommendations for each of the toll plazas for short-term and medium-term implementation are shown in Table 4.

As a result of the recommended "Short-term" lane configurations, one additional dedicated ETC lane is recommended to be added to each of the state-owned Bay Area bridges, except the Antioch and Richmond-San Rafael Bridges. In general, an additional dedicated lane is recommended (short-term) when vehicle throughputs in a current ETC dedicated lane exceed 1,200 vehicles per hour in any given hour. It should be noted that unless there is usage of variable or fixed signage to vary between mixed and ETC dedicated lanes, opening additional ETC dedicated lanes will increase throughput during weekday peak periods, but on some facilities may negatively impact weekend traffic since ETC utilization rates are lower on weekends.

The "Medium-term" lane configurations would add additional ETC dedicated lanes to many of the bridges. However, it should be noted that implementation of the "Medium-term" lane configurations outlined below, are contingent upon significant increases in ETC utilization rates on the bridges. If utilizations do not increase significantly (to 40% to 60% range), many of the recommended "Medium-term" lane configurations may not be warranted.

Table 4
Recommended Lane Configurations (ETC Dedicated Lanes)

Bridge	Short-term	Medium-term
Antioch Bridge	• No changes to current configuration.	• No changes to current configuration.
Bay Bridge	• Convert lane number 3 or 4 to a dedicated ETC lane.	• Convert lane numbers 18, 19 and 20 (mini toll plaza) to dedicated ETC lanes when left-side bus lane is completed.
Benicia Bridge	• Convert lane number 5 to a dedicated ETC lane.	• Open lane numbers 15 and 16 at new toll plaza as dedicated ETC lanes.
Carquinez Bridge	• Convert lane number 8 to a dedicated ETC lane.	• No changes to short-term recommendations.

Table 4 (continued)
Recommended Lane Configurations (ETC Dedicated Lanes)

Bridge	Short-term	Medium-term
Dumbarton Bridge	• Convert lane number 5 to a dedicated ETC lane. Lane modifications for the Dumbarton Bridge are subject to analysis of downstream traffic impacts (see discussion below).	• Convert lane number 4 to a dedicated ETC lane.
Richmond Bridge	• Convert lane number 4 to a peak period dedicated High-occupancy-vehicle (HOV) lane.	• Convert lane number 3 to a peak period dedicated HOV lane. • Convert lane number 4 to a dedicated ETC lane.
San Mateo-Hayward Bridge	• Convert lane number 7 to a dedicated ETC lane.	• Convert lane number 3 to a dedicated ETC lane.

It should be noted that there is some concern that additional dedicated lanes on the Carquinez and the Dumbarton Bridges could result in increases in "downstream congestion" since there will be more un-metered vehicle capacity through those toll plazas. For the Carquinez Bridge, additional congestion could occur on Interstate 80 through Vallejo and for the Dumbarton Bridge, added congestion would be expected to occur at the Route 84/101 Interchange in San Mateo County. In both cases the result of the potential increased "downstream" congestion could most disadvantage high-occupancy-vehicle users since added ETC dedicated lanes will increase the capacity for single-occupancy-vehicles at the toll plaza and reduce the capacity for all vehicles at the downstream interchanges. It is recommended that further analysis regarding the impacts of the downstream traffic be conducted, especially for the Dumbarton Bridge.

Additionally, for the San Francisco-Oakland Bay Bridge, the short-term recommendations will result in ETC dedicated lanes in Lane #11 (existing) and Lane #3 (new). This configuration will continue to require a merge for motorist approaching the bridge from Interstate 880 (I-880) to reach a dedicated ETC lane. The medium-term recommendations include added ETC dedicated lanes on the Bay Bridge in Lanes #18, #19, and #20, which can be directly accessed from I-880. Caltrans and BATA are currently reviewing the operational impacts on truck and other traffic of providing a dedicated ETC lane that can be directly accessed from the I-880 approach in the near term.

The implementation of additional ETC dedicated lanes will require associated capital and operational improvements, including:

- Access Improvements for Toll Takers - ensuring that toll takers are not required to cross ETC dedicated lanes to reach staffed toll booths.

- Advance Approach Signage, which includes fixed and/or variable message signs in advance of the toll plazas to inform motorists of locations and potential status (i.e. open, closed, mixed flow) of ETC dedicated lanes. Variable advanced signage could enable flexibility for dedicated lanes to be open during peak periods and be mixed flow during off-peak periods, regardless of lane striping. However, due to the configurations of many of the bridge approaches, for some facilities, placement of advanced signage would not correctly align with the toll booths and could be confusing to motorist.

- Metering Light Revisions - Metering lights are currently used on the San Francisco-Oakland Bay Bridge to control westbound traffic onto the bridge after the toll plaza. As the number of dedicated ETC lanes increases, the flow of dedicated ETC traffic into the metering lanes needs to be evaluated. It is recommended that dedicated ETC lanes not merge with other lanes before the metering lights. It is further recommended that the metering light system provide faster metering rates for ETC lanes to provided added time-savings for ETC users.

IV. Toll Rate Discounts for ETC Use

Offering discounts for use of ETC is one of the most effective methods to encourage motorist to open an ETC account. GGBHTD's recent toll increase, which includes a $1.00 discount for use of ETC resulted in a significant increase in ETC sign-ups. Also, the Port Authority of New York/New Jersey provides a congestion pricing discount structure ($6-cash, $5-ETC during peak and $4-ETC off-peak). Other toll agencies throughout the country have various types of discount plans, including "frequency of use" discount plans, which provide discounts to patrons based on their use of the facilities. It is recommended that re-establishing a discount program for the state-owned bridges be considered as part of any legislative efforts to increase tolls on the state-owned bridges. If revenue loss is a concern, a frequency of use discount plan, could be structured to have minimum impact on revenues.

V. ETC Marketing Plan

Important components of increasing ETC utilization are 1) ensuring that the motoring public is aware of the system, including system benefits, and 2) can easily and conveniently access the system, including the ability to easily open an ETC account and quickly access an ETC transponder. This section identifies a few specific marketing measures that should be implemented to increase awareness and improve customer convenience. It should be noted that based on experiences of other toll agencies, the best marketing in terms of attracting new customers is to provide ETC dedicated lanes and toll discounts for ETC use, as discussed above.

Increasing System Awareness

- Advertising: It is recommended that general system advertising primarily focus on road signs and billboards at the toll facilities. The advertising should be relatively straight-forward, mostly communicating the CSC phone number or web site

address (see discussion below) to prospective patrons. Based on experiences of other toll agencies, radio, television and newsprint advertisement of ETC does not appear to be effective. It is further recommended that advertisement of the ETC system and ETC applications be distributed by toll takers at the toll plazas on an as needed basis and in a fashion that does not impact traffic.

- Business Days: An innovative way to encourage ETC signups is to coordinate with large organizations. The Massachusetts Turnpike (MassPike) has used business days with positive results. The MassPike contacted major businesses along the turnpike and arranged to have a booth or table set up in a lobby or cafeteria. Employees of those corporations or businesses then have the opportunity to ask questions directly to a FasTrak representative and fill out applications on the spot. Caltrans could establish a similar program, such as in conjunction with downtown San Francisco employers, to issue pre-activated tags at that time or simply process the applications at the end of business that day and mail tags out to those customers.

- Co-branding and Partnerships: Similar to business days, Caltrans could work in partnership with well-known businesses to market FasTrak. Partnering with organizations such as the Department of Motor Vehicles and the California State Automobile Association could provide the effective benefits of walk in centers without the cost.

Increasing Access to ETC Accounts/Transponders

- Enhanced Web Site: While a printable application is currently on the Caltrans web site, actual on-line enrollment is not provided. For some toll agencies, on-line signup represents over 50% of their enrollments. It is recommended that an interactive ETC web site, which allows customers to open accounts and obtain other information be implemented as soon as practical. Additionally, it is recommended that any development of a new web site for the FasTrak system include account management features allowing customers to review account balances, replenish accounts, revise account information, find answers to frequently asked questions etc. Caltrans and BATA should also investigate opportunities to coordinate and integrate ETC web access with other web site programs (e.g. Caltrans web site, 511 Traveler Information web site, etc.). Given that the CSC operations will be re-bid in the near future, it is recommended that on-line applications and customer services be a requirement as part of a new CSC contract.

  If it is determined that a full functioning web site can not be implemented prior to the establishment of a new CSC contract, it is recommended that in the meantime, on-line sign ups be implemented by allowing customers to fill out an application using on-line web forms. Upon submittal, the customer information data is securely sent to the CSC, which would re-enter the data into the CSC system, as they would with a paper application.

- CSC Walk-in Centers: Currently there is one Customer Service Center located in Concord, California. The CSC reports that currently about 1% of accounts opened are from walk-in customers. As a comparison, the Golden Gate Bridge maintains that 18% of accounts are opened by walk-in customers and New York toll agencies (MTA and PANYNJ) report that 31% of accounts are opened by walk-ins. In the case of the GGBHTD, the majority of traffic passes directly by the location of the Customer Service Center. In New York, there are multiple walk-in sites available to customers. The comparatively low percentage of walk-in customers for the Caltrans system is likely due to the location of the single CSC, which is quite remote from the majority of bridge traffic. While CSC walk in sites are popular, they are not necessarily cost effective. Any development of additional walk in centers should include estimates of their cost on the basis of accounts established and transactions processed (mostly replenishments). Additionally, the toll plaza administration buildings at each Caltrans facility could be used as a satellite walk-in center or walk-up sites that sell transit tickets could also offer ETC transponders. In the past, commute tickets were sold at the toll plazas. Security and contractual implications, such as the availability of pre-activated tags, or access to the customer database outside the control of the CSC operator, will need review.

It is recommended that BATA and Caltrans develop a marketing program for the ETC program to be implemented prior to and coinciding with the implementation of additional ETC dedicated lanes on the bridges. It is believed that motorist should be informed of pending dedicated lanes, be aware of the ETC system and have easy access to ETC transponders, in conjunction with the implementation of additional dedicated lanes.

It is further recommended that BATA and Caltrans ensure that the ETC CSC is able to accommodate increases in ETC utilization as new dedicated lanes are introduced and marketing activities are undertaken. In addition to quickly dispensing transponders, the CSC must be able to quickly respond to customer inquiries and process and maintain customer accounts.

VI. Action/Implementation Plan

Table 5 outlines an implementation plan and schedule for improvements to the ETC system on the state-owned bridges over the next 18 months.

Table 5
ETC Improvement Program Implementation Plan

	2003				2004	
	Quarter 1	**Quarter 2**	**Quarter 3**	**Quarter 4**	**Quarter 1**	**Quarter 2**
Implementation of New Customer Service Center (CSC) Contract		Issue RFP for ETC CSC to begin operations in January 2004	Award contract for ETC CSC to begin operations in January 2004		Begin operations of new CSC contract, including interactive web capabilities for establishing and managing accounts	
ETC Marketing Program		Complete development of marketing strategy for ETC system and implement marketing activities	Continued implementation of marketing efforts	Continued implementation of marketing efforts	Continued implementation of marketing efforts	Continued implementation of marketing efforts
Implement Additional ETC Dedicated Lanes	Initiate capital improvements to improve access for toll collectors at San Mateo-Hayward Bridge Review metering light system on Bay Bridge to determine impact of providing faster metering rates for ETC lanes.	Open new ETC dedicated lane (Lane 8) on Carquinez Bridge Open new peak hour dedicated HOV lane (Lane 4) on Richmond-San Rafael Bridge Open new ETC dedicated lane (Lane 3 or 4) on Bay Bridge	Open new dedicated lane (Lane 5) on Benicia-Martinez Bridge Open new dedicated lane (Lane 5) on Dumbarton Bridge		Complete capital improvements to improve access for toll collectors at San Mateo-Hayward Bridge	Convert lane number 3 to a peak period dedicated HOV lane and convert lane number 4 to a dedicated ETC lane on the Richmond-San Rafael Bridge Open new ETC dedicated lane (Lane 7) on San Mateo-Hayward Bridge