ATTACHMENT A:

Task 1.0 Video Tolling Concepts Review

Technical Memorandum – Final Report

BATA Video Tolling Demonstration Project

Video Tolling Concepts Review

June 18, 2008

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DOCUMENT CONTROL PANEL		
File Name:	*Technical Memorandum – Video Tolling Concepts Review*	
File Location:		
Deliverable Number:	1.1	
Version Number:	6.10	
Name		**Date**
Created By:	McQueen / Bausher	4/17/08
Reviewed By:	Dillard / Chang / Biggs	4/18/08
	Biggs / Miller / Moradi	4/21/08
	Johns / Smith	4/23/08
	Bonds / Biggs / Chang	4/30/08
	Dillard	5/14/08
Modified By:	Bausher / Dillard	4/20/08
	Dillard / McQueen / Bausher	4/21/08
	Dillard	4/25/08
	Dillard	4/30/08
	Bausher	5/19/08
	Dillard	6/11/08
Completed By:	Dillard	6/18/08

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Introduction

Purpose of Memorandum

This memorandum provides a broad survey of video tolling usage within the toll industry. Interviews were conducted with other agencies to gain an understanding of video tolling implementations already in place, as well as those being studied or planned for implementation in the near future. Additionally, this memorandum provides an analysis of the types and patterns of video tolling developing across the industry, from typical image-based posting of tolls to transponder-oriented accounts, to invoice-based video billing, to third-party support for image-based tolling of rental cars. The practical experience captured and conclusions reached in the course of this review will provide a foundation for the definition of functional and systems requirements for BATA, decision support for business rules, demonstration project planning, and system design choices, and a basis for further study and upcoming recommendations within the context of this project.

Context within Project and Toll Industry

The use of video cameras for electronic tolling enforcement purposes has been prevalent since the late 1990's. Cameras are typically used to capture an image of the vehicle license plate, enabling a vehicle with no transponder or an unreadable one to be identified by alternative means. Originally, all video images were manually reviewed by a skilled human operator in order to match the license plate to department of motor vehicle (DMV) records. Since violation rates for a well-run electronic toll operation typically run between 2 and 4% of transactions, it was practical to manually review all images. Increased use of video, however, increases the volume of images requiring review to a level that makes full manual review impractical.

In response to that need, Automated License Plate Recognition (ALPR) technologies have evolved. ALPR is one of several terms used to describe systems that capture license plate images and convert them to text. These systems generally use automated tools like Optical Character Recognition (OCR). Similar identifying terms may include automated number plate recognition (ANPR), automated vehicle identification (AVI), and car plate recognition (CPR), but for the purposes of this memorandum, ALPR will be used generically to refer to any system performing these functions.

Over the past several years, ALPR techniques have developed to the point that video technologies are now viable tools for mainstream toll collection use. A large percentage of vehicle license plates can now be read and accurately transcribed into alphanumeric strings using a combination of advanced ALPR techniques. This presents the possibility that the existing video infrastructure used for toll enforcement can serve double duty as an alternative form of electronic toll payment. Much of the driving force behind the current technological capabilities resulted from the need to address Electronic Toll Collection (ETC) customers whose transponders were not read as they passed the tolling

point, and to process these "accidental" violators as valid customers. **Figure 1** provides a timeline for the advent of video as a mature option for video tolling.

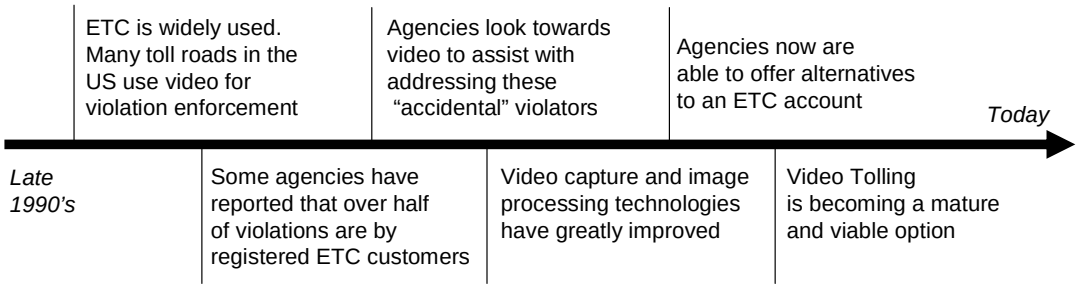

Figure 1 - Video Tolling Development Timeline

Outside the U.S., video image capture and license plate processing have been implemented as part of demand management strategies like congestion pricing. Pioneering applications in London and Stockholm have created a surge in global interest in these techniques. The London system in particular is notable for the exclusive use of ALPR techniques for payment of the congestion charge. These applications have driven the quality of such systems and operations to new levels.

Between national and international video projects, from tolling to congestion pricing, a great deal of knowledge and practical experience exists from which BATA may draw when evaluating the feasibility and suitability of video tolling techniques for the Bay Area.

The Practice of Video Tolling

Video Tolling Defined

Research has revealed that, although the term "video tolling" is widely used within the toll industry, it is not widely understood according to any standard definition. A variety of interpretations of this term have resulted in implementations of "video tolling" that include significantly different functions and structures. A complete list of Video Tolling Definitions is attached to this document as **Appendix A**, for easier reference.

The identifiers included in each video tolling category adhere to the following pattern:

1) The first part of the identifier indicates registration requirements – REG for pre-registered, and UNREG for unregistered.
2) The second part reflects payment requirements – PRE for pre-paid, and POST for post-paid.
3) The last section indicates transponder- or video-based. When there is no third section, video is assumed. Transponder account-related tolling shows READ for

transponder-based transaction posting and NORD for video-based transponder posting when the transponder did not read.

4) Standard ETC is included for context, with an identifier of ETC.
5) Third-party / rental car tolling is also included, with an identifier of RENTAL.

These categories and identifiers will be used throughout this document and attachments, in an attempt to bring consistency and clarity to this variety of non-standardized applications.

ETC-Related Video Tolling: REG/PRE/READ and REG/PRE/NORD

Posting of toll transactions to **pre-registered, pre-paid transponder-based accounts** outside of standard ETC processing, as defined in **Table 1** below. ETC-related video tolling is referred to by a variety of names, depending on the agency.

Table 1: ETC-Related Video Tolling

Categ	Identifier	Other Names	Register	Pre-/Post-Paid	Tag	Transaction Posted By	Invoiced
ETC	ETC	Standard ETC	Pre-Reg	Pre-Paid	Tag Read	Tag	No
	REG/PRE/READ	V-Tolling (TxDOT); V-Tolling / Violation tolling (BATA)	Pre-Reg	Pre-Paid	Tag Read	Tag	No
	REG/PRE/NORD	I-Tolling (Image tolling) (TxDOT, BATA); Pay by Plate (TxDOT); V-Tolling (General industry)	Pre-Reg	Pre-Paid	Tag Exists, but No Tag Read	Image / Plate	No
		M-tolling (Manual tolling) (TxDOT); V-Tolling (General industry)	Pre-Reg	Pre-Paid	Varies	Manual Correlation	No

Although ETC-related video tolling is often collectively referred to as v-tolling in the tolling industry, it can be broken down into two subtypes (not including standard ETC), based on the method of converting the transaction to a valid toll posting:

- **REG/PRE/READ** is typically called v-tolling, and refers to the posting of an ETC transaction that had an invalid tag read in the lane based on the tag / account status provided to the lane system. Once the transaction reaches the back office posting process, however, the account has become valid due to a replenishment or clearing of other issues, and the transaction is posted based upon the tag read.

- **REG/PRE/NORD** is generally referred to as i-tolling, image tolling, or Pay by Plate. It refers to transactions posted to valid accounts based on the license plate number retrieved during image review. In this case, the license plate is already associated with a valid transponder-based account. This method was originally deployed to prevent violations from going out when valid transponders weren't read by lane equipment – an anomaly that occurs a small percentage of the time, regardless of the technology in use.

A related method of posting a toll transaction may also be included in this group. It is sometimes referred to as m-tolling, although this term is less frequently used. In many cases this type of transaction posting is simply included in the customer service process without a specific name. It refers to tolls that are originally considered invalid and not posted, resulting in an invoice or violation notice, but are then manually re-evaluated and posted as the result of a customer contact with the agency's customer service personnel.

These processes are widely used, as many modern back office systems either allow or require the customer to list the vehicles and license plate information associated with the transponders provided. REG/PRE/NORD is more expensive than tolling based on a transponder read, as it does involve image review, so most agencies do not promote it as a primary means of toll collection. However, it provides a backup to the ETC process by transforming equipment errors and unreadable transponders into valid transactions without creating a violation and unnecessarily alarming the customer.

Within BATA, all methods above are already in use with the current systems, under the names v-tolling and i-tolling. As such, it will not be a significant focus of this study.

Pre-Registered Video Tolling: REG/PRE

Posting of image-based toll transactions to **pre-registered, pre-paid license plate-based accounts (without a transponder)**, also referred to as pre-registered video tolling, defined in **Table 2** below. This method is an extension of ETC-based video tolling, whereby the agency allows customers to attach vehicles with no transponder to a new or existing account and have their toll transactions posted based on their license plate. Because REG/PRE is a more expensive process than ETC, some agencies also pass on this cost in the form of a higher toll rate or a "convenience" fee.

Table 2: REG/PRE Video Tolling

Categ	Identifier	Other Names	Register	Pre-/Post-Paid	Tag	Transaction Posted By	Invoiced
VT-PRE	REG/PRE	Pay by Plate, I-Tolling (TxDOT); Toll by Plate (FTE), Pre-Registered Video Tolling (NCTA)	Pre-Reg	Pre-Paid	No Tag	Image / Plate	No

REG/PRE tolling is very similar to REG/PRE/NORD, in that transactions are posted based on an image read, and is often also referred to as i-tolling or pay by plate. The difference in this case is in the initial setup and the intention of the customer. REG/PRE/NORD requires that a license plate be associated with a transponder on a valid account; REG/PRE allows the registration of a vehicle license plate to an account without a transponder. When the customer sets up his account in this manner, it is his intention to be tolled based on a license plate image, instead of mounting a transponder on his windshield, even though in some cases it may cost him more. Not all systems allow for license plate registration without a transponder, so this method of image-based tolling is less common than the ETC-related options. In general, it is restricted to the small percentage of customers who are willing to pre-register, and are willing to pay extra in order not to use a transponder. The majority of agencies providing video tolling-type services support this method, including Toronto, London, Florida's Turnpike Enterprise (FTE) and the Texas Department of Transportation (TxDOT).

REG/PRE tolling may be further delineated by the type of customer allowed to use it. In that case, it follows the same process, but is restricted to only a certain type of customer, such as a fleet or commercial account. It is typically used by agencies to assist companies with the difficulties of maintaining transponders on large fleets. It may also be restricted in duration, such as a pre-paid day pass or limited duration account.

BATA does not currently support the registration of vehicle license plates without a transponder, so REG/PRE is not already in use and will be a topic of analysis within this memorandum and future deliverables.

Post-Paid Video Billing: REG/POST and UNREG/POST

Image-based posting of toll transactions to **post-paid license plate-based accounts**, known by the few agencies using this process as video billing or Pay by Mail. Post-paid

video tolling is an invoice-driven process, as illustrated by **Table 3** below. In the case of UNREG/POST, accounts are created based on the vehicle license plate, using owner name and address data retrieved from the state's DMV equivalent.

Table 3: Post-Paid Video Billing

Categ	Identifier	Other Names	Register	Pre-/Post-Paid	Tag	Transaction Posted By	Invoiced
VT-POST	REG/POST	Fleet Tolling (MDX)	Pre-Reg	Post-Paid	No Tag	Image / Plate	Yes
	UNREG/POST	Video Tolling (ETR 407); Video Billing, Pay by Mail (TxDOT); Unregistered Video Tolling (NCTA)	Un-Reg	Post-Paid	No Tag	Image / Plate	Yes

Post-paid video tolling is generally supplemental to the typical ETC-plus-video enforcement process. It may be put in place to more conveniently collect from that segment of potential violators who either don't intend to violate, or refuse to pre-register, especially in non-cash collection locations. It is also viewed in cash collection locations as having the potential to gradually supplant all but a small amount of the existing cash tolling.

Because this is a post-paid collection method, it results in a greater inherent percentage of non-payment. And in the case of UNREG/POST, that risk is also increased by the potential for unavailable / invalid vehicle owner name and address information. However, if unpaid invoices are followed up with traditional violations, collections, court action, or similar enforcement methods, the combination of video billing and ETC comprises a formidable set of tools.

Post-paid video billing may also be restricted to a specific type of customer, such as fleet or commercial accounts. Although in the past post-paid commercial customers were common, as companies tended to pay by purchase order, they haven't been as readily supported in recent years. As a result, this model appears to be the least common of those considered – Miami-Dade Expressway (MDX) is the only agency within this review using this limited-audience method.

BATA, like most other U.S. toll agencies, does not currently employ this type of invoiced, post-paid arrangement. Post-paid tolling based on video images is a fairly new concept within the United States, but has been used on the ETR 407 in Toronto for many years. More recently it has been deployed on several projects in Texas and Florida, and is being studied in a variety of U.S. locations for near-future implementation. As a result, this type of tolling will be a significant subject within this memorandum and subsequent deliverables.

Third-Party Video Tolling: RENTAL

Third-party image-based tolling, typically used in support of rental car companies and similar fleets, as illustrated by **Table 4** below. Because fleets are more difficult to manage in the tolling arena, private companies have established a variety of solutions in an attempt to support them.

Table 4: RENTAL Video Tolling

Categ	Identifier	Other Names	Register	Pre-/Post-Paid	Tag	Transaction Posted By	Invoiced
RENTAL	RENTAL	Rental Car Tolling; Third-Party Video Tolling	Un-Reg	Post-Paid	No Tag	Image / Plate	Varies

Current providers for the rental car industry include American Traffic Solutions / PlatePass, Rent a Toll, and Highway Toll Administration LLC (HTA), who each follow their own model and work with different rental car companies to support the collection of tolls from rental car users. HTA has used a traditional transponder-based approach in the northeastern U.S. for many years, but the two newer providers use an image-based tolling concept. PlatePass works from a transaction-based model, where the rented vehicle is automatically signed up, but the customer is only charged if and when they use a toll facility. Rent a Toll uses an opt-in model, where the rental customer may choose to pay a per-day tolling fee for the duration of the rental agreement and not deal with the individual transactions. Each of these has negotiated different types of interfaces with different agencies, and supports only rental car companies with which they have agreements – Avis, Budget and Hertz for PlatePass, and Dollar/Thrifty for Rent a Toll.

Individual rental car companies, car leasing companies, and companies with other types of fleets may also make their own arrangements with tolling agencies. Some agencies

choose to only support these types of accounts using a standard approach like REG/PRE, and others forego the additional complication and require fleets to use transponders.

BATA is currently supported by ACS in their interactions with these types of customers, but is investigating the potential use of RENTAL outside of this project. As a result, this method will receive only limited attention within this memorandum.

Video Tolling Projects

Video Toll Projects Currently in Operation

Currently there are a variety of active facilities that utilize video tolling methods. Various examples are listed below, along with a brief description of each:

- **407 ETR, Toronto, Canada** – North America's first 100% electronic toll system, accepting both transponder and image-based toll payments, opened in 1997. REG/PRE and UNREG/POST are supported. Video toll customers pay a premium charge above the transponder rate, with a variety of fees associated. Trip cost depends on the time of day, vehicle class, distance and section(s) travelled, as well as correct mounting and use of a valid transponder. The roadway is 67 miles in length and includes 197 ramps. In 2005, over 100 million trips were processed with an accuracy rate of 99.9%. Originally constructed and operated under the auspices of the Ontario Provincial Government, 407 ETR is now operated by an international consortium under a concession agreement.

- **London Congestion Charging, London, England** – A sizeable area of central London into which vehicles are charged to travel. This is done in an attempt to reduce congestion and emissions in downtown London, while creating a revenue stream for transit enhancements. This program was initially deployed in 2003, and the charge area was expanded in 2007. Although Transport for London (TfL) is exploring the use of transponders, video license plate image capture is currently the sole method for identifying vehicles in this cordon pricing scheme. REG/PRE is employed in a manner very similar to other highlighted facilities, but with the addition of post-transaction registration (within a defined amount of time following the transaction). The primary difference between this application and typical video tolling is the subject of the charge. With tolling, drivers are being charged to travel a specific road or cross a bridge. London is charging for the use of an entire network of roads, with video installed in many points around and within the ring. London's program is operated by TfL.

- **Stockholm Congestion Pricing, Stockholm, Sweden** – Similar to London's program, Stockholm's Congestion Pricing scheme employs a system of transponder readers and video cameras to levy a congestion charge on most vehicles entering and exiting central Stockholm. Charges vary by the time of day, and drivers are responsible for paying the "tax" within 14 days without any invoicing. If unpaid after 14 days, a reminder notice with an additional late fee

is mailed. A REG/PRE program allows charges to be deducted from the registrant's bank account by transponder read or image read and plate match. Charges can be post-paid, but it is not truly an UNREG/POST program, as vehicles are "registered" along with their vehicle registration, and invoices are not mailed. This program was piloted in 2006, with permanent implementation during 2007, and is operated by the Swedish Road Administration.

- **Texas SH 121, Dallas, TX** – A twelve-lane toll road with 6.5 miles currently open and 9.5 miles under construction. On SH 121 tolls can be paid in two ways: through a transponder account (TxTag™, TollTag™, or EZ Tag) or through UNREG/POST (Pay by Mail). Because the roadway uses only video technology, all transactions are processed by image reads, and license plates matching existing accounts are then v-tolled (REG/PRE/NORD and REG/PRE).

  SH121 has been operated under this model by TxDOT since fall 2006. It is being transitioned over to the North Texas Tollway Authority (NTTA), which operates the remaining toll facilities in the Dallas area. They have agreed to continue the video tolling services, and are in fact adopting the practice on their other facilities.

- **Loop 49, Tyler, TX** – A two-lane rural toll road with the 7 mile pilot phase currently open and an additional 25 miles in design phases. Loop 49 employs ETC with REG/PRE/NORD, REG/PRE, and UNREG/POST, expanding the TxDOT model from its video-only application on SH 121. Acting as a bypass to the south and west of Tyler, the roadway has been built with two lanes undivided due to low anticipated traffic volumes. However, it is designed to include additional lanes for a conventional 2x2 lane expressway.

  Loop 49 has been operated under this model by TxDOT since fall 2006, but may be transitioned over to the North East Texas Regional Mobility Authority (NETRMA) at some point.

- **Central Texas Turnpike, Austin, TX** – A four- to six-lane divided toll road with 65 miles of toll lanes on three connected highways – Loop 1, SH 45N, and SH 130. The final segment of the originally funded Central Texas Turnpike System (CTTS) project opened April, 2008. Other related projects (SH 45 SE, SH 130 segments 5&6) are planned, but were not part of the originally funded CTTS. The CTTS employs cash, ETC with REG/PRE/NORD, and Video for REG/PRE and UNREG/POST methods, further expanding the TxDOT model in use on SH 121 and Loop 49. The CTTS is owned and operated by TxDOT.

- **Selmon Crosstown Expressway, Tampa, FL** – A 15-mile, 4-lane divided crosstown roadway with a tolled reversible lane pilot in the elevated portion. The pilot system is cashless, accepting transponders, REG/PRE/NORD, or REG/PRE for payment on the elevated reversible lanes of the Expressway. The facility is operated by Florida's Turnpike Enterprise (FTE). Motorists without a transponder must contact the toll authority via an 800 number and pay the toll, either before the transaction or within 72 hours afterwards. Cash is still accepted in Tampa on the old surface tollroad below the elevated lanes, at the conventional stop-to-pay mainline toll plaza.

- **Melbourne CityLink, Melbourne, Australia** – A 14-mile toll road divided into two separate segments. Each connects major arterials in the city of Melbourne. CityLink is an all-electronic facility, employing ETC and video tolling for toll payments. REG/PRE requires an account to be opened, either prior to travel or within three days, and payment is either required in advance or extracted from a customer-provided bank or credit card account. A variety of account types are supported, including day and weekend passes, frequent and infrequent use, requiring transponders or not. CityLink began collecting tolls in 2000, and is operated by TransUrban under a concession agreement with the Victorian government.

- **Multi-Concession Toll Network, Santiago, Chile** – A 97-mile network of urban highways in and around Santiago, which are operated under concession agreements by four different concessionaires with full interoperability. Santiago has a very heavy ETC penetration that is supplemented with REG/PRE and UNREG/POST. Non-ETC customers can acquire a day pass, late day pass, or use the roadway and have an invoice mailed to them. The day pass can be purchased 30 days before or up to 48 hours after use of the road. It is valid for one calendar day (not a 24 hour pass) and the customer can only purchase 24 day passes on a yearly basis. The customer can purchase a late day pass, which is available from the third day after road usage and up to 20 days. After 20 days, the customer is issued a UNREG/POST invoice. Failure to pay the invoice constitutes a violation.

Video Toll Projects Proposed and/or Being Studied

In addition to the operational systems previously listed, various agencies are currently analyzing and planning video tolling implementations. Among them are:

- Miami-Dade Expressway Authority

  - Currently implementing all-electronic tolling and eliminating cash plazas
  - REG/POST in use for fleets and transit agencies
  - RENTAL provided by Rent a Toll and PlatePass
  - UNREG/POST concept in planning stages

- North Carolina Turnpike Authority (NCTA)
  - Plans for UNREG/POST and REG/PRE tolling
  - Road opening planned for 2010

- Port Mann Bridge, British Columbia, Canada
  - REG/PRE and/or UNREG/POST will supplement ETC system
  - Establishment of design / build / operate concession agreement in progress, with completion by 2013

- 183A, Central Texas Regional Mobility Authority (CTRMA), Austin, Texas
  - Implementation of UNREG/POST has been approved and is in progress, to be completed in the next few months

- North Texas Turnpike Authority (NTTA), Dallas, Texas
  - Taking over operation of SH 121, including REG/PRE and UNREG/POST
  - Plan to move all their facilities to AET with REG/PRE and UNREG/POST by 2010
  - RENTAL provided by Rent a Toll

- Port Authority of New York & New Jersey (PANYNJ)
  - Beginning a study investigating video tolling possibilities to supplement current ETC system

- E470, Denver, CO
  - Studying potential for REG/PRE and/or UNREG/POST with removal of cash by 2009
  - RENTAL provided by Rent a Toll

Agency Interviews

In order to better understand the current state of the video tolling practice, agency interviews for performed. A sample of agencies that have either deployed or are in the planning stages of video tolling were selected from the above list for interview. The interviews were conducted by telephone, using a question and answer matrix as a checklist and a structured method of capturing answers and information. Each set of answers was provided to the interviewee for review and feedback prior to completion.

Interview Participants

As reflected in previous sections, there are a variety of agencies currently operating video tolling systems, and quite a few more currently studying or planning video tolling deployments. From that list of potential interviewees, several were selected. Interviews with 407 ETR, TxDOT, and FTE were considered mandatory, due to the applicability of their current programs. Others were included based on their potential to illustrate unique aspects of video tolling, as well as their availability to be interviewed during the required timeframe.

Interviews include both active systems and those currently in planning stages. Also, interviews were divided among those with many years of operational experience (407 ETR) and those with relatively new systems (SH 121 and Selmon Crosstown Expressway), as well as those handling many thousands of transactions per day (London) compared to those with relatively few (Loop 49).

Table 5: Video Tolling Agencies Interviewed

Agency	Program	Status
407 ETR International, Inc.	407 ETR, Toronto, Canada	Operational since 1997
Transport for London (TfL)	London Congestion Charging	Operational since 2003
Swedish Road Administration (SRA)	Stockholm Congestion Pricing	Operational since 2006
Texas Department of Transportation (TxDOT)	SH 121, Dallas, TX; Loop 49, Tyler, TX; CTTS, Austin, TX	Operational since 2006
Florida's Turnpike Enterprise (FTE)	Selmon Crosstown Expressway, Tampa, FL	Operational since 2006
Miami-Dade Expressway Authority (MDX)	New Video Tolling Program	In Planning Stages
North Carolina Turnpike Authority (NCTA)	New Tolling Program	Planned for 2010

Interview Questions

In order to gain maximum benefit from the review work, an initial search of documents and reports available from agencies and on the internet was conducted. Careful consideration was given to focus areas specified within the original BATA scope of work, supplemented by general bridging questions to fill in the gaps.

The responses to these questions will highlight the general business practice questions of agencies already using video tolling, as well as some who are still in the planning stages. These responses will form the basis for further analysis and future recommendations. The resulting set of questions is included in **Appendix B**, attached.

Interview Results

Results of the agency interviews have been compiled into three appendices, to be delivered in conjunction with this memorandum:

- **Appendix C: Video Tolling Business Practice Matrix** is a summary-level side-by-side comparison of the general business practices of each agency. This matrix will allow provide an at a glance illustration of the "state of the practice" for video tolling as currently used.

- **Appendix D: Agency Interviews** includes a paraphrased transcript of each interview. Interview transcripts will provide additional detail, for those who want it, as they can be referenced wherever questions remain after reviewing this memorandum and the matrix.

- **Appendix E: Video Toll Signing** is a brief overview of signing practices related to video tolling, with illustrations.

While these appendices lay out the details of each operation as provided by interviewees, the following section of this memorandum provides conclusions drawn from that material.

Analysis

Throughout the collection of toll industry data through research and interviews, key characteristics were noted and set aside for analysis, with the goal of clarifying definitions and observing patterns. This section focuses on the results of that analysis, providing a list of conclusions for consideration as the project moves forward.

Conclusions

Analysis of issues and items noted during this technology review resulted in several key observations that will be beneficial to keep in mind as the project proceeds. Each is noted below, in no particular order, along with a brief explanation for clarification. It is expected that these observations will impact project objectives and tasks as the project proceeds, helping to guide the project outcome.

1) Of the seven agencies interviewed, only the TxDOT CTTS and the non-pilot segment of the Selmon Crosstown Expressway still accept cash in the lanes. Based on this fact and recent general trends in the tolling industry, it appears that many agencies are moving away from cash tolling and may also be considering the adoption of video tolling to compensate for the customer's inability to pay cash in the lane.

2) All of the agencies interviewed use ETC, with the exceptions of TxDOT's SH 121 and TfL's Congestion Charging. However, SH 121 is eventually intended to include ETC, and TfL is considering a move to transponders, as well. In fact, most agencies appear to use video tolling as part of a portfolio of solutions. This indicates that video tolling is not a replacement for ETC, but a complementary technology.

3) Most of the interviewed agencies support, or are planning to support, some form of REG/PRE video tolling. Only ETR 407 and TxDOT have UNREG/POST video billing currently in operation, and MDX is the only adopter of (fleet only) REG/POST tolling. This reflects a sensible amount of caution within the toll industry regarding post-paid payment methods. However, considering the number of video tolling studies currently in development or soon to be, it could foreshadow an upward trend in post-paid implementation projects. As an agency with a demonstration project already in the works, BATA may be on the leading edge of that curve.

   An issue frequently raised with regard to post-paid tolling is the ability of a public agency to provide post-payment options or "extend credit", due to statutory or bond requirements. This has been addressed and found not to be a barrier by several agencies. For example, in Texas it was determined that invoicing was a payment option and not an extension of credit, since the point of "violation" did not occur until the invoice went unpaid for 60 days. In Florida, a legal opinion states that the extension of credit does not apply to the individual customer, as it relates to the customer's involvement in the electronic tolling program. This is less of an issue for

NCTA since it is being resolved on the front end of their operational and systems development efforts.

4) Four of the interviewed agencies are processing anywhere from about 70,000 to 350,000+ video transactions a day. Image review has long been considered one of the more expensive functions related to electronic tolling, with high volumes of image capture viewed as something to avoid. Current movements toward video tolling indicate that the associated costs have come more into line with other toll collection options than they were just a few years ago. This is due to improved image capture and text conversion technologies. Nonetheless, ETC transaction processing is still cheaper than video.

The largest processor of video images, Stockholm's Congestion Pricing, began with transponders and is phasing them out in favor of video. This may be an extreme case driven in part by Sweden's legal requirements, but it reflects a noticeable trend in the industry.

5) Only three of the seven interviewed agencies require pre-registration for video tolling, and two of those process a "negligible" percentage of video transactions and retain 40% cash processing. While MDX could be expected to support only a small percentage of video based on the limited focus of their current program, the other two agencies still supporting cash, FTE and TxDOT, show significantly different market breakdowns directly proportionate to the restrictions of their programs. This indicates that requiring pre-registration and supporting a restricted audience also constrains the benefits of video tolling, including the potential to offset cash collection and supplement ETC.

6) Several common themes are reflected in the reasons agencies cited for the adoption of video tolling, including congestion management / traffic reduction, revenue generation, providing more options to the customer, social / environmental justice objectives. While traffic management and revenue generation have traditionally been common goals of toll programs, they have become more critical as cities become more enmeshed in traffic. In addition, the last two objectives indicate the expanding focus of the toll industry. As toll facilities develop in more parts of the world and the driving public becomes more educated about those programs, the need to better serve the customer and to offset imbalances caused by tolling has become a clearer driving factor.

7) Video tolling blurs the previously clear line between customer and violator. In the past, at least in most cases, customers either paid cash or had funded accounts and valid transponders. Violators used the toll facility without these items, in clear violation of the rules. Allowing those who do not meet the previous definition of "customers" to still pay via an invoice without being considered "rule-breakers" is a significant shift in mindset for the industry. It is one, nonetheless, that is being adopted in many areas as a customer-service driven model of business.

8) The more extensive a public education / marketing campaign supported by an agency, the higher market penetration their ETC and video programs return. This, in turn, shows a return on investment (ROI) for marketing that offsets the more costly cash collection process, even though marketing expenses can rarely be justified on the basis of ROI.

   Public information and marketing is necessary in order for the customer to make a payment, but it is also important to help customers see that the system is fair and equitable, and that the potential for fraud, abuse and waste (by other customers or violators, as well as by the agency) is minimal. Transportation agencies in general have not been market-driven in the past. Tolling segments of those agencies, as well as stand-alone toll authorities, are becoming more aware of the need to educate the public. Improving the visibility of their operation in the public eye is critical, not in small part because their revenue and funding depends directly on customers' participation and use of their facilities.

9) Although only ETR 407 and TxDOT currently support UNREG/POST video billing, their toll rate structure implementations illustrate the effectiveness of differential toll rates for ETC, video, and cash (where applicable). In order to keep UNREG/POST focused on supplanting cash collection and avoid cutting into ETC penetration, it is important that an incentive exists for ETC over video. A higher rate and/or added fee for the conveniences of video tolling (e.g., no transponder, no pre-registration and funding, and invoiced post-payment) provides such an incentive.

10) It is interesting to note the differences in billing approach between the North American and European agencies. In North America, post-paid video tolling is generally approached as a customer convenience, with invoices provided in support of that focus. In Europe, video tolling as part of congestion charging is a tax in the case of Stockholm, and a mandatory charge with nearly the emphasis of a tax in London. Neither sends video invoices, making it the customer's responsibility to track their usage and pay their charges in order to avoid violations / penalties. Both methods work, but it is clear that European political support for the hard-line approach is much stronger.

11) Although video tolling estimated costs appear to range widely across the interviewed agencies, it should not be assumed that costs truly vary that much. It is more likely that agencies are calculating their costs according to different formulas and including different functions, based on their individual implementations and tolling types. It is difficult to compare apples to apples for any function across agencies in the toll industry, and much more so with regard to a function as non-standardized and relatively new as video tolling.

12) With the exception of traffic safety enforcement and top violator tracking, it appears that none of the interviewed agencies use law enforcement for direct toll

enforcement. This is a necessary consequence of video tolling, since law enforcement officers may no longer be able to identify violators as they pass through a toll plaza. Enforcement of both ETC and video tolling are shifted to the back office.

Video tolls and violations are two sides of the same coin, and offset each other to some degree. Initial implementation of video tolling can be expected to cause some unavoidable confusion, temporarily resulting in higher violation rates. A focus on customer service and clear communication of video tolling procedures will increase video tolling success, thereby reducing the volume of violations to be created and pursued.

Early enforcement of violations in conjunction with video tolling has proven to be important. The public will learn quickly if unpaid video toll invoices do not proceed to enforcement within the stated timeframes, causing more invoices to go unpaid and resulting in a higher volume of violations to enforce. This will, in turn, reinforce public concerns that the system is prone to abuse and waste, because everyone is not paying their fair share.

Appendix A: Video Tolling Definitions

Category	Identifier	Other Names	Registration	Pre-/Post-Paid	Tag	Transaction Posted By	Invoiced	Terms
ETC	ETC	Standard ETC	Pre-Reg	Pre-Paid	Tag Read	Tag	No	Standard ETC transaction, posted directly to a valid transponder-based account.
	REG/PRE/READ	V-Tolling (TxDOT); V-Tolling / Violation tolling (BATA)	Pre-Reg	Pre-Paid	Tag Read	Tag	No	Tag is read on invalid transponder-based account (in lane); Account becomes valid between toll transaction creation and transaction posting (e.g., account is replenished, other issues are cleared up). System posts transaction to valid account.
	REG/PRE/NORD	I-Tolling (Image tolling) (TxDOT, BATA); Pay by Plate (TxDOT); V-Tolling (General industry)	Pre-Reg	Pre-Paid	Tag Exists, but No Tag Read	Image / Plate	No	After image review or thru the sweep process, license plate matches a plate associated with a valid transponder-based account. System posts transaction to matched account.
		M-tolling (Manual tolling) (TxDOT); V-Tolling (General industry)	Pre-Reg	Pre-Paid	Varies	Manual Correlation	No	Customer calls CSC to clear up account issue that resulted in an invoice or violation. CS Rep manually posts transaction to account.
VT-PRE	REG/PRE	Pay by Plate, I-Tolling (TxDOT); Toll by Plate (FTE), Pre-Registered Video Tolling (NCTA)	Pre-Reg	Pre-Paid	No Tag	Image / Plate	No	Same as REG/PRE/NORD, but associated account is not transponder-based. Only possible where agency allows creation of license plate-based accounts, with no transponders. May be referred to as I-Tolling / Pay by Plate because system will post transactions in the same manner. May also be specified for use by a specific type of customer (e.g., fleet, rental company, etc.) or a specific duration (e.g., day pass).
VT-POST	REG/POST	Fleet Tolling (MDX)	Pre-Reg	Post-Paid	No Tag	Image / Plate	Yes	Same as REG/PRE, but not requiring customer pre-payment. Meant to capture audience that doesn't want tag, infrequent user that doesn't want money held on account, etc. May also be specified for use by a specific type of customer (e.g., fleet, rental company, etc.).
	UNREG/POST	Video Tolling (ETR 407); Video Billing, Pay by Mail (TxDOT); Unregistered Video Tolling (NCTA)	Un-Reg	Post-Paid	No Tag	Image / Plate	Yes	After image review, license plate does not match any existing account, or matches an existing license plate-based account. If no account, a new plate-based account is created using customer name/address retrieved from DMV. Transactions are invoiced and customer pays in arrears. These are the remainder of the "violators", accidental / occasional and intentional, but are given the option of acting as "customers" and paying an invoice first.
RENTAL	RENTAL	Rental Car Tolling; Third-Party Video Tolling	Un-Reg	Post-Paid	No Tag	Image / Plate	Varies	Process dependent on agreement negotiated between agency and third-party provider. Services currently provided by ATS/PlatePass, Rent a Toll, various rental car companies.

Appendix B: Interview Questions

	Agency / Facility Identification:
	Contact Information:
0	General
	What volume of transactions are you experiencing?
	Are you planning to implement video tolling or is it already operating?
	What needs, issues, problems or objectives are being addressed by video tolling for your agency?
10	Payment methods
	Do customers have to pre-register to use video tolling?
	What are the registration rules and arrangements?
	How do customers pay for video tolling?
20	Registration methods
	What channels can customers use to register?
	What are the most popular?
30	Payment timeframes
	How long does the customer have to make payment before being considered a violator?
40	Billing methods
	What methods are used for billing customers?
50	Differential toll rates and payment structures
	How much does video tolling cost to operate?
	Do customers pay a higher or lower toll to use video tolling and is there a service fee?
60	Program eligibility
	Who is eligible and what are the rules?
70	Interagency DMV agreements
	What is the format and content of agreements with your local DMV and out of state ones?
80	Enforcement methods
	What methods are used for enforcement?
90	Public awareness arrangements
	What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?
100	What's working and what's not?

Appendix C: Video Tolling Business Practices Matrix

Agency / Program	407 ETR International, Inc.	Transport for London (TfL)	Swedish Road Administration (SRA)	Texas Department of Transportation (TxDOT)			Florida's Turnpike Enterprise (FTE)	Miami-Dade Expressway Authority (MDX)	North Carolina Turnpike Authority (NCTA)
Business Practice	**407 ETR, Toronto**	**Congestion Charging**	**Stockholm Congestion Pricing**	**SH 121, Dallas**	**Loop 49, Tyler**	**CTTS, Austin**	**Selmon Crosstown Expressway, Tampa**	**Fleet Tolling Program**	**New Tolling Program**
Facility Type	Urban commuter roadway; Video plus ETC, no cash	Urban cordon tolling scheme; Video only, no ETC, no cash	Urban cordon tolling scheme; Video, minimal ETC, no cash (ETC is being phased out)	Urban commuter roadway; Video only, no ETC, no cash	Rural loop toll pilot; ETC plus Video, no cash	Network of SH 130 (city bypass), SH 45N and Loop 1 (commuter); Cash, ETC, and Video	Standard Cash+ETC toll road with cashless ORT (ETC and Video) reversible commuter lanes in elevated section	Urban commuter roadway; ETC plus Video, no cash	Planned urban commuter roadway; ETC plus Video, no cash
Status - Planned or Open	Opened in 1997	Opened in 2003	Piloted in 2006, Full implementation 2007	Opened Fall 2006	Opened Fall 2006	Opened Jan 2007	Opened Nov 2006	Fleet Program Opened 2006	Planned for 2010
Video Tolling Types	UNREG/POST	REG/PRE with short-term post-transaction registration allowed	REG/PRE (via vehicle registration only)	UNREG/POST (Video Billing / Pay by Mail); REG/PRE/NORD and REG/PRE to TxTag and Interop accounts			REG/PRE (Toll by Plate) on elevated portion only; REG/PRE/NORD to SunPass, E-Pass accounts	REG/POST for fleets; UNREG/POST concept in planning	UNREG/POST, REG/PRE being planned
Transaction Volumes	Averaging between 3 and 5 million transactions per month	Averaging 4.8 million transactions per month (160,000 transactions per day)	Averaging 12 million cordon crossings per month (400,000 cordon crossings or transactions per day)	Averaging 2.25 million transactions per month	Averaging 115,000 transactions per month	Averaging 5.25 million transactions per month	Approximately 15,000 transactions per month from about 2,000 REG/PRE accounts	About 8,000 transactions per month	Projected 5.1 million transactions per month (For 2010 forecasted 113,600 trips per day, 400,000 vehicles and 1.5 transactions per trip)
Optical Character Recognition (OCR) Use	All images OCR'd; high confidence accepted without review. Remainder and special / listed plates are manually reviewed.	Automated Number Plate Recognition (ANPR) software, including OCR engine, is used for initial charging. Capture rate is around 85% due to multiple captures. Trained staff manually review images prior to violation (PCN) being sent.	Automated License Plate Recognition (ALPR) software with multiple OCR algorithms is used. About 96% are accepted with high confidence. Remaining 4% are manually reviewed. All images are manually verified prior to violation notice being sent.	Adaptive OCR (AOCR) is used, including OCR read and confidence rating (generally around 95%) as one factor. Filters out 55 - 58% of images. Remainder are manually reviewed before being used to issue invoices or notices.			All images are OCR'd, but only accepted with one matching manual review. Non-matches are re-reviewed by another operator.	OCR not currently in use - all images are reviewed manually. Future OCR being considered in support of further video implementation.	All images will be OCR'd first in the field, second in the back office. Non-matches and plates not seen before will be manually reviewed. Period manual reviews will be performed on familiar plates.
Market Breakdown	About 75% ETC, 25% Post-Paid Video	100% Video	Less than 2% ETC, 98+% Video	100% Video (49% REG/PRE)	46% ETC, 54% Video	75% ETC, 14% Cash, 11% Video	60% ETC, 40% Cash, Negligible Video	60% ETC, 40% Cash, Negligible Video	In planning stages - no data available
Plate / Vehicle Rules	Plate stays with the person who owned the vehicle.	Information not available	Information not available	Plate stays with the vehicle, unless the owner pays to transfer it to a new vehicle.			Plate stays with the person who owned the vehicle.	Plate stays with the person who owned the vehicle.	Plate stays with the person who owned the vehicle.
Video Tolling Objectives	Primary - Provide full open road access similar to other roads in the region	Primary - congestion management	Primary - reduce traffic by 10-15% during rush hour	Primary - customer service focus, environmental justice / accessibility concerns			Primary - social equity, customer choice (response to public reaction to lack of choice, high startup cost for SunPass)	Primary - provide fleet customers the option of not managing tags	Enable construction of facilities without cash collection plazas by using video to augment ETC
	Secondary - Allow drivers to avoid pre-purchasing / pre-registering before use of the road	Secondary - fund transit improvements; improve journey time reliability	Secondary - reduce emissions	Secondary - Prevent loss of opportunity to toll	Secondary - rural pilot volumes didn't justify cash collection costs	Secondary - provide additional options for customers before violation	Secondary - pilot for possible REG/PRE across FTE network	Secondary - provide backup to ETC; provide an alternative to infrequent users or those willing to pay a premium toll to avoid the establishment of a prepaid account	
Pre-Registration Req'd	No	Yes	No - vehicle registration constitutes registration	No			Yes	Yes	No
Eligibility	No requirements	No requirements	No requirements	No requirements			Valid credit or debit card required	Must be one of three fleet customers	No requirements
Registration Rules		Register prior to driving or by 10:00 pm the day of use, or by midnight the next day for an additional $4 fee					Register prior to driving or within 72 hours after to avoid violation		Pre-registered users can call in with credit card and vehicle information, use the internet or go to a customer service center.

Appendix C: Video Tolling Business Practices Matrix

Agency / Program / Business Practice	407 ETR International, Inc.	Transport for London (TfL)	Swedish Road Administration (SRA)	Texas Department of Transportation (TxDOT)			Florida's Turnpike Enterprise (FTE)	Miami-Dade Expressway Authority (MDX)	North Carolina Turnpike Authority (NCTA)
	407 ETR, Toronto	Congestion Charging	Stockholm Congestion Pricing	SH 121, Dallas	Loop 49, Tyler	CTTS, Austin	Selmon Crosstown Expressway, Tampa	Fleet Tolling Program	New Tolling Program
Registration Rules, cont'd	No pre-registration required	Registered drivers receive a Fast Track card, which makes payment easier Customers can choose to pay daily, weekly, or monthly instead of per trip	All vehicles are automatically registered by virtue of their vehicle registration. Transponder users must complete a direct debit form	Registration is not required, but allowed by attaching license plate to new or existing TxTag account. Registration by plate was already possible prior to implementation of video billing.			Indefinite account - essentially SunPass account with plate only. $5 min deposit, $10 replen Limited duration account for casual users - $5 min deposit, agreement to have tolls deducted from credit / debit card on file	REG/POST users must provide vehicle and license plate information to MDX. A $250,000 letter of credit is required as collateral.	Registration can be any time in advance of driving Will also allow for a 4 hour post-transaction registration window
Registration Methods, Preferences	By web, phone, fax, mail, or walk-in at CSC; Web use is predominant	By web, email, or mail	Transponder users can complete direct debit form online, at participating merchant, or by mail	By web, phone, fax, mail, or walk-in at CSC; Web use is predominant			By phone to CSC only, for now; web interface in development	Direct communication with MDX	By phone, internet, or customer service center
Public Education / Marketing	Newspaper, TV, mall campaigns, and free periods used to raise awareness	Extensive multimedia publicity campaign	Formal, full scale operational trial for 7 months followed by public referendum. Extensive marketing before and during the trial.	Signage, news coverage, inclusion in significant ETC marketing, some specific public education in the Dallas area			Dynamic message signs; Press releases	None so far - partnership arrangement with three specific fleet operators	Press conference, animated film. Installing temp readers on adjacent roads, permanent ones early to enable potential customers to try before they buy. Major publicity campaign for about 6 months prior to opening.
Toll Rate and Fee Structure	All light vehicle users pay the same toll rate in cents/KM, varying by time of day and roadway. Heavy vehicles pay 2 to 3 times the light vehicle rate. UNREG/POST users pay an additional $3.65 per trip	Basic fee is £8 ($16); Pay Next Day for additional £8 ($4); Verified residents get a 90% discount.	Payment varies - 10, 15 or 20 SEK depending on time of day ($1.67, $2.50 and $3.35). No ETC differential.	Separate rate for UNREG/POST and PRE/REG, 33% higher than ETC and 20% higher than cash; $1.00 admin fee included on each invoice			REG/PRE rate same as cash. Three-tiered rate structure (cash, ETC, and video) being considered, but will require legislation.	Fleet operators pay cash rate, about $0.25 higher than the ETC discount.	Double-double approach. REG/PRE will be twice the ETC toll and UNREG/POST will be twice REG/PRE.
Billing Methods	Monthly post-usage paper and e-billing invoices	Drivers are not billed - they are responsible for paying the charge.	No paper bills are issued, Drivers can see the amount owed on the web page, or at participating stores when paying there.	Monthly invoice to registered owner of vehicle, beginning ~14 days after the first transaction by that plate.			Charges debited from pre-registered account; After 72 hours, Unpaid Toll Notice (UTN) is mailed - similar to video invoice, but issued to all customers as prelim step in violations process	Fleet customers billed monthly in retrospect for the tolls incurred. Standard invoice is issued to pre-established account.	Invoices and credit card payments (frequency of invoicing is to be determined)
Payment Methods	Pay by credit card, debit card, check or cash On the web, by phone (IVR or operator), mail, or customer service center	Pay by credit card, debit card, check or cash On the web, by phone, mail, SMS text message, or at retail outlets or automated kiosks	Direct debit, over the counter at Pressbyrå and 7-Eleven, Internet using credit or debit, and at the Bank or via internet banking	Cash at walk-in only; Check or money order at walk-in or by mail; Credit card by return mail, web, phone, or walk-in.			Video - credit or debit card with auto-replenishment UTN - credit card by phone or walk-in; web interface in development	Invoice and credit card by phone or walk-in	Pay by credit card and invoice
Payment Timeframes	Users are billed at the end of the monthly billing cycle. 36 days after issuance of the bill to pay, then second bill is issued that includes interest. At 60 days after issuance of the first bill, transferred to collections and a $15 fee is added. At 120 days after the first bill, customer goes into "plate denial" and is not allowed to renew registration until fees are paid.	Unpaid charges become violations after 24 hours at 2 am, and a Penalty Charge Notice (PCN) is mailed with a $200 fee.	Taxpayers have up to 14 days to pay. Reminder notice including a service charge of SEK 70 is sent by mail after 14 days. After 30 days another surcharge of SEK 200 is added. If the tax and charges still remain unpaid, the matter is referred to Enforcement Services for collection.	30 days after first invoice a second invoice is sent; Each invoice includes a $1 fee. 30 days after second invoice, unpaid transactions become violation notices with a $5 added fee. Unpaid violations are sent to collections with the $5 fee increased to $25. Unpaid violations become sworn complaints for court processing, and the fee is increased from $25 to $100. With additional court fines of up to $250 plus court costs, the penalty per transaction can total over $400.			REG/PRE - Within 72 hours of transaction UTN - 30 days, then violation (Unpaid Toll Citation, or UTC) with $25 fee is mailed	Transaction information for each fleet is extracted on the 5th day of the following month. Invoice is sent, with payment due within 30 days. Serious delay in payment results in violations - a Universal Traffic Citation would be generated and sent to the fleet operator in question	Up until 4 hours after roadway use for REG/PRE Up until 30 days after invoice is generated for UNREG/POST before becoming a violator

Appendix C: Video Tolling Business Practices Matrix

Agency / Program / Business Practice	407 ETR International, Inc.	Transport for London (TfL)	Swedish Road Administration (SRA)	Texas Department of Transportation (TxDOT)			Florida's Turnpike Enterprise (FTE)	Miami-Dade Expressway Authority (MDX)	North Carolina Turnpike Authority (NCTA)
	407 ETR, Toronto	Congestion Charging	Stockholm Congestion Pricing	SH 121, Dallas	Loop 49, Tyler	CTTS, Austin	Selmon Crosstown Expressway, Tampa	Fleet Tolling Program	New Tolling Program
Video Tolling Estimated Cost	Unable to provide	Initial costs were around $3.00 per transaction, but have been reduced as operations stabilized. FY 2006 - 07 provisional reports indicate about 42% of total revenue is expended in operation and administration costs.	Unable to provide	About $0.60 per transaction, including invoicing costs			$0.25 / transaction for image review - all images are manually reviewed. $2.80 per paper statement mailed, including invoice dev, envelopes, postage, handling, floor space / overhead, and a percentage of call center time related to statements.	$0.25 per transaction comprised of $0.06 per transaction for any non-cash (ETC or video) transaction plus an additional $0.19 per transaction for administrative costs of secondary manual license plate recognition and invoice preparation	Data not available
DMV Agreements	Agreement with Ontario DMV	Unmatched vehicle data sent to national Driver and Vehicle Licensing Authority (DVLA) via custom web interface; Results are returned within 5 hours	Video tolling is a tax covered by current tax legislation and rules, including access to vehicle owner information	Texas' Vehicle Titles and Registration (VTR) also part of TxDOT - no formal agreement required; Out of state agreements in development			FTE agreement in place with Florida Dept of Law Enforcement and DMV for SunPass	They have a direct connection to the DMV and request data on a batch basis, once per day at 3:00 AM.	Currently negotiating with the DMV on the content and format for an agreement on data transfer.
	No "official" out of province / state agreements currently in place - out of province violations not pursued						No out of state agreements currently in place - out of state violations not pursued	DMV data is provided under state statute with additional sub agreements for violation enforcement purposes.	Investigating the ability to establish agreements between the toll agencies to share and transfer data
Enforcement Methods	Police "blitzes" across the corridor, specific targeting of repeat violators. Mobile transponder reader for checking trucks, which are required to have transponders.	Manual verification of plate prior to PCN issuance, with $200 fee; Unpaid PCN's go to county court and warrants are issued.	Reminder notice with SEK 70 service charge after 14 days, SEK 200 after 30 more days. Enforcement Services for collection pursue according to prevailing tax laws.	Unpaid UNREG/POST transactions become violations after 60 days; may also go to collections, followed by courts where total fees per transaction can exceed $400.			Back office - UTN, UTC, then courts	Standard video enforcement with vehicle classification conducted through the use of inductive loop analysis techniques.	Violators will be treated as REG/PRE users if they pay up to 4 hours after use. Persistent violators will be tracked and police patrol will intercept. They will also make use of collection agencies to recover tolls.
		TfL does on-street enforcement, and can clamp or remove vehicles of persistent offenders; Mobile enforcement vehicle recently introduced.		Texas Department of Public Safety (DPS) patrols roadways, but focus is on traffic safety law enforcement, not toll			Lane enforcement - FDLE officers patrol lanes, focus on top violators and enforcement of license plate legibility laws		
Working	No information provided	Early costs were very high, but have been managed down to acceptable levels.	Started with transponders and video for enforcement. Video became more effective and tax rules require a video image even for transponder transactions so they are phasing out the transponder.	Video billing well accepted in Texas - will be used on all future TxDOT and concession facilities, and other Texas toll agencies are also adopting.			Public appears positive and accepting - surveys planned	Especially pleased with the low maintenance costs of the IVIS system in comparison to the more traditional light curtain and treadle approach to vehicle classification.	Simple toll classification system - 3 classes, motorcycles/cars, small trucks and large trucks.
				Payment rates for invoices 45% to 60%, which reduces violations, collections, and impact on courts somewhat. Expected to increase now that violations process has been implemented.				Video cameras are working well and the OCR algorithms have improved over the past few years.	Plan to use a combination of axle count and vehicle profiling to classify vehicles.
Not Working	Winter weather conditions cause lower read rates	Exploring use of transponders to reduce costs and offer additional services		Back office processing heavily impacted at first. System modifications were necessary, and financial and reporting aspects were done after the fact.			Public difficulty accessing receipts and statements in a timely manner - web interface in development to address	Need a more formal audit support function in the tolls back office	No information provided - not operational yet
	No "official" out of state / province DMV arrangements			Lane processing was impacted by addition of third toll rate. Interim solution handled, followed by lane system modifications to correct.				Need swift action during the initial stages in handling violators.	
				Strong feedback from Dallas-area customers, requiring additional signage and public education.					

Appendix D – Interview Results

This appendix contains notes from the interviews with the following agencies:

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North Carolina Turnpike Authority (NCTA) 27

407 ETR International, Inc., Toronto, Canada

Imad Nassereddine
Chief Traffic Operations Officer

Volume of transactions
Between 3 and 5 million video transactions per month, lowest in the winter and highest in the summer months. They charge by vehicle class, time of day and section of road used (this last element was introduced in February 2008). They record vehicle entry and exit through control points then calculate the toll charge on a per km basis. Each entry or exit is counted as one transaction. A combined entry and an exit constitute a trip.

Are you planning to implement video tolling or is it already operating?
They are among the leaders in the application of video tolling technology. The system started operation on October 14th, 1997.

Objectives
What needs, issues, problems or objectives are being addressed by video tolling for your agency?
The first part of the road (68 kms of the current 108 kms) was originally financed and constructed by the government. A key policy objective was to ensure that the road was as open and accessible as other public roads in the region. There was a desire to avoid the need for road users to pre-register, purchase transponders, or set up account arrangements before using the road. They wanted to provide the ability for drivers to use the road and then be billed later.

Payment methods
Do customers have to pre-register to use video tolling?
No, customers are not required to pre-register to use video tolling. They do have to pre-register to use a transponder.

What are the registration rules and arrangements?
Transponder users have to sign a lease agreement for the use of the transponder, which costs $2.55 per month or $21.50 annually. Additional transponders can be leased at approximately half this cost.

How do customers pay for video tolling?
Video toll users drive on the road and are then sent a bill at the end of the monthly billing cycle.

Registration methods
What channels can customers use to register?
Only transponder toll users need to register. They can do this online, at the customer service center, by interactive voice response (IVR) system and by mail.

What are the most popular?
Currently, online registration is the most popular.

Payment timeframes
How long does the customer have to make payment before being considered a violator?
A bill for the use of the road is issued at the end of each monthly billing cycle. Customers have 36 days from the date of issue of this first bill to make payment. If the first bill is not paid within 36 days, a second bill is issued. This is for the original toll amount plus interest that has accrued over the 36 days, and is a notice of failure to pay. The notice of failure to pay would indicate that if the bill is not paid within 90 days after the date of issue of the notice of failure to pay, the Ontario Registrar of Motor Vehicles may refuse to validate the person's vehicle permit. This makes it impossible for the driver to renew the vehicle registration. In the mean time, the debt is sent to collections and an additional $15 collection fee is added to the bill. There is an additional administration fee for plate denial .

Billing methods
What methods are used for billing customers?
Customers are sent paper billing statements by mail. Customer can opt to combine multiple accounts onto "One Simple Bill" by applying online or by mail. Customers can also opt to make use of online e-Billing through an arrangement with ePost. This service partner is an affiliate of Canada Post.

Differential toll rates and payment structures
How much does video tolling cost to operate?
They were not prepared to divulge this information.

Do customers pay a higher or lower toll to use video tolling and is there a service fee?
All light vehicle customers pay the same toll rate - 19.25 / 19.00 cents (depending on zone) per kilometer peak and 18.00 cents per kilometer off-peak, varying by time of day and section of road used. Heavy vehicles pay 2 or 3 times the light vehicle rate depending on whether they are heavy single or heavy multiple, respectively. Video toll users pay an additional video toll charge of $3.65 per trip. Any vehicle with a tampered or altered plate making it not recognized by the video system is considered a violator and is subject to a flat toll charge of $50 per trip in addition to the tolls.

Program eligibility
Who is eligible and what are the rules?
Video tolling is open to everyone, but heavy goods vehicles over 5 tonnes gross vehicle weight (GVW) are required by law to be transponder equipped. Police have mobile transponder readers to check. If unequipped heavy goods vehicles use the road they are treated as video customers by the tolling system, but may be subject to a fine under the Highway Traffic Act if caught by the police.

Interagency DMV agreements
What is the format and content of agreements with your local DMV and out of state ones?
They have an agreement with the Ontario DMV, under which they send vehicle details in batch to the DMV overnight, then receive the vehicle permit name and address information the following day. They also have agreements with other non-DMV organizations to provide name and address information from a number of states and provinces.

Enforcement methods
What methods are used for enforcement?
Heavy vehicles over 5 tonnes GVW are required to have transponders to address the issue of separately registered tractors and trailers. They have agreements with Ontario Provincial Police, who enforce the Highways and Traffic Act. Police conduct enforcement "blitzes" along the entire road corridor and act on specific cases of frequent violation by intercepting offending drivers.

Public awareness arrangements
What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?
Most of these arrangements were made by the public sector prior to the transfer of operations to the current concession company (407ETR Concession Company Ltd., a consortium of Cintra Concessions de Infraestructuras de Transporte, Macquarie Infrastructure Group and SNC-Lavalin). Newspapers, TV, mall campaigns and a period of free road operations were all used to raise awareness. For a period of 4 months after opening, users were allowed to use the road for free. When the free period was over about 50% of the traffic left the highway, indicating that the public understood the nature of the road charging.

What's working and what's not
They have some issues reading license plates in the winter months due to dirty plates and snow buildup on license plates. They also have a minor issue with out of province vehicles, as they have no agreements with “official” out of province DMVs, but volumes involved are very small. Some states and provinces will not provide details of vehicle owners and the "plate denial" option is only available in Ontario.

Additional information

1) OCR and Manual Checking Process – All images are run through the OCR engine first. Plates with a high confidence level go to billing. The remainder are sent to manual review. In addition to the plates that did not achieve a high confidence review, some “special” plates receive a manual review even if they had a high confidence OCR read. This includes plates that are being observed for the first time, as well as plates that have previously been billed wrong (e.g. due to errors

in confusing characters such as D, 0, and O). To assist in improving accuracy and confidence, they are using vehicle fingerprinting in addition to the plate image. This has helped with issues associated with dirty plates, license plate frames that obscure part of the plate, and some vanity plates, and has reduced the number of manual reviews. If an image is sent to manual review, it is checked by two operators who must concur on the plate number. If they disagree, a supervisor reviews the plate.

2) Plate Rules – In Ontario the license plate stays with the person who owned the vehicle. The new owner must obtain a new license plate.

3) Plate Characteristics – 90% of the plates in Ontario are dark blue characters on a white background with a crown in the middle. The OCR system looks for the crown as the immediate identifier. Ontario does not have duplicate plate numbers and they have agreements with other agencies and a firm (Polk) to acquire out of province (including U.S.) plate / vehicle registration information.

4) Rewards Program – They have a rewards program for frequent light vehicle road users to earn free weekend kilometers and gasoline discounts for frequent road usage. They also have a program for heavy vehicle drivers to receive toll discounts for frequent use and better payment behavior.

Transport for London (TfL)

Jeremy Evans
Head of Traffic & Technology

Volume of transactions
The London system processes just over 160,000 transactions per day on average, operating from 7:00 AM to 6:00 PM Monday through Friday, excluding public holidays.

Are you planning to implement video tolling or is it already operating?
The London Congestion Charging system, which uses Automatic Number Plate Recognition (ANPR) software to check and enforce registration plate data obtained from roadside cameras, has been operational since February 2003. In February 2007, the charging zone was extended to the West, effectively doubling the area of the charging zone to more than 40 square kilometers.

Objectives
What needs, issues, problems or objectives are being addressed by video tolling for your agency?
The objectives of the London congestion charging implementation are to reduce congestion, make radical improvements to bus services, improve journey time reliability for private car users, make the distribution of goods and freight more efficient, reduce emissions and generate revenue for transportation improvements.

Payment methods
Do customers have to pre-register to enter the Congestion Charging zone?
No, there is an option to pay without registration, but you do have to accept a data protection notice. If you are a resident and claiming a discount, you have to register. The basic operating concept of the system is that drivers will register that they plan to make use of the roads within the charging zone prior to use. If drivers pay the charge on the day of travel, they pay 8 pounds ($16). They can choose to pay on the first charging day after travel and incur an additional fee of 2 pounds ($4). Video cameras at all entry and exit points to the cordon and on some key routes inside the zone are used to capture vehicle and license plate images. These are supplemented by 10 mobile enforcement units. After images are captured, data is transferred to automated license plate recognition systems in the back office.

What are the registration rules and arrangements?
There are two basic ways to pay - registered and unregistered, and several payment channels. Payment channels available are online, by short messaging service (SMS text messaging) on your cell phone, by land line telephone, at a shop, at a self service machine and by mail. If you choose the unregistered route you cannot pay via the short messaging service. Paying through the other payment channels is faster if you register, as you will be issued a Fast Track card on registration to make payment quicker by

phone and in person. Registration can take place at any time prior to accessing the congestion charging zone, or within the following day for an additional charge.

How do customers pay the charge?
Customers can pay by credit card, debit card, check or cash using one of the following payment channels - retail outlets, automated kiosks, web site, SMS text messaging, call center, IVR and mail. Retail outlets accept all payment methods, automated kiosks accept credit or debit cards, the web site accepts credit or debit cards, SMS text messaging uses credit or debit card, credit and debit cards are accepted by phone and credit, debit and check are accepted by mail.

As of Spring 2008, just under 20% of customers choose to pay at a retail outlet, 36% by web, just under 20% by SMS text, just over 20% using dial in to an operator at the call center, just under 5% by interactive voice response to the call center and almost 0% by mail.

Customers can also choose to pay the charge daily, weekly, monthly or annually. Currently for standard charges about 46% of customers choose to pay daily, 10% weekly, 10% monthly, and 33% pay annually. For resident charges which are discounted, the numbers are 19%, weekly 16% monthly, and 65% annually. Customers must pay the congestion charge by 10:00 PM on the day of travel in order not to incur a premium charge.

Registration methods
What channels can customers use to register?
Customers can register online at the web site, by email, text, or mail.

What are the most popular?
SMS texting – low operational costs and popular with users.

Payment timeframes
How long does the customer have to make payment before being considered a violator?
Customers are not treated as violators until at least 2 am on the second working day following the charging day when the vehicle was detected using the roads within the charging zone. This allows time for the driver to use the premium Pay Next Day service.

Billing methods
What methods are used for billing customers?
There are no post-payment bills. Drivers pay in advance or use the Pay Next Day option. All others are violators and receive a Penalty Charge Notice.

Differential toll rates and payment structures
How much does Congestion Charging cost to operate?
Financial Year 2006-07 (Provisional)

Revenues	**£ Million**
Standard Daily vehicle charges (£8 / $16)	125
Fleet vehicle daily charge (£7 / $14)	27
Resident vehicle (£8 / $8 per week)	6
Enforcement income	55
Total revenues	**213**
Total operation and administration costs	**- 90**
Net revenues	**123**

Do customers pay a higher or lower toll to use video tolling and is there a service fee?
There are no other options. Drivers can pay retrospectively up to midnight of the day after they have been in the zone for an additional fee of $4 added to the basic fee of $16.

Program eligibility
Who is eligible and what are the rules?
Everyone using the charging zone is eligible, with registered and verified residents receiving a 90% discount.

Interagency DMV agreements
What is the format and content of agreements with your local DMV and out of state ones?
Unmatched vehicle data is sent to the national Driver and Vehicle Licensing Agency (DVLA) using a custom web interface. Within 5 hours, the DVLA sends vehicle detail back to Transport for London.

Enforcement methods
What methods are used for enforcement?
Before enforcement proceeds, trained staff conduct a manual review of vehicle license plate details to check that the automated systems have correctly interpreted the vehicle license plate number. A Penalty Charge Notice (PCN) for $240 is then issued to the registered keeper of the vehicle as identified from the DVLA records. If paid within 14 days this fine is reduced to $120. If not paid within 28 days, the fine increases to $360.

Registered keepers of vehicles have the legal right to challenge the fine in writing. On receipt of the written challenge, the enforcement process is placed on hold until investigation is complete. If TfL reject the challenge, the driver can appeal to an Independent Traffic and Parking Appeals Authority.

When the PCN remains unpaid, the debt is registered at the County Court and a warrant passed to bailiffs for the recovery of the debt. About 260,000 of these were issued in 2007.

Bailiffs have the authority to seize property up to the value of the debt plus defined penalty charges. TfL also conducts on-street enforcement by wheel clamping the vehicles of persistent offenders. During 2007 almost 2,500 vehicles were clamped or removed. They have also recently introduced a mobile video enforcement vehicle capable of reading vehicle license plates at normal traffic speeds.

Public awareness arrangements

What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?

An extensive multimedia publicity campaign was implemented prior the introduction of the system. The timing for the introduction was also carefully chosen to lie within a relatively quiet traffic period (school holiday) and highway related construction work on major roads within the zone was discouraged during the initial stages of operation. Drivers can obtain information from the TfL congestion charging web site, written brochures and reports. They can also call the customer service center.

What's working and what's not

Early operating costs for congestion charging were very high but have been managed down to an acceptable level. TfL continues to explore the additional use of wireless transponders to reduce operating costs and offer additional driver services.

Additional information

1) ALPR Process and Manual Checking– In London they do not have to positively identify every passage into the zone, but rather to identify vehicles who aren't registered as paid for the day. The capture rate per passage is over 70%. Vehicles are typically detected multiple times, so there are several opportunities to detect the vehicle. This increases the net capture rate to around 85%. The list of potential violators (plates found with no corresponding payment) is checked 100% manually prior to any penalty notices being sent.

Swedish Road Administration (SRA)

Ben Morris, IBM (under contract to SRA)

Volume of transactions
During the course of the trial, an average of 400,000 cordon crossings per day were handled. During recent operation of the system, the use of transponders has been reduced to about 1 or 2% of the total transactions as the video toll system has become more efficient and accurate.

Are you planning to implement video tolling or is it already operating?
The Stockholm congestion charging system was originally implemented as a large scale fully operational pilot program from January 2006 through July 2006. After a successful public referendum, it was introduced as a permanent operation in 2007.

Objectives
What needs, issues, problems or objectives are being addressed by video tolling for your agency?
The primary objectives of the Stockholm Congestion Charging system are to reduce traffic to and from the city by 10 - 15 percent during rush hour, provide a better level of service in Stockholm city traffic, reduce emissions of carbon dioxide, nitric oxide and particulate matter and ensure that city residents will experience a better city environment.

Payment methods
Do customers have to pre-register to use video tolling?
There is no requirement to pre-register, but direct debit taxpayers sign a direct debit contract and receive a transponder for their vehicles.

What are the registration rules and arrangements?
Anyone can use video tolling. As described above, transponder users sign a direct debit form.

How do customers pay for video tolling?
All payment is retroactive. Taxpayers have up to 14 days to pay the charge. They can pay by direct debit, over the counter at Pressbyrå kiosk (stores) and 7-Eleven shops, by Internet using credit or debit cards and at the Bank or via internet banking. Vehicle owners can see the tax amount they are liable to pay by logging into the “mina skattebeslut”(“my tax decisions”) page. Users can log in using either an e-identity or the authorization code found on their vehicle registration certificate.

Registration methods
What channels can customers use to register?

No special pre-registration is required, as DMV records are used to track vehicle ownership. Only Swedish-registered vehicles are required to pay the congestion charge.

What are the most popular?
Not applicable.

Payment timeframes
How long does the customer have to make payment before being considered a violator?
They have up to 14 days to make the payment, then service charges are applied and finally the case is transferred to enforcement.

Billing methods
What methods are used for billing customers?
No paper bills are issued. Drivers can see the amount owed on the web page, or can enquire at participating stores when paying there.

Differential toll rates and payment structures
How much does video tolling cost to operate?
This is a privately operated system (IBM), so we couldn't get access to this information.

Do customers pay a higher or lower toll to use video tolling and is there a service fee?
No and No.

Program eligibility
Who is eligible and what are the rules?
All Swedish registered vehicles that drive in and out of the congestion zone are subject to taxation and can use the video tolling option. The registered vehicle owner is required to pay.

Interagency DMV agreements
What is the format and content of agreements with your local DMV and out of state ones?
The charge is a tax collected by the state. Prevailing tax legislation is used to gain access to vehicle ownership information.

Enforcement methods
What methods are used for enforcement?
If a tax decision is not paid within 14 days, a reminder notice including a service charge of SEK 70 will be sent by mail. This service charge along with the tax decision amount is to be paid within 30 days, after which a surcharge of SEK 200 will be added. If the tax and charges still remain unpaid, the matter is referred to Enforcement Services for collection.

Public awareness arrangements

What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?

A seven month live trial of the congestion charging system was implemented. This was preceded by an extensive publicity campaign and followed by a public referendum. The public voted in favor of keeping the system, and the trial system was then re-opened for permanent use.

What's working and what's not

Stockholm started with transponders and video for enforcement. Video became more effective and tax rules require a video image even for transponder transactions, so they are phasing out the transponder.

Additional information

1) Tax - The congestion charge is treated as a tax and subject to the prevailing tax rules and legislation. Swedish registered vehicles are charged for driving into and out of the Stockholm inner city zone from 6:30 AM until 6:29 PM Monday through Friday. Each passage (entry or exit) costs 10, 15 or 20 SEK depending on the time of day ($1.67, $2.50 and $3.35).

2) Exemptions - There are some movements through the city that are exempt from the charge. Essingeleden - Those driving on the E4/E20 Essingeleden past Stockholm do not have to pay a congestion tax. Lidingö - No congestion tax is imposed on vehicles that within a time span of 30 minutes pass two separate control points, providing that one of these is located on Gasverksvägen, Lidingövägen or Norra Hamnvägen. The only connection to the national road network from these areas is through the inner city zone, and it was thought to be unfair to apply a tax to these drivers.

3) ALPR Accuracy and Manual Checking - In Stockholm, each vehicle passage in/out of the cordon is captured with front and rear images, with essentially only one chance to identify the vehicle. About 96% of those images are read by a combination of multiple OCR algorithms at high confidence, requiring no manual review. That leaves around 4% that go through the manual process, of which some are bad captures or various anomalies (no/manipulated license plate on vehicle, etc). This is used to charge accounts. Manual checking and review of every plate captured does not occur, as it would have a tremendous cost impact. When a charge remains unpaid and reaches a penalty state, there is a manual verification of 100% of those images to make sure that the original read was correct before sending a notice.

   Also important to note: ALPR accuracy is a capture rate at an error rate. Many on-camera ALPR software products will state an accuracy of about 85-95%, with

an error rate of 0.5% - 1% (incorrect reads out of the 85-95%). In Stockholm, it is working very well, as they are currently observing an error rate of about 0.01%.

Texas Department of Transportation, Turnpike Authority Division (TxDOT / TTA)

David Powell, Director of IT and Toll Operations for TxDOT / TTA Division
Rick Hurst, PBS&J Program Manager for TxDOT

Facility Information

- State Highway 121 (SH121), Dallas, Texas - urban commuter facility; Video only (no ETC, no cash)
- Loop 49, Tyler, Texas - rural loop toll pilot, very low volume; ETC plus Video (no cash)
- Central Texas Turnpike System (CTTS), Austin, Texas - made up of SH 130 (city bypass), SH 45N (commuter), and Loop 1 (commuter) facilities; Cash plus ETC plus Video

Volume of transactions

- SH121 - Averaging 2.25M transactions per month
- Loop 49 - Averaging 115K transactions per month
- CTTS - Averaging 5.25M transactions per month combined

Are you planning to implement video tolling or is it already operating?

- SH121 - Operational since Sept 2006
- Loop 49 - Operational since Oct 2006, additional segment Jan 08
- CTTS - Operational since Jan 2007, last segment Apr 08

Objectives

What needs, issues, problems or objectives are being addressed by video tolling for your agency?

Several objectives have been addressed, related to each facility. In all cases, the primary objectives were increased customer service and environmental justice / social equity.

In the case of SH121, TxDOT needed to get tolls on the road quickly (4 - 6 months from decision) to avoid losing the opportunity. (TX state law prohibits tolling existing facilities after they are open.) Video was quicker to implement than ETC, and due to technology improvements, it met TxDOT's requirements.

Loop 49 was initially a pilot project, to test the viability of tolling in a rural setting, and volumes were not high enough to justify the cost of cash collection. Video billing provided a viable second option to collect from non-tagholders.

On the CTTS, TxDOT was looking for an interim step between ETC and violations. Because tolling is new to the Austin area and SH130 is a city bypass, TxDOT did not want to penalize the "accidental" violators, tourists, etc., with high violation costs.

Payment methods

Do customers have to pre-register to use video tolling?

No - video tolling is accomplished without pre-existing accounts. Customers may pre-register, by attaching their plate to a new or existing TxTag account for v-toll purposes, but it is not required.

What are the registration rules and arrangements?
Pre-registering was not technically part of the video tolling implementation. Customers already had the capability to register using only a license plate (no transponder), but it was minimally used.

How do customers pay for video tolling?
Video billing invoices can be paid with cash at the CSC only, check or money order by mail or CSC, or credit card by return mail, on the web, or over the phone.

Registration methods
What channels can the customers use to register?
If they decide to register, web, phone, mail, or CSC.

What are the most popular?
Web, then phone.

Payment timeframes
How long does the customer have to make payment before being considered a violator?
Customers have 30 days to pay before receiving a second invoice, which gives them another 30 days before their unpaid transactions become violations.

Billing methods
What methods are used for billing customers?
An invoice is sent to the registered owner of the vehicle, per Texas Vehicle Titles and Registration (VTR) records. The first invoice is sent ~14 days after the first transaction, and then a monthly invoice after that, billing for all transactions during that billing period and any outstanding from the previous period.

Differential toll rates and payment structures
How much does video tolling cost to operate?
According to a KPMG review of TxDOT's rates and costs last year, total cost for video billing is about 60 cents per transaction, including invoicing costs.

Do customers pay a higher or lower toll to use video tolling and is there a service fee?
TxDOT uses three rates - one for ETC, one for cash, and a third rate for video billing. The video billing rate is 33% higher than the ETC rate, and about 20% higher than the cash rate. Tolls vary by location.

Program eligibility

Who is eligible and what are the rules?
There are no eligibility requirements. Rules are as stated previously.

Interagency DMV agreements
What is the format and content of agreements with your local DMV and out of state ones?
Texas' VTR division is also part of TxDOT, so no formal agreement is required between TTA and VTR. TxDOT is currently in the process of developing access to out of state DMV information.

Enforcement methods
What methods are used for enforcement?
Unpaid transactions become violations, which may then also be passed to a collections agency, followed by the local courts for prosecution, if they remain unpaid. Total costs for one unpaid transaction that goes all the way to court can exceed $400, including the toll, fees, fines, and court costs. In the lanes, TxDOT has Department of Public Safety (DPS) patrols to enforce driving safety laws, but they do not enforce toll infractions on the roadway.

There is a $5 administrative fee levied at issuance of the violation notice. This is increased to $25 if the transaction is sent to collections. If still unpaid, the court collects the toll plus a $100 administrative fee upon conviction. Additionally, if convicted, the violator may be responsible for a fine up to $250 and applicable court costs. Violation administrative fees may be reduced if the violator accepts one of the three Violation Conversion Offer (VCO) options. Fee reductions vary for each.

Public awareness arrangements
What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?
Some marketing was done in each area prior to video billing implementation, but the primary emphasis was on tag distribution and ETC users. Video billing was communicated as another method of payment through signage, marketing, and news coverage. In the Dallas area, with SH121 operating as video-only and connecting with North Texas Tollway Authority (NTTA) cash and ETC tolling facilities, the public education effort was more assertive. Efforts are continually made to convert video tollers to ETC customers, using inserts in video billing invoices and payment deals.

What's working and what's not
Video billing has been well accepted in Texas, and will be used on all future TxDOT facilities, including concession-operated. It is also being adopted by NTTA in Dallas and by the Central Texas Regional Mobility Authority (CTRMA), also in Austin.

Payment rates for video bills currently appear to be anywhere from 45% to 60%, depending on the area. This cuts down on the number of violations, as well as the collections effort and the volume of violations that make it to court, but could be higher.

TxDOT did not pursue violation processing for some time. Now that TxDOT's violations program has been implemented, with associated publicity, the rate of paid invoices appears to be rising. TxDOT expects this rate to increase even more in subsequent months as they receive their first court verdicts.

Back office processing was heavily impacted at first, both by the new processes and by the volumes. Initial effort was focused on getting the data in, creating accounts, and creating invoices, but additional effort was needed after opening to update reports and handle financial processing. Recent updates to TxDOT's back office system have smoothed out that process even further.

Lane system processing was impacted by the additional toll rate for video billing, which had not been envisioned prior to the SH121 decision. An interim solution was put in place to calculate the additional rate, and the lane systems were later modified to store and use all three rates.

Despite strong marketing in the Dallas area, the SH121 opening still resulted in many complaints from drivers used to NTTA facilities, not realizing it was a toll facility, not believing they should have to pay, etc. Additional signage and public education were required.

Additional Information

1) OCR – TxDOT's Adaptive OCR (AOCR) process filters images based on repeated recognition of the same plate in the lanes. Currently, AOCR filters out approximately 55-58% based on the formula followed, which significantly reduces manual review volumes. Although OCR data is collected, it is used as one part of the AOCR process, so images are not filtered out based on OCR confidence ratings alone.

2) OCR impact on cost of operations - Each image reviewed costs approximately 4.5 cents (labor).

3) Plate rules – In Texas, the plates typically stay with the vehicle when it is sold. However, the seller of the vehicle can choose to keep the license plates, and can remove the the plates and windshield registration sticker before transferring the vehicle to the buyer. The seller may request a $5 license plate transfer at their local county tax office in order to use the plates on another vehicle. The buyer of the vehicle must then acquire a new plate and registration sticker.

4) Toll rate table – The table below, from the Texas Tollways website, provides toll rates for the Austin area.

Austin Area Toll Road Rates		2-axle Vehicles			3-axle Vehicles			4-axle Vehicles			5-axle Vehicles			6-axle Vehicles		
		TxTag Rate	Cash Rate	Pay by Mail	TxTag Rate	Cash Rate	Pay by Mail	TxTag Rate	Cash Rate	Pay by Mail	TxTag Rate	Cash Rate	Pay by Mail	TxTag Rate	Cash Rate	Pay by Mail
LP 1 & SH 45	Plazas	$0.68	$0.75	$0.90	$1.35	$1.50	$1.80	$2.03	$2.25	$2.70	$2.70	$3.00	$3.60	$3.38	$3.75	$4.50
	Ramps	$0.45	$0.50	$0.60	$0.90	$1.00	$1.20	$1.35	$1.50	$1.80	$1.80	$2.00	$2.40	$2.25	$2.50	$3.00
SH 130	Plazas	$1.35	$1.50	$1.80	$2.70	$3.00	$3.60	$4.05	$4.50	$5.40	$5.40	$6.00	$7.20	$6.75	$7.50	$9.00
	Ramps	$0.45	$0.50	$0.60	$0.90	$1.00	$1.20	$1.35	$1.50	$1.80	$1.80	$2.00	$2.40	$2.25	$2.50	$3.00
183A	Park Street Main Plaza	$1.35	$1.50	N/A	$2.70	$3.00	N/A	$2.70	$3.00	N/A	$5.40	$6.00	N/A	$6.75	$7.50	N/A
	Ramps	$0.45	$0.50	N/A	$0.45	$0.50	N/A	$0.45	$0.50	N/A	$0.45	$0.50	N/A	$0.45	$0.50	N/A
	Lakeline Plaza**	$0.45	N/A	N/A	$0.90	N/A	N/A	$0.90	N/A	N/A	$1.80	N/A	N/A	$2.25	N/A	N/A

5) Out of state plates – Due to the size of the state, out of state plate percentages vary by the region of the state.
   a. The CTTS roadways in Austin average 400+ miles to the nearest border with another state. Out of state plates account for between 0.3% of transactions on SH 45 and Loop 1 (commuter facilities) and 0.8% on SH 130 (city bypass with NAFTA truck traffic).
   b. Tyler Loop 49 is near Louisiana, Arkansas, and Oklahoma. As a result, out of state plates account for 1.6% of transactions.
   c. SH 121 in Dallas receives heavy traffic from Oklahoma, in particular. Out of state plates account for 4.2% of transactions there.

Florida's Turnpike Enterprise (FTE)

Tom Knuckey,
Deputy Program Director, PBS&J (under contract to FTE)

Volume of transactions
Video tolling is only operational on one part of the overall FTE road network - the Selmon Crosstown Expressway. This is an open road toll (ORT) reversible lane facility carrying commuter traffic, elevated above a standard cash plus ETC toll road. Volumes of video transactions are very low - around 2000 registered accounts are set up, generating around 15,000 transactions per month.

Are you planning to implement video tolling or is it already operating?
It has been operational since November 1, 2006.

What needs, issues, problems or objectives are being addressed by video tolling for your agency?
The Crosstown Expressway was opened as a cashless toll facility using open road tolling with the SunPass transponder. The use of SunPass requires a $25 minimum balance and the transponder must be purchased for an additional $20. Public reaction to the lack of payment option choices, including the perceived high start up costs, prompted FTE to consider the use of video tolling, or Toll by Plate as it is known at FTE. Therefore the primary objective of video tolling is social equity and customer choice. An important secondary objective is use of the Crosstown deployment as a pilot to investigate the feasibility of extending video tolling across the 550 mile FTE network.

Payment methods
Do customers have to pre-register to use video tolling?
Yes, you must pre-register.

What are the registration rules and arrangements?
A video tolling account is created when you register. A pre-registered account is available to anyone with a valid credit or debit card. Registration can be conducted anytime before road use and up to 72 hours afterward. The 72 hour period was chosen because the FTE back office system currently takes 96 hours to complete image processing and data checks. This provides a cushion so that regular customers will have paid before processing is complete.

There are two account options - indefinite and limited duration. For an indefinite account, the customer effectively establishes a SunPass account. FTE staff will try to up-sell the customer to transponder-based tolling. The customer is required to make a minimum deposit of $5 and agrees to replenishment from a credit or debit card in $10 increments. For the limited duration account, there is also a mandatory $5 initial deposit and an agreement to pay the tolls from a credit or debit card account. The limited duration

account requires a specified end date, and is designed for casual users that don't want to have their details permanently held.

How do customers pay for video tolling?
Customers pay by credit or debit card with a minimum starting balance and auto replenishment.

Registration methods
What channels can customers use to register?
Currently, customers can only register via a phone call to the customer service center. A web site interface is under development.

What are the most popular?
Customers can only register by phone.

Payment timeframes
How long does the customer have to make payment before being considered a violator?
Customers have 72 hours to settle the bill before it becomes a violation. The violation process is the same as SunPass. After 72 hours an Unpaid Toll Notice (UTN) is issued. This could also be viewed as a video toll bill as it provides details of the transactions and requests payment, but is used for all unpaid transactions. If there is no response to the UTN after a further 30 days, then a Universal Traffic Citation (UTC) is issued for the amount of the tolls due and an additional penalty of $25 for each infraction (each toll payment point passed without payment). After a further 30 days, the matter is escalated to the courts.

Billing methods
What methods are used for billing customers?
Ideally, the transponder is linked to a credit card with initial deposit and auto replenishment. If not, they will receive an Unpaid Toll Notice after 72 hours. This can be paid by credit card through dial in services to a Customer Service Representative, in person at the Customer Service Center in Boca Raton or by credit card. There will be a web option, but it is still under development

Differential toll rates and payment structures
How much does video tolling cost to operate?
FTE estimates that it costs 25 cents per transaction for an operator to review each video image. All images are currently reviewed manually. It costs approximately $2.80 to generate and send out each paper statement, including costs for invoice development, envelopes, postage, handling, floor space / overhead, and a percentage of call center time related to calls related to statements received. Printing and assembly of the statement is outsourced to PRIDE Enterprises (Prison Rehabilitative Industries and Diversified Enterprises Inc.). FTE sends digital files and PRIDE generates and mails the statements.

Do customers pay a higher or lower toll to use video tolling and is there a service fee?
Customers pay the same toll rates as cash customers. FTE will require statutory authority to add additional fees for differential pricing. They are considering a three-tiered pricing structure for cash, video tolling, and SunPass.

Program eligibility
Who are eligible and what are the rules?
The video tolling program is open to anyone with a credit or debit card, and is only operational on the Selmon Crosstown Expressway. See "Rules and Arrangements" for further details.

Interagency DMV agreements
What is the format and content of agreements with your local DMV and out of state ones?
FTE has an agreement in place with Florida Department of Law Enforcement (FDLE) and the Department of Motor Vehicles for SunPass. This agreement and the process it supports allow FTE immediate online access to DMV records, and are also used for video tolling. The FTE Violation Processing System (VPS) is on the state FDLE and DMV network, which is in turn connected to the national law enforcement database. There are no out of state DMV or law enforcement arrangements, and FTE typically doesn't pursue out of state violators at present.

Enforcement methods
What methods are used for enforcement?
Video toll transaction records are matched to SunPass, E-Pass and other toll agency databases, then to rental car company databases (they have agreements with 4 rental car companies). If no match is found, the license plate details are transferred to the DMV for address look up. The UTN would be sent to the address on record at the DMV for the registered keeper of the vehicle.

On the roadway, Florida Highway Patrol (FHP) troopers are utilized on a "buy back" basis. They are paid overtime to enforce toll collection for FTE. A “wolfpack” of 4 to 5 troopers focus on specific plazas and tolling locations where the top ten violators have been observed. FHP troopers have constant communication with the Customer Service Center to help them distinguish between good customers having operational problems (dead batteries, etc.) and intentional violators. Due to the 72 hour grace period for video tolling, it is not possible to conduct roadside enforcement, as the violation decision has not yet been made. The focus is placed instead on enforcing legibility of license plates.

Public awareness arrangements
What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?

Press Releases have been used to inform the public, but the primary channel for awareness information is through dynamic message signs on the expressway.

What's working and what's not

Public perception of the video tolling application has been positive and accepting. FTE is planning a more formal customer survey to quantify this. There are some issues relating to customers' inability to access receipts and statements in a timely manner, as the web facility is not yet available.

Additional Information

1) OCR – FTE currently has OCR engines for the two most popular Florida plates, which accounts for approximately 80% of Florida license plates. OCR is attempted on all images. Each OCR read is reviewed manually by a staff person at Verification Station 1. If the OCR matches what is manually observed then the reviewer accepts the image. If it is different, the reviewer enters in what they observe to be the plate number. The image and adjusted plate number is then provided to a second operator who rechecks the plate number against the image.

2) Extension of credit – A legal review was performed and a legal opinion developed that stated the "extension of credit" clauses did not apply to the individual customer because it related to the customer's involvement in the electronic tolling program. The agreement allows FTE to charge the credit card for the toll amount. No collateral is needed.

3) Plate rules – In Florida, the license plate stays with the person who owned the vehicle. The new owner must obtain a new license plate.

4) Out of state plate processing – All license plate images are processed, including out of state plates. Violations for out of state plate vehicles are not currently enforced.

Miami-Dade Expressway Authority (MDX)

Stephan P. Andriuk
Director of Toll Operations

Volume of transactions
About 2,000 vehicles in three fleets operate under the fleet program, generating around 8,000 transactions per month.

Are you planning to implement video tolling or is it already operating?
MDX is in the planning stages of full-scale video tolling at the moment, but has a limited live application. MDX is using video tolling to address the specific needs of three major fleet users - Miami-Dade Transit, Greyhound Buses and Ryder. They are also using commercial services for rental cars, such as Rent a Toll and PlatePass.

Objectives
What needs, issues, problems or objectives are being addressed by video tolling for your agency?
Video tolling is aimed at providing a backup or ancillary service to transponder-based electronic toll collection. It provides an alternative to the very infrequent user, or to those willing to pay a premium toll to avoid the establishment of a prepaid account but still have the benefits of non-stop tolling. The main target group for video tolling is visitors from out of town and tourists.

The current fleet video tolling partnership is aimed at addressing specific fleet management issues and an interesting legal issue – Miami-Dade Transit vehicles are prohibited by law from mounting any kind of device on the windshield of the bus. MDX also views video tolling as a supplementary system that will improve the accuracy of their electronic toll collection system, taking overall accuracy from 99.9% to 99.99%.

Payment methods
Do customers have to pre-register to use video tolling?
Yes, the three fleet customers provide vehicle and license plate information to MDX. MDX considers this to be a partnership with the fleet operators. There were previously considerable violation issues with each of the three fleets, caused by the difficulty in maintaining tag-to-vehicle inventory and license plate updates with the fleets' high vehicle turnover rates.

What are the registration rules and arrangements?
Under the partnership arrangement, the fleet operators provide vehicle and license plate details to MDX, enabling all participating vehicles to be pre-registered.

How do customers pay for video tolling?
The fleet customers are billed in retrospect for the tolls incurred. MDX extracts transaction information for each of the three fleets on the 5th day of the month

following the month in which the transactions occur. An invoice is prepared and a transaction record is sent to each fleet operator along with the invoice. The invoice is due for payment within 30 days, in compliance with standard state procurement regulations. Serious delay in payment would result in transactions being re-classified as violations, and a Universal Traffic Citation would be sent to the fleet operator in question.

Registration methods
What channels can customers use to register?
For the fleet partnership application only one channel is used - direct communication with MDX.

What are the most popular?
Only one is used.

Payment timeframes
How long does the customer have to make payment before being considered a violator?
30 days.

Billing methods
What methods are used for billing customers?
A standard invoice is issued to pre-established accountholders. Transaction details to within 1/100th of a second are provided as backup to the invoice. Fleet operators are also finding this report useful for vehicle tracking and retrospective fleet management.

Differential toll rates and payment structures
How much does video tolling cost to operate?
The typical toll for 2 axle vehicles is between $1 and $1.25, depending on location, and $1 to $1.25 for each additional axle. Cash customers pay an additional 25 cents per transaction, as they don't get the electronic toll collection discount.

- Fleet operators pay 8% of monthly gross revenue created by their transactions as a processing fee to Florida's Turnpike Enterprise.

- A video tolling fee of six cents per transaction is added to the SunPass toll rate if the license plate is found in the rental car database. If there is no match and it is later determined that the vehicle was part of the rental car fleet, there is a $2.90 fee in addition to the SunPass toll rate. These fees cover processing costs.

- Miami-Dade Transit vehicles are issued a unique sticker which is placed on the plate to identify it as a transit vehicle. MDT is then billed monthly at the cash rate. This arrangement was established due to transponder theft, challenges in keeping the vehicle database accurate, and the MDT-related legal issue. While the tolling charge is higher than with a transponder, this process is more efficient to manage.

Do customers pay a higher or lower toll to use video tolling and is there a service fee?
They pay a higher fee. Fleet customers have agreed to pay the full cash toll, instead of the discounted electronic toll rate. Currently, there is a 25 cent discount available to users that make use of a SunPass transponder to pay tolls automatically.

Program eligibility
Who is eligible and what are the rules?
Only fleet operators with partnership arrangements can currently participate in video tolling.

Interagency DMV agreements
What is the format and content of agreements with your local DMV and out of state ones?
They have a direct connection to the DMV and request data in batch once per day at 3:00 AM. Plate numbers from the previous day's transactions are submitted and usually responded to within an hour. This is for violation enforcement and non-video tolling purposes only, as the current pre-registered video tolling arrangement doesn't require DMV lookup. DMV data is provided under state statute with additional subagreements.

Enforcement methods
What methods are used for enforcement?
Standard video enforcement with vehicle classification conducted through the use of inductive loop analysis techniques, using Intelligent Vehicle Identification System (IVIS) technology developed by United Toll Systems. IVIS classifies vehicles using their electromagnetic signatures.

Public awareness arrangements
What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?
None so far, as it is a partnership arrangement with three specific fleet operators.

What's working and what's not
All working very well. They are particularly pleased with the low maintenance costs of the IVIS system in comparison to the more traditional light curtain and treadle approach to vehicle classification. The video cameras are working well and OCR algorithms have improved in leaps and bounds over the past few years. MDX uses United Toll Systems back office systems, and it has taken them about 2 1/2 years of development and operations to get to this point.

A major issue identified is the need for a more formal audit support function in the tolls back office. The 8-10 suppliers of toll back office systems are typically from the tolls business and not from an accounting background. As the volume of revenue has increased, the need for formal audit support has grown. MDX is currently developing an

audit support function for their back office, targeted for introduction in the first quarter of 2009. This will address their need to comply with General Accepted Accounting Principles (GAAP).

A major lesson learned when MDX implemented ORT last July was the need for swift action during the initial stages in handling violators. MDX took a forgiving approach and waited about 6 weeks before seriously going after violators. In retrospect they feel that better results would have been achieved through the delivery of an early letter to violators offering amnesty from the penalty in return for signing up for electronic toll collection. By their estimate, this approach might have captured an additional $1 million in toll revenue.

Additional information

1) OCR - Since they currently do not utilize OCR all images are reviewed manually. For their future system they are looking to deploy a system that recognizes plate type in addition to capturing the license plate characters.

2) Violations – When they started open road tolling in July last year, they experienced a net violation rate of approximately 30%. They have managed this down to 2.8 - 2.9%.

3) Transponder costs – Currently transponders are sold in Florida for $25 each with no account balance. In July they will migrate to the TransCore sticker tag, which will be sold for $5 with an included balance of $4.95. Balance on the account can be replenished with an accompanying key fob device at grocery stores and other merchant service partners.

4) Interoperability – MDX has an agreement with FDOT to participate in the SunPass statewide electronic toll collection system. They pay varying monthly payments to FTE in return for toll collection services. The monthly payment is related to the proportion of statewide electronic transactions that MDX generates and the size of the FTE budget. This has become an issue, as MDX has no control over the size of the budget. They currently pay 11.9 cents per transaction. The transaction cost increased by 78% this year due to increased electronic transactions at MDX and increased FTE budget.

5) Future plans – MDX expects the volume of electronic transactions to increase from the current 300,000 per day to over 1.2 million as they close revenue leaks in the system. They are migrating towards segmentation of their road network with additional gantries, allowing them to approximate a distance-based toll pricing structure in excess of 15 cents per mile.

6) Registration – Fleets interested in becoming part of the program are required to provide a $250,000 letter of credit as collateral.

North Carolina Turnpike Authority (NCTA)

James J. Eden,
Chief Operations Officer

Volume of transactions

The roads are not open yet, so they only have forecasts at the moment. In 2010 for their first stretch of road, which is three lanes in each direction, they forecast 113,600 trips per day, 400,000 vehicles and 1.5 transactions per trip. They expect 93,500 of the transactions to be transponder based, 15,900 to be registered video and 4,200 to be unregistered video toll transactions.

Are you planning to implement video tolling or is it already operating?

NCTA is in the planning stage of video tolling and all other activities. They are a new toll agency and will have their first road open in 2010.

Objectives

What needs, issues, problems or objectives are being addressed by video tolling for your agency?

They are planning to drive cash from the roadside with an all electronic open road tolling environment. They see video tolling as one of the cashless alternatives - pay by transponder, pay by pre-registered video toll or pay by non-registered video toll. There will be no cash accepted at the roadside and no violators, only premium-paying customers. Video tolling is viewed as part of the overall open road cashless payment portfolio that has enabled them to manage environmental impact concerns and avoided approximately $65 million in construction costs.

Payment methods

Do customers have to pre-register to use video tolling?

Not necessarily, as they will support two options for video tolling - registered and unregistered. Pre-registered video toll users will pay a lower toll than unregistered.

What are the registration rules and arrangements?

Pre-registered video toll users can call in with credit card and vehicle information, use the internet or go to a customer service center. They can do this at any time in advance of making use of the road. NCTA will also apply a 4 hour post-registration window. If a road user registers within 4 hours of use, they will retrospectively be treated as a pre-registered video toll user.

How do customers pay for video tolling?

Customers pay via credit card over phone or internet with additional cash alternatives at customer service centers. There will be two field customer service centers, one at each end of the first road, and eventually a network of customer service centers close to the new road network. They are also investigating the use of day passes, utilizing temporary accounts that could expire after predefined time periods. Day passes would provide unlimited travel on the road network for a fixed, prepaid fee.

Registration methods
What channels can customers use to register?
Dial in, internet and customer service center. They also plan the use of mobile customer service centers at fairs and employment locations in the technology triangle, to encourage registration.

What are the most popular?
Don't know yet as they have not gone live.

Payment timeframes
How long does the customer have to make payment before being considered a violator?
30 days.

Billing methods
What methods are used for billing customers?
Invoices and credit card payments.

Differential toll rates and payment structures
How much does video tolling cost to operate?
Refer to the recent cashless versus cash study report conducted by WSA, HNTB and PBS&J for NCTA. To be clear, these are estimated "consensus" numbers used for forecasting, not actual costs, since NCTA's facilities are not operational yet.

Cost per Transaction Category	**2007**
Daily valid cash / card transactions [A]	$0.25
Daily successful ETC transactions [B]	$0.10
Daily video matching ETC accounts - "v-Toll" ETC transactions [C]	$0.18
Daily Registered Video [D]	$0.28
Unregistered video	
Daily unregistered - unusable image [E]	$0.12
Daily unregistered - match prior video image [F]	$0.15
Daily unregistered - Out-of-state plate [G]	$0.67
Daily unregistered - Returned Mail [H]	$0.98
Average Cost per Transaction Category	**$0.34**

Do customers pay a higher or lower toll to use video tolling and is there a service fee?
They will take a double-double approach to differential toll rates. If for example, the toll for a transponder-based transaction was $1 at a specific network location, then the corresponding toll for a registered video toll transaction would be $2, and $4 for an

unregistered video toll transaction at the same network location. Tolls rates vary by location but the differential will be maintained.

Program eligibility
Who is eligible and what are the rules?
Everyone is eligible. Transponder and registered video toll customers sign up for a toll account subject to a minimum balance in the account. The account is linked to their credit card and money is drawn down in increments when the balance in the toll account falls below the minimum. They are considering a $20 minimum account balance with $50 draw down increments, but will vary this according to monthly toll use.

Interagency DMV agreements
What is the format and content of agreements with your local DMV and out of state ones?
They are currently negotiating with the DMV on the content and format for an agreement on data transfer. NCTA is also the prime driver and founder of the Alliance for Toll Interoperability (ATI). This is an informal alliance of 12 states - North Carolina, South Carolina, Georgia, Florida, Texas, Louisiana, Oklahoma, Kansas, Tennessee, New York State, Delaware and Maine. They are initially focused on the definition and agreement of a data exchange standard between toll operators and respective DMVs. They are using existing agreements and standards from California, Florida, Texas and the I-95 Corridor Coalition (E-ZPass). Initially focused on the needs of video tolling, this effort will define the format and content for the transaction records to be exchanged, including license plate details and images for enforcement. They plan to establish agreements between the toll agencies, then leave each toll agency to agree and transfer data with their own DMV. The American Association of Motor Vehicle Administrators (AAMVA) is also involved in the standards setting.

Enforcement methods
What methods are used for enforcement?
Violators will be treated as pre-registered video toll users if they pay within 4 hours after use. Following that, they are considered unregistered and will be invoiced. Non-payment of the invoice constitutes a violation. Persistent violators will be tracked for regular road use and police patrol will be used to intercept. NCTA can't keep the fines, they can only recover the toll. This form of enforcement is expensive, but publicity surrounding it acts as an excellent deterrent. In addition to the patrols, they will also make use of collection agencies to recover tolls.

Public awareness arrangements
What arrangements were made to make the public aware of the operation and benefits of video tolling before, during and after implementation?
They are holding a press conference to talk about the technology and how the open road tolling system will work. An animated film is also being developed, explaining how the transaction takes place on the road. They will install temporary readers on adjacent roads and install the permanent ones early on some parts of the road network that will

be completed early and open for free use. This will be used to enable potential customers to try before they buy and find out how it works. To increase awareness of the options, a major publicity campaign will take place for about 6 months prior to road opening for tolls. Consequently, when the road opens there will be no free trial period and they will go straight to revenue collection from day one.

What's working and what's not

They don't have any special arrangements for commercial fleets, as this traffic will make up less than 2% of the total traffic. They have deliberately adopted a simple toll classification system - 3 classes, motorcycles/cars, small trucks and large trucks. They plan to use a combination of axle count and vehicle profiling to classify vehicles.

Additional information

1) Public reaction – Local public reaction has been positive with the primary concern that the system is fair. "If I pay, how are you going to make sure that everyone pays?"

2) OCR- OCR will be performed first in the field. A second OCR review will be performed by the system in the back office and will be used to match against other video transactions. If the results of the OCR return a plate number that has never been seen it will go to a station for human review. For plate reads that have been achieved and match previous reads periodic manual checks will also be performed. The OCR read will also be checked against a hotlist of tags for repeat violators.

3) Plate rules – In North Carolina the license plate stays with the person who owned the vehicle. The new owner must obtain a new license plate. The plate owner may transfer it to a new vehicle for a $15 transfer fee.

Appendix E: Video Toll Signing

Introduction

Just as video tolling has few precedents within North America, video toll-associated signing is also fairly scarce. This appendix includes examples of signing on projects in Texas, Florida, and Ontario, Canada, and related observations.

It is also important to note that the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) does not currently address video tolling. Some consideration has been given, in recent years, to toll-related signing, with potential toll signage standards expected in 2009. Generally speaking, toll signing has moved toward MUTCD color coding, using purple as a potential toll-specific color. However, the details are still being worked out.

Roadway / Route Signing

With regard to roadway route marker shields, no distinction is generally made between a standard toll road route marker and one that includes video tolling, as illustrated by the examples in **Figure 1** below. Both facilities support unregistered video tolling.

Figure 1: Route Markers for SH 121 in Dallas, Texas, and 407 ETR in Ontario, Canada

Toll-Related Advance Signing

The most critical location for video toll-related signing appears to be well in advance of the toll plaza. In **Figure 2** below, TxDOT uses an advance signing gantry on SH 130 to direct drivers to the appropriate lanes for TxTag and Pay by Mail.

Their cash plaza is accessed by way of an exit off the main route, as indicated by the Cash Lanes sign. However, it is important to note that there is no mention of Pay by Mail in association with the cash lanes, despite the fact that video tolling is an option there. This is due to an emphasis on traffic movement and congestion avoidance. Vehicles in the cash lanes may be informed that they will receive a bill in the mail and waved through if they are backing up the cash plaza queues due to insufficient funds, looking for change, etc. This option is not heavily promoted, however, to avoid adding traffic volume to the cash plazas.

Figure 2: SH 130 Advance Toll Signing

The signs in **Figure 3** are examples of advance signage proposed by Florida's Turnpike Enterprise (FTE) during an exploration of Sawgrass Expressway for all-electronic tolling. FTE has pursued the purple color-coding espoused by the MUTCD.

Figure 3: FTE Proposed Advance Signing

Including posted rates for toll facilities has traditionally been difficult, due to the necessity of addressing rates for different types of tolling and the many difference sizes and types of vehicles. Video tolling adds yet another factor to that already complex area, so it is only used in certain circumstances. For example, the SH 121 sign shown in **Figure 3** below includes both the types of toll collection included and the general types of vehicles, in a simple matrix format. This was only possible because SH 121 was video-only at the time, with transponder tolls performed through plate matching to TxTag accounts. Note that no signage is included on the gantry itself.

Figure 4: SH 121 Toll Rate Signing

The sign in **Figure 4** illustrates new simplified signing proposed for use for on TxDOT's Austin toll facilities.

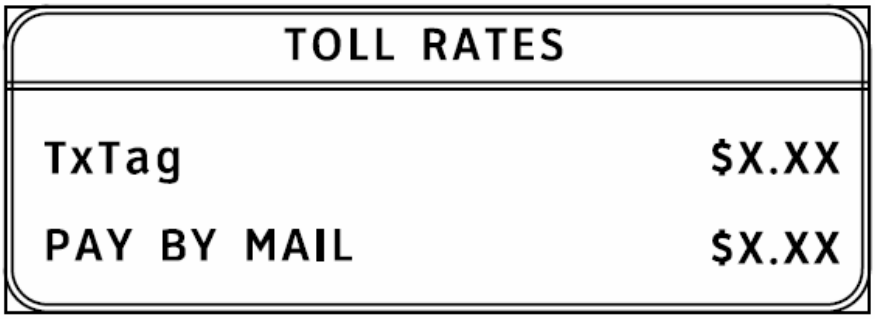

Figure 5: Proposed TxDOT Rate Signing

Advance signing may also be used at the beginning of a facility, to make drivers aware of payment options prior to entering. The rendering in **Figure 7** has been proposed by the Central Texas Regional Mobility Authority (CTRMA) in Austin, Texas, for use when they move their currently-operating 183A toll facility to a cashless operation.

Figure 6: CTRMA Begin Toll Facility Sign

Advance signing may also be used to address issues specific to a facility. The sign in **Figure 7** provides clear communication to drivers regarding Canada's license plate visibility regulations.

Figure 7: 407 ETR Regulatory Sign

The sign in **Figure 8** was created specifically to address customer complaints on SH 121 in Dallas. When SH 121 opened with video tolling only, the customer service center began receiving a large percentage of calls complaining that it was not clear the roadway was a toll road, and it was not clear where and how to pay. As a result, this sign was erected to assist short-term in alleviating those concerns, in addition to accellerated public education in the Dallas – Ft. Worth area.

It is important to note that this sign, while very clear and direct, is not in compliance with MUTCD regulations. It is considered an information sign, but has been constructed using regulatory signing standards in black and white. Later long-term signing plans would address this issue, but in the short-term, it accomplished its purpose and reduced the complaints.

Figure 8: SH 121 Video Toll Informational Sign

Plaza / Gantry Signing

Video toll-related signing on the plaza gantries themselves is difficult to find, due at least in part to the necessity of keeping plaza signing simple and straightforward. In TxDOT's case, they chose to address video tolling capabilities through their public education campaigns and advance signing, and avoid cluttering the gantries further by attempting to clarify this point. It is also important to note that video tolling, or Pay by Mail, is accepted in all TxDOT lanes, so there was no need to direct drivers to specific lanes for that purpose.

Signing on TxDOT's Loop 1 mainline toll plaza gantry, as shown in **Figure 9** and **Figure 10** below, illustrates this point. Cash plaza signing includes signing for manned lanes and dedicated ETC lanes, and Express / ORT lanes reflect only the TxTag logo. Drivers were made aware of the Pay by Mail capability in the ORT lanes by the advance gantry signing, with no further mention of it here.

Figure 9: Loop 1 Cash and ORT Plaza Signing

Figure 10: Loop 1 Express / ORT Lane Signing

ATTACHMENT B:

Task 2.0 Legal & Legislative Review

Technical Memorandum – Final Report

BATA Video Tolling Project

Task 2.0: Legal and Legislative Review

July 9, 2008

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1.0 Introduction

Emerging transportation-related technologies have the potential to benefit the Bay Area's system of bridges and highways by alleviating congestion, enhancing traffic safety and boosting fuel conservation. For all these benefits, however, new technologies in the context of toll collection raise questions about individual privacy protection and whether existing law may accommodate such new methods and resources.

BATA is the public instrumentality responsible for the administration of all toll collection and revenue distribution from state-owned Bay Area toll bridges.[1] Currently, BATA employs a tolling system using both conventional toll plazas with individual toll booths for cash payment, as well as FasTrak,[2] an electronic toll collection ("**ETC**") system that allows users to pay tolls at toll booths without stopping. ETC uses radio frequency identification ("**RFID**") technology whereby an overhead antennae detects a signal from a transponder mounted on the windshield of a vehicle passing through the toll collection site and debits the associated prepaid account.[3] If a vehicle does not have a transponder, the tolling system registers the vehicle as a toll violator and uses cameras to take photos of the toll violator's license plate for processing.[4] BATA has also implemented limited RFID open-road tolling ("**ORT**"), allowing users to drive through booth-less toll plazas at highway speeds while paying for tolls with prepaid transponders linked to prepaid accounts.[5]

Unlike the existing ETC technology employed by BATA, video tolling does not rely upon RFID transponders linked to prepaid accounts in order to process toll users. Nor are drivers categorized as either valid users or violators (users without a transponder or cash) upon passing through the toll collection site, as under current law. Instead, vehicle information is obtained through video capture of the vehicle license plate while the vehicle is passing through the tolling zone. Tolls are then charged by either the debiting a prepaid account associated with a transponder or the license plate number or, in the absence of a prepaid account, by invoicing the registered owner of the vehicle associated with the license plate number. In the latter case, BATA would identify and locate a toll user by requesting and receiving information from the California Department of Motor Vehicles ("**DMV**"). Toll users invoiced by such a process would be classified as a violator only *after* having been provided the opportunity to pay the invoiced toll charges and the user has failed to pay in a timely manner.

Although states and provinces across North America are currently considering the move to video tolling,[6] only Texas and Ontario, Canada have established operational video tolling systems. Ontario's 407 Express Toll Route ("**407 ETR**") uses two ETC alternatives; transponder

[1] Sts. & Hy. Code, § 30950 *et seq*.
[2] FasTrak Web site, http://www.bayareafastrak.org/static/about/howit.shtml (as of April 7, 2008).
[3] FasTrak Web site, http://www.bayareafastrak.org/static/about/howit.shtml (as of April 7, 2008).
[4] FasTrak Web site, http://www.bayareafastrak.org/static/about/howit.shtml (as of April 7, 2008).
[5] Bay Area Toll Authority Web site, http://bata.mtc.ca.gov/bridges/ben-mar.htm (as of April 7, 2008)("The Benicia-Martinez Bridge is Northern California's first open road tolling system allowing FasTrak customers to travel through the toll plaza at 55 mph.")
[6] TOLLROADSnews, http://www.tollroadsnews.com/node/3423 (as of April 9, 2008) (reporting that "New York is joining the list of US toll authorities planning or studying going cashless" and other commentary on video tolling).

(RFID) technology as well as video tolling to process toll charges by users without transponder devices.[7] Light vehicle drivers with transponders are charged 19.25 cents/km (Canadian). A driver without a transponder is billed a C$3.60 video toll charge per trip. A C$50.00 flat toll charge per trip is imposed upon a driver without a transponder whose rear license plate is obscured or unreadable by the toll system.[8]

The first "high-tech toll road"[9] of its kind in the United States, Texas State Highway 121 also uses the combination of RFID electronic toll tags[10] for account holders and video license plate capture and monthly billing for users without tags. In Texas, drivers without electronic toll tags are charged rates that are one-third more than tag-users in order to offset the costs of processing the license plate information attained by using video cameras. Monthly invoices for tag-less drivers reflect an additional $1 fee and are payable within 15 days from the invoice date.[11]

This memorandum will address the legal issues raised by the implementation of video tolling technology on the seven state-owned Bay Area toll bridges[12] managed by BATA. The State Constitution, state and federal law, as well as the courts all shape the legal landscape. This memorandum explains the relationship between the legal issues raised by video tolling and current law. In the event legal barriers to implementation exist, this memorandum offers recommendations for resolving such issues towards the goal of establishing a Video Tolling Project on the Bay Area bridges.

[7] 407ETR Web site, http://www.407etr.com/About/qas.htm#q5 (as of April 7, 2008).
[8] 407ETR Web site, http://www.407etr.com/About/custserv_fees.asp (as of April 7, 2008).
[9] Texas Highway 121 Web site, http://www.texas121.org/ (as of April 7, 2008).
[10] TxTag Web site, http://www.txtag.org/tagbasicsgeneral.php (as of April 7, 2008) (The "TxTag" sticker is the RFID technology equivalent to the FasTrak transponder used in California.)
[11] Texas Highway 121 Web site, http://www.texas121.com/english/qa.htm (as of April 7, 2008).
[12] Antioch, Benicia-Martinez, Carquinez, Dumbarton, Richmond-San Rafael, San Francisco-Oakland Bay and San Mateo-Hayward.

2.0 Privacy

2.1 General Privacy Principles

Privacy concerns have received significant attention over the past 40 years, leading to the passage of substantial legislation on the state and federal level.

2.1.1 The Constitutional Right of Privacy.

In 1972, the California State Constitution ("State Constitution") was amended to add "privacy" to the short list of inalienable rights granted each citizen of this state.[13] Article I, Section 1 provides:

> "All people are by nature free and independent and have inalienable rights. Among these are enjoying and defending life and liberty, acquiring, possessing, and protecting property, and pursuing and obtaining safety, happiness, and **privacy**."[14]

This provision protects two legally recognized interests. First, the State Constitution protects the interest of the individual in preventing the dissemination or misuse of sensitive and confidential information.[15] Second, the State Constitution protects the interest in "making intimate personal decisions or conducting personal activities without observation, intrusion or interference."[16] An individual's reasonable expectation of both privacy with respect to either interest is an objective entitlement founded on "broadly based and widely accepted community norms."[17] Privacy concerns are not absolute and must be balanced against other competing interests.[18] An interest derived from "legally authorized and socially beneficial" activities of government reduces the relative strength of the interest in privacy afforded the individual.[19] As such, the constitutional guaranty of privacy does not prohibit the enactment of reasonable rules and regulations adopted in the exercise of the state's police power.[20]

2.1.2 Interest Against Observation, Intrusion or Interference.

The use of video cameras to capture vehicle images and document vehicle toll crossings implicates the fundamental right of the individual to conduct personal activities without unwarranted intrusion or observation. This is because information regarding driver movements through toll crossings will be observed and recorded using video technology. But the privacy

[13] *Valley Bank of Nev. v. Super. Ct.* (1975) 15 Cal.3d 652, 656; see also *Garstang v. Super. Ct.* (1995) 39 Cal.App.4th 526, 533.
[14] Cal. Const., art. I, § 1 (emphasis added).
[15] *Valley Bank of Nev., supra,* 15 Cal.3d at 656.
[16] See generally *Edgerton v. State Personnel Bd.* (2000) 83 Cal.App.4th 1350.
[17] *Ragge v. MCA/Universal Studios* (C.D.Cal. 1995) 165 F.R.D. 601, 604-05.
[18] See *Hill v. Nat. Collegiate Athletic Assn*. (1994) 7 Cal.4th 1, 15.
[19] *People v. Martinez* (2001) 88 Cal.App.4th 465, 479 (citing *Hill v. Nat. Collegiate Athletic Assn*., supra, 7 Cal.4th at 37-38).
[20] *Elliott v. Haskins* (1937) 20 Cal.App.2d 591, 699.

interest held by the individual is balanced against the public benefits of BATA's Video Tolling Project, including traffic safety, operational efficiency, congestion relief and resulting positive environmental impacts. The strength of the privacy interest depends on the circumstances surrounding the invasion. BATA's Video Tolling Project may minimize the severity of an "observational invasion" by implementation in a manner only intrusive enough to achieve the social objective, such as targeting the image capture to include only the license plate. The reasonableness of the privacy invasion would be enhanced by maintaining a cash-only lane as an option for drivers wishing to remain anonymous. Weighed against the interest to the public in the efficient administration of regional infrastructure projects, the privacy interest of the individual is likely to yield. Capturing additional information, and/or eliminating the ability to travel anonymously through a cash lane would weaken the arguments in favor of video tolling, but even then the public interest would likely outweigh the privacy interest. Because this is a new technology, there is no precedent that answers the question directly.

2.1.3 Interest against Dissemination of Information.

Video tolling also implicates the second fundamental right of the individual; to keep personal information, private. This is because disclosure of DMV records to BATA is necessary to accommodate users that forego preregistration with the tolling authority but still want to pass through the toll collection site. As above, the privacy interest held by the individual is balanced against the public benefits of a video tolling project. The severity of the invasion from document disclosure may again be minimized by prudent program implementation, including comprehensive retention and security measures to keep records disclosed by the DMV to BATA, confidential. The privacy interest would again likely yield to the greater public interest in adopting the Video Tolling Project. Legislative history substantiates this conclusion. A California Legislative Counsel Opinion issued at the time the constitutional amendment to add "privacy" moved through the California Legislature concluded that DMV disclosure laws were not restricted by the constitutional grant of a privacy right.[21] Therefore, the constitutional right to maintain the privacy of personal information should pose no obstacle to implementing a Bay Area video tolling project using DMV disclosure to BATA as a means of obtaining information necessary to bill toll users.

The resale or redisclosure of information by BATA to third parties also falls under this constitutional scrutiny. BATA has a less compelling case to make for a public interest in disclosure of personal information for other purposes, such as marketing or solicitation[22]. Third party disclosure is not required for the Video Tolling Project to operate, as is the case for DMV

[21] 3 Assem. J. (1972 Reg. Sess.) p. 5682 (granting unanimous consent to printing Ops. Cal. Legis. Counsel, No. 13370 (June 30, 1972) Right of Privacy – Public Records).

[22] BATA currently sends marketing information to existing FasTrak customers consistent with both its Application and License Agreement, as well as its Privacy Policy. To the extent the video tolling project makes agreements with customers in the same fashion—that is, such toll payers are similar to FasTrak customers and the only difference is the technology identifying them—the situation should be no different. BATA can obtain consent in the agreements with those customers to send marketing information to them. However, to the extent the plates of users without a prior agreement are read, the situation is different. Because these toll users have not received the requisite notice or opportunity to agree affirmatively to the terms and conditions of a program, including use of personal information for marketing purposes, such individuals would have a much stronger claim for breach of privacy and to avoid such claims BATA should exclude such users from "customer" mailing lists.

disclosures to BATA for billing purposes. Therefore, in balancing the privacy interest against the public interest, the individual interest in preventing the further dissemination of personal or confidential information may prevail.

BATA could eliminate the privacy interest at stake by disclosing only non-identifying information received in connection with the Video Tolling Project. By removing personal, individual details regarding toll users and their vehicles, BATA could render the data sufficiently anonymous to conform to constitutional privacy protections while preserving the utility of the information for other purposes. Thus, for example, it could prepare public reports about video toll usage, so long as they did not contain any personal identifying information.

2.2 Tortious Invasion of Privacy (Civ. Code, § 1708.8).

2.2.1 Statutory Cause of Action for Invasion of Privacy.

The California Civil Code creates a separate cause of action for invasion of privacy specific to the capture of visual images, sound recordings and other impressions. Although adopted to "reduce aggressive paparazzi-like behavior against private individuals,"[23] section 1708.8 creates a broad civil liability for physical and constructive invasions of privacy using cameras and other electronic devices. Section 1708.8(a) creates liability for a physical invasion of privacy with respect to image capture if one "knowingly enters onto the land of another without permission . . . with the intent to capture any type of visual image . . . ."[24] Such trespass must be perpetrated "in a manner offensive to a reasonable person."[25]

Section 1708.8(b) defines a constructive invasion of privacy involving image capture as an attempt to capture any type of visual image "of personal or familial" nature "under circumstances in which a plaintiff had a reasonable expectation of privacy . . . ."[26] The Project should fall outside such definitions. Section 1708.8 does not, however, impair or limit otherwise lawful government agency action taken to capture visual images during an investigation or while monitoring conduct to obtain evidence of suspected illegal activity or suspected violation of any administrative rule or regulation.[27]

2.2.2 Issue: Image Capture, Invasion of Privacy.

A video tolling project uses cameras to capture license plate images at toll collection site, implicating the statutory invasion of privacy tort. However, neither the physical nor the constructive theory of privacy invasion covers the type of activity used in video tolling.

First, video tolling does not involve the physical entry onto the land of another in order to capture an image. Nor should the manner of image capture at toll collection sites be offensive

[23] Off. of Sen. Floor Analyses, 3rd reading analysis of Sen. Bill No. 262 (1997-1998 Reg. Sess.) Aug. 26, 1998.
[24] Civ. Code, § 1708.8(a).
[25] Civ. Code, § 1708.8(a).
[26] Civ. Code, § 1708.8(b).
[27] Civ. Code, § 1708.8(g).

to the reasonable person. Automated devices, including video cameras, are becoming increasingly ubiquitous. Cameras are currently used in transportation-related enforcement to capture parking,[28] toll,[29] and red light[30] violations (see also "Related Technology: Automated Enforcement Systems" below). Therefore, there should be no physical invasion of privacy liability attributable to BATA.

Second, invasion of privacy liability should not attach under the statute's constructive invasion of privacy theory. This is because an individual has no reasonable expectation of privacy while driving in an automobile on the roadways, as is required by the statutory definition.[31] The United States Supreme Court has repeatedly affirmed this principle and has distinguished the high degree of privacy protection a person's home from the expectation of privacy in a person's vehicle. Absent a reasonable expectation of privacy, there is no constructive invasion of privacy. Therefore use of video imaging technology to capture images of vehicles passing through toll collection sites raises no unanticipated risk of privacy invasion under the statutory tort.

2.3 Common Law Causes of Action.

In addition to the statutory rights and remedies created by Civil Code section 1708.8,[32] the courts have developed common law privacy torts to address four distinct injuries: [33] intrusion,[34] public disclosure of private facts,[35] false light[36] and misappropriation.[37] None of these common law tortious invasions appear tailored to address a conceivable fact pattern stemming from the operation of cameras in a video tolling project. However, even in the event such a fact pattern arose, the general rule regarding the invasion actionable under the tort weighs against finding any liability in the video tolling context.

An actionable invasion of privacy under any of the four common law causes of action requires an invasion be "highly offensive to a reasonable person."[38] While, for example, secretly recording employee conversations in the workplace may violate an employee's reasonable expectation of privacy,[39] as noted above, video cameras for security and transportation enforcement purposes have become virtually commonplace. The objective reasonable person is

[28] Veh. Code, § 40240(a).
[29] Veh. Code, § 40250.
[30] Veh. Code, § 210.
[31] *U.S. v. Knotts* (1983) 460 U.S. 276, 281; see also *U.S. v. Karo* (1984) 468 U.S. 705, 707, 721.
[32] Civ. Code, § 1708.8(i).
[33] Rest.2d Torts, § 652A, com. b, com. c, p. 376-77.
[34] Elder, David A., *Privacy Torts*, (2002) pp. 2-2 – 2-3 (calling the tort of intrusion the "right to be left alone" and noting the law requires that individuals become accustomed to the "inevitable concomitants of life in an industrial and densely populated society").
[35] Elder, David A., *Privacy Torts*, (2002) pp. 3-2 – 3-5 (calling the tort an "extension of defamation" and giving the factual example of a defendant-police officer disclosing to third parties that the plaintiff was HIV-positive).
[36] Elder, David A., *Privacy Torts*, (2002) pp. 4-2 – 4-2, 4-25 (the plaintiff must be depicted "as something or someone which he is not" by falsification and widespread publicity).
[37] Elder, David A., *Privacy Torts*, (2002) pp. 6-1 – 6-4 (noting that the appropriation tort emphasizes a property right in one's likeness more than a privacy interest in minimizing invasions of "personal sensibilities")
[38] Rest.2d Torts, § 652B, p. 378.
[39] See generally *Shulman v. Group W Productions* (1998) 18 Cal.4th 200.

unlikely to consider camera imaging in the context of video tolling to be "highly offensive," particularly because its use is no longer novel (see also "Related Technology: Automated Enforcement Systems" below). Nor does limited record-sharing between government agencies for toll administration offend the reasonable person's consideration of privacy rights to the degree required by the common law.

Such an issue may pose more of a public relations hurdle because the financial and political viability of a video tolling system may turn on the public perceiving the degree of intrusion necessitated by the system as generally unobjectionable. BATA may choose to conform the Bay Area video tolling project to try to meet this expectation by, for example, limiting the range of the video capture to the license plate only, excluding capture of the driver or the vehicle (see Section 6.2.1, "Image Capture, Scope of Target"). But in general, BATA's video tolling project should not raise any legal issues of tortious invasion of privacy under a common law theory, even if the image capture is more extensive.

3.0 Confidentiality of Driver's License Information (Veh. Code, §§ 1808 et seq. and the Federal Driver's Privacy Protection Act).

3.1 Personal Information.

The Vehicle Code generally limits the disclosure of personal information in records maintained by the DMV. Section 1808 *et seq*. bars the DMV from making available or disclosing personal information about a person[40] unless such disclosure is in compliance with federal law – the Driver's Privacy Protection Act of 1994 (the "**DPPA**").[41]

The federal DPPA prohibits the knowing disclosure of personal information, except that disclosures to any government agency for use in carrying out agency functions, including those related to motor vehicle or driver safety, are permitted**.**[42] "Personal information" means:

"[I]nformation that identifies an individual, including an individual's photograph, social security number, driver identification number, name, address (but not the 5-digit zip code), telephone number, and medical or disability information, but does not include information on vehicular accidents, driving violations, and driver's status."[43]

Disclosures permitted by the DPPA remain subject to state prohibition against the sale or distribution of a person's photograph or physical description unless requested by the licensee.[44]

3.1.1 Issue: DMV Disclosure to BATA.

The DPPA generally prohibits DMV disclosure of the type of personal information BATA will require, including names and addresses, but provide a limited exception for "any government agency." A general rule of statutory construction provides that unless otherwise clearly intended, words and phrase are construed "in accordance with the "plain and commonsense"[45] or "ordinary meaning of the language used."[46] The DPPA does not define "any governmental agency." However, a plain and commonsense interpretation of the phrase strongly suggests that BATA, a *public* toll authority created by *state law* to administer *state-owned* bridges,[47] would be considered a governmental agency for purposes of the DPPA. Therefore, "any government agency" appears plainly broad enough to include the Bay Area Toll Authority[48] and BATA's requests for personal information retained by the DMV would fall under the "any

[40] Veh. Code, § 1808(e).
[41] 18 U.S.C. § 2721 *et seq*.
[42] 18 U.S.C. § 2721(b).
[43] 18 U.S.C. §2725(3).
[44] Veh. Code, § 12800.5(a)(2).
[45] *Garcia v. McCutchen* (1997) 16 Cal.4th 469.
[46] *In re Marriage of Bonds* (2000) 24 Cal.4th 1.
[47] Sts. & Hy. Code, § 30950 *et seq*.
[48] Sts. & Hy. Code, § 30910 *et seq*.

government agency" exception to the disclosure prohibition. BATA should be able to access DMV information needed to effectively implement a video tolling project.

3.1.2 Issue: Information Resale or Redisclosure by BATA.

BATA may, as a recipient of information used in the administration of its Video Tolling Project, desire to resell or re-disclose the information gathered for other purposes. The Vehicle Code prohibits the sale or distribution of certain types of personal information: a person's photograph or physical description.[49] The DPPA provides that an authorized recipient of personal information may resell or redisclose the information only for a permitted use.[50] The list of permitted uses is limited and exclusive, and includes redisclosure to provide notice of a towed or impounded vehicle, and resale or redisclosure by any government agency in carrying out its functions.[51] The DPPA does not expressly allow resale or redisclosure for marketing or solicitation purposes. It is unlikely that the "performance of its functions" use is broad enough to allow BATA to sell or disclose the personal information that it receives from the DMV.

3.2 Residence Address.

In 1972, the Vehicle Code was amended to restrict DMV disclosure of residence addresses in response to the widely publicized killing of a Hollywood actress . The victim's place of residence had been located through DMV records. Vehicle Code section 1808.21 provides that "any residence address in any record of the department is confidential and shall not be disclosed to any person, except a court, law enforcement agency, or other government agency, or as authorized in Section 1808.22 or 1808.23."[52] Vehicle Code section 1808.23(d) provides that "residential addresses released shall not be used for direct marketing or solicitation for the purchase of any consumer product or service."

3.2.1 Issue: DMV Disclosure to BATA.

We assume BATA will require the residential addresses of unregistered users in order to send billing invoices or confirm toll account information. In the event that BATA requires such information, the Vehicle Code restricts access to residence addresses but contains an exception for disclosure to "other government agencies." Therefore, BATA, as a government agency, should be permitted to request and receive residence addresses from the DMV in order to send invoices to the DMV-registered owners of vehicles passing through toll collection sites.

[49] Veh. Code, § 12800.5(a)(2).
[50] 18 U.S.C. § 2721(c).
[51] 18 U.S.C. § 2721(c).
[52] Exceptions for requests by financial institutions, insurance companies, attorneys, vehicle manufacturers, vehicle dealers, and persons in compliance with § 1798.24 of the California Information Practices Act of 1977.

3.2.2 Issue: Information Resale or Redisclosure by BATA.

The Vehicle Code prohibits the use of residential addresses acquired by release from the DMV for the purposes of direct marketing or solicitation of consumer goods or services.[53] Therefore, BATA may not sell or redisclose residential addresses for such a purpose.

3.3 Mailing Address.

Vehicle Code section 1808.21(b) provides:

"[R]eleases of any mailing address or part thereof in any record of the department may be restricted to a release for purposes related to the reasons for which the information was collected, including, but not limited to . . . ownership of vehicles . . . . This restriction does not apply to a release to a court, a law enforcement agency, or other government agency . . . ."

3.3.1 Issue: Disclosure to BATA.

BATA may also require access to DMV mailing address records for invoicing toll collection site users without prepaid accounts or to confirm registration information to the extent that residential and mailing addresses are different. The Vehicle Code limits DMV disclosure of mailing addresses but provides an exception for disclosure to "other government agencies." Requests for mailing addresses by BATA pursuant to a video tolling project should fall under this "other government agencies" exception, but BATA could not transmit that information to others.

3.4 Social Security Account Numbers (Veh. Code, § 1653.5).

The federal Privacy Protection Act of 1974 provides that no individual shall be denied a right for failure to disclose one's social security number account information.[54] This individual right to keep social security account number information private is tempered by circumstances in which an individual is required to disclose social security information.[55] For example, every applicant for the issuance or renewal of a driver's license or identification card must provide a social security account number.[56] The DMV uses this information to determine eligibility for licensing.

[53] Veh. Code, § 1808.23(d).
[54] 5 U.S.C § 552(a)(note) (This federal law applies to state and local agencies with respect to the one prohibition found in § 552(a)(note) only. Otherwise, the Federal Privacy Protection Act of 1974 provides the information sharing and retention practices applicable only to federal agencies. Because BATA will be accessing personal information through the state DMV, the remainder of this comprehensive federal statute does not govern.)
[55] *Miller v. Reed* (9th Cir. 1999) 176 F.3d 1202 ("[s]tate's denial of driver's license for refusal of applicant to provide his social security number did not violate applicant's right to interstate travel"); *Lauderback v. Zolin* (1995) 35 Cal.App.4th 578 (the Federal Privacy Act "did not prevent state from requiring social security numbers in administering driver's license or motor vehicle registration law").
[56] Veh. Code, § 1653.5(a).

However, an applicant's social security account number obtained by the DMV is "not a public record and may not be disclosed" except for certain enumerated purposes.[57]

3.4.1 Issue: DMV Disclosure to BATA.

It is our understanding that BATA will not likely require social security account information from the DMV in order to administer a video tolling project. Therefore this is not a material issue. In the event BATA requires social security account number information amending Vehicle Code section 1653.5(f) to include video tolling projects would provide statutory authorization at the state level. However, at that point, further analysis of the federal statute would be needed.

3.5 California Public Records Act (Gov. Code, §§ 6250 *et seq*.).

In enacting the California Public Records Act ("**CPRA**"), the Legislature declared that every person in the state had a "fundamental and necessary right" to access information concerning the conduct of the public's business.[58] However, the public's interest in monitoring government activity is balanced against the interest in preserving individual privacy.[59] Although the CPRA does not articulate a general right to privacy, the Act provides a number of exemptions to public disclosure and inspection where the balance favors nondisclosure. For example, public disclosure of records is not required where disclosure "is exempted or prohibited pursuant to federal or state law . . . ."[60]

3.5.1 Issue: CPRA Rules on Disclosure to BATA.

We assume the creation of a Memorandum of Understanding or other agreement between BATA and the DMV to facilitate the disclosure of information from the DMV to BATA and do not believe a CPRA records request is the method by which BATA will seek information maintained by the DMV.

The information collected by the DMV is generally considered public information under the CPRA. However, because the CPRA does not override disclosure prohibitions mandated by other state or federal law,[61] existing law on the subject of DMV disclosures governs. As detailed above, the DMV is barred from disclosing certain personal and confidential information under state law and federal law,[62] except that disclosures to government agencies such as BATA are permitted. Therefore, BATA may request and receive information from DMV files in order to carry out its statutory duties administering and managing the Bay Area bridges. Because the CPRA works in conjunction with more specific state and federal law to regulate the

[57] Veh. Code, § 1653.5(f) (authorized purposes are limited to (1) child support and welfare, (2) offsets to tax refunds administered by the California Franchise Tax Board (the "FTB"), and (3) FTB requests for tax administration purposes).
[58] Gov. Code, § 6250; *see generally* Cal. Atty. Gen., *Summary of the California Public Records Act* (2004).
[59] Cal. Atty. Gen., *Summary of the California Public Records Act* (2004) p. 2-3.
[60] Gov. Code, § 6254(k).
[61] Gov. Code, § 6254(k); *see also* "Confidentiality of Driver's License Information" above.
[62] Civ. Code, § 1798 *et seq*.; Veh. Code, 1808 *et seq*.; 18 U.S.C. § 2721 *et seq*.

confidentiality of personal information contained in the files of public agencies, it poses no additional barrier to BATA's access to DMV files under existing law.

3.5.2 Issue: CPRA Disclosure by BATA.

A related disclosure issue raised by the CPRA is whether BATA, as a governmental agency governed by the CPRA, must comply with requests for information related to names and addresses obtained from the DMV or directly from registered users. If BATA is required to make public disclosures of its records containing confidential or restricted information to the public, the CPRA would undermine the privacy protections detailed above.

As noted above, the CPRA mandatory disclosure requirements do not apply to records that cannot be disclosed pursuant to other state or federal law.[63] Here, both state and federal law override BATA's obligation to comply with a CPRA records and information request. As noted above, the DPPA governs the resale or redisclosure of personal information by an authorized recipient of confidential or restricted information.[64] Because an authorized recipient may only resell or redisclose the information for the limited permitted uses provided in statute,[65] and none of those permitted uses contemplates or authorizes a public records-related disclosure, BATA would likely be prohibited from disclosing the personal and confidential information in its records pursuant to a CPRA request. Furthermore, the California Information Practices Act discussed below prohibits the disclosure of personal information if it would link the information disclosed to the individual to whom it pertains.[66] Therefore, the CPRA information disclosure requirements should not threaten the privacy and restricted nature of the information BATA receives from the DMV or directly from registered users and retains in the administration of a video tolling project.

3.6 Information Practices Act of 1977 (Civ. Code, §§ 1798 *et seq.*).

The Information Practices Act of 1977 ("**IPA**") expands upon the constitutional guarantee of privacy by providing limits on the collection, management and dissemination of personal information by state agencies.[67] Finding that the increasing use of "sophisticated information technology" has magnified the potential risk to individual privacy, the IPA subjects the dissemination and maintenance of such personal information to strict limits.[68] Similar to the definition provided by the DPPA, "personal information" means:

"[A]ny information that is maintained by an agency that identifies or describes an individual, including, but not limited to, his or her name, social security number, physical description, home address, home telephone number, education, financial matters, and medical or employment history."[69]

[63] Gov. Code, § 6254(k).
[64] 18 U.S.C. § 2721(c).
[65] 18 U.S.C. §§ 2721(b), (c).
[66] Civ. Code, § 1798.24.
[67] Civ. Code, § 1798 *et seq*.
[68] Civ. Code, § 1798.1.
[69] Civ. Code, § 1798.3(a).

The IPA prohibits the disclosure of personal information if it would link the information disclosed to the individual to whom it pertains, except disclosures to an agency where "necessary for the transferee agency to perform its constitutional or statutory duties, and the use is compatible with a purpose for which the information was collected."[70] The Act also provides that an individual's name and address may not be "distributed for commercial purposes, sold, or rented by an agency unless such action is specifically authorized by law."[71]

The IPA only applies to an "agency" as defined to mean "every state office, officer, department, division, bureau, board, commission, or other state agency"[72] except that the term does not include certain specified entities including, "a local agency, as defined by subdivision (a) of Section 6252" of the CPRA (see also "California Public Records Act" above).

3.6.1 Issue: Applicability of the IPA to BATA Disclosure.

Section 6252 of the CPRA defines a "local agency" broadly to include any "other local public agency." BATA is not defined as either a state agency or a local agency. However, BATA is governed by the same board that governs the Metropolitan Transportation Commission ("MTC"), a local planning agency established to provide regional transportation planning.[73] Therefore, BATA should be considered a "local agency" for purposes of the IPA and thus, the disclosure provisions do not apply.

3.6.2 Issue: DMV Disclosure to BATA.

In any event, should the IPA govern BATA's information maintenance and dissemination, the following analysis applies.

In order to implement a video tolling project that allows for post-paid toll use without vehicle pre-registration, BATA will require access to identifying personal information from automobile registration records in order to invoice and bill tolling charges. The IPA applies strict limits on the disclosure of personal information by agencies but permits agency disclosure where required for the agency to perform its statutory duties. BATA's statutory mandate is to administer and manage toll revenues for the state.[74] Should BATA pursue video tolling as a means to perform and fulfill its statutory directives, disclosures associated with the Video Tolling Project should fall under the existing exception for agency performance. Therefore, the IPA should not impose a privacy barrier for DMV disclosures of personal information to BATA.

[70] Civ. Code, § 1798.24.
[71] Civ. Code, § 1798.60.
[72] Civ. Code, § 1798.3(b).
[73] Sts. & Hy. Code, § 31950; Gov. Code, § 66502.
[74] Sts. & Hy. Code, § 31950 *et seq*.

4.0 Collection Methodology

4.1 Invoicing Procedure on Toll Evasion Violations (Veh. Code, § 40250 et seq.).

Every vehicle entering into any "vehicular crossing"[75] (including toll bridges) is immediately liable for tolls and other charges prescribed by the California Transportation Commission.[76] The Vehicle code states that it is "unlawful" for any person to refuse to pay tolls and provides that "[n]o person shall evade or attempt to evade the payment of tolls on any vehicular crossing . . . ."[77] Toll violators are subject to civil penalties, the enforcement of which is governed by the entity, public or private, that is the agency authorized to collect tolls.[78]

The Vehicle Code sets out the procedure by which the agency manages toll violations. The process provides detailed requirements including requisite notice periods and availability of civil debt collection. The agency is obligated to use its best efforts to obtain accurate information concerning the identity and address of the registered owner for the purpose of sending a notice of toll violation.[79] The registered owner of a vehicle cited for a toll evasion violation of a toll facility is jointly and severally liable for the toll evasion penalty imposed unless such owner can show the vehicle was used without consent, express or implied.[80]

4.1.1 Issue: Statutory Authorization for Disclosure to BATA.

The Vehicle Code does not expressly direct a tolling agency to request and receive personal information from the DMV, either for toll violation enforcement purposes or more generally. Nor are there legislative findings regarding the propriety of such an arrangement . However, the existing statutory toll evasion procedure hinges upon this arrangement, strongly suggesting two things; (1) no actionable privacy violation is created by the existing process and (2) the existing toll violator procedure may provide model language upon which to base statutory authorization for administration of a broader video tolling project in California, taking into account the inherent differences in the two systems.

As an authorized toll authority, BATA is charged with identifying and locating the "registered owner" of the vehicle observed (visually or by automated device)[81] evading a toll. After identifying and locating the registered owner, the Vehicle Code requires the tolling agency to send the registered owner a notice of violation. Importantly, the Vehicle Code defines

[75] Veh. Code, § 23224 ("A 'vehicular crossing' is any toll bridge or toll highway crossing and the approaches thereto, constructed or acquired by the Department of Transportation under the provisions of the California Toll Bridge Authority Act.").
[76] Veh. Code, § 23301.
[77] Veh. Code, § 20250 (e)(1).
[78] Veh. Code, § 20235 (providing that the entity authorized by state law to collect tolls (the "issuing agency") may contract with another party to process the notices of toll evasions (the "processing agency"), and that where no such contract exists, "processing agency" is synonymous with "issuing agency.")
[79] Veh. Code, § 40254(e).
[80] Veh. Code, § 40250(b).
[81] Veh. Code, § 40254(a).

"registered owner" as the person registered by the DMV as the owner of the vehicle.[82] As the generator of, and repository for, registered ownership information, the DMV is the entity BATA would most naturally contact in order to acquire such information. This section accepts the underlying premise that a tolling agency will request personal information from the DMV in order to facilitate the toll evasion violators process.

Additional evidence of authority to seek identifying information from the DMV for the purpose of administering the seven state-owned toll bridges is found in Vehicle Code section 40255(b)(4). This section provides that, for purposes of administrative review of a toll violation, the tolling agency is not required to produce evidence other than the notice of toll violation, a statement under penalty of perjury from the person reporting the violation, and importantly here, "information received from the **department** identifying the registered owner of the vehicle."[83] The Legislature accordingly must have anticipated that the tolling agency would request and receive identifying personal information from the DMV in order to facilitate the toll evasion violators process.

The aforementioned provisions of the Vehicle Code clearly demonstrate that BATA has access to DMV records under existing law governing for purposes of pursuing toll violators. Importantly, the information request and release aspect of a proposed video tolling procedure will likely mirror that which occurs under the existing toll violation process.

4.1.2 Issue: Violators versus Non-violators.

One issue that is not clearly dealt with in the statutes is the change to a person passing through the toll system as being a non-violator. For a long term change to video tolling, we recommend seeking a change in the statutes to make the rules clear. However, we believe the current statute is sufficiently flexible that, if accompanied by an appropriate BATA determination as specified below, the demonstration project can be carried out without changing the law.

The existing procedure by which a tolling authority is authorized to identify, locate and pursue a toll evader is crafted to address users that fail to pay a toll at the point of service by cash, transponder or other device attached to an AVI. When that auto passes through the toll area, it is immediately a violator.

Users that refuse to pay the toll or fail to register for video tolling with BATA, on the other hand, may operate on a different underlying premise. Toll bridge users that fail to pay by cash, transponder, pre-registration or other means at the vehicular crossing itself, while still immediately liable for those toll charges, would not be in violation of the law. Instead, users would become subject to penalties only in the event of failure to pay in a timely manner invoices sent by BATA for past toll use. Such a system does not fit precisely into the current statutory scheme.

[82] Veh. Code, § 505.
[83] Veh. Code, § 40255(b)(4) (emphasis added); Veh. Code, § 290 (defining "department" as the Department of Motor Vehicles).

Section 23302(a) of the Vehicle Code states that it is prima facie evidence[84] of a toll violation for any person to enter any vehicular crossing without (1) sufficient cash to pay the toll, (2) a transponder, or (3) "other electronic toll payment device" associated with an Automatic Vehicle Identification account[85] with a balance sufficient to pay those tolls. Section 23302(b) of the Vehicle Code provides that, for vehicular crossings that use electronic toll collection as the <u>only</u> method of paying tolls, it is prima facie evidence of a violation for any person to enter any vehicular crossing without a transponder or other electronic toll payment device. Thus it would seem that someone using the video tolling would technically be creating a prima facie case of a violation under the current statute.

Ultimately, should a video tolling project that allows for post-paid toll use without vehicle pre-registration become permanent, this would merit a change in the statue to clarify matters. However, for purposes of the demonstration project, we conclude that BATA could proceed without that change because of the wording of the statute, specifically the term "prima facie." Because Section 23302 only establishes prima facie, not conclusive, evidence of a toll violation, the presumption of a violation may be rebutted by a toll user having timely paid toll charges after receipt of invoice. We would propose that BATA pass a resolution defining video tolling procedures for purposes of the demonstration project, including procedures to support pre-registration and post-paid video tolling, if both will be pursued. Further, there should be clear signage and instructions establishing video tolling principles at the demonstration project site. Both would provide drivers with ammunition to rebut a violation or other traffic citation, in the event they received either based on their passage through the demonstration facility. Since it is BATA that would be directing enforcement, it would also be within BATA's power not to treat such individuals as prima facie violators. Therefore, we conclude that, for purposes of implementing a demonstration project, BATA would not be required to pursue a change to existing law.

Under applicable provisions of the Streets and Highways Code, liability for a misdemeanor toll evasion is characterized as, in relevant part, "[i]f a person refuses to pay the tolls."[86] One does not "refuse" to pay the toll at a vehicular crossing operated by video tolling merely by passing through the toll collection site without cash or a transponder device. Furthermore, the misdemeanor statute in the Streets and Highways Code does not parallel the Vehicle Code's prima facie evidence provision for civil liability. A misdemeanor "refusal to pay" in the video tolling context would occur under existing law only when a registered owner failed to pay a properly invoiced bill for toll charges in a timely manner. There is a small risk that a violator who refuses to pay a video toll could argue that the statutes are unclear in this context. However, the risk would seem small for the short run, and in the long run BATA could get the statute changed.

[84] Evid. Code, § 602 ("A statute providing that a fact or group of facts is prima facie evidence of another fact establishes a rebuttable presumption." This means that the user of the video tolling vehicular crossing would have the burden of showing there was no toll violation. The effect of leaving this evidentiary standard in place with respect to video tolling sites would be to place an administrative burden on the processing agency and a degree of uncertainty and burdensomeness on the individual user.)
[85] See generally Cal. Code Regs,. tit. 21, § 1702.1 (describing Automatic Vehicle Identification ("AVI") accounts and transponder equipment).
[86] Sts. & Hy. Code, § 30843.

5.0 Differential Pricing.

To reduce its video-tolling-collection costs, BATA is considering charging some drivers a higher toll or an administrative fee or convenience charge. Under the current proposal, drivers would be charged only the normal bridge toll if they pre-register their vehicles with BATA and maintain an account balance of pre-paid toll charges. Drivers who pre-register their vehicles and provide BATA with information to facilitate billing, including vehicle-license-plate number, but do not pre-pay toll charges would be invoiced and charged an administrative fee or convenience charge. Drivers who choose not to preregister with BATA – thereby requiring BATA to obtain toll charge payment by invoicing, using vehicle registration and billing information from the DMV – would, under the proposal, have to pay a higher toll or additional administrative fee or convenience charge.

Existing law does not permit BATA to implement the differential-pricing program as it is described above. BATA is permitted to charge an administrative service fee only in the event that a registered owner fails to pay a toll evasion penalty or properly contest the violation.[87] In the video tolling context, where the event of violation is the failure to timely pay an invoice for toll charges, such an administrative fee could be assessed to cover BATA's costs of pursing the violation.[88] However, existing law does not authorize BATA to charge toll users an administrative fee where no violation has occurred.[89]

BATA operates as a bridge-specific subsidiary of MTC.[90] It oversees Caltrans's toll-collection, bridge-maintenance, and bridge-improvement activities on all Bay Area bridges except the Golden Gate Bridge.[91] It accounts for the bridges' toll revenues, reimburses Caltrans's bridges-related toll-collection costs, and appropriates Tolls revenues to MTC and Caltrans.[92] BATA also issues toll-revenues-backed bonds to finance voter-approved bridge- and transportation-improvement projects.[93]

BATA charges vehicles two separate charges to cross the bridges that it oversees:

(1) Base Toll: Base-toll amounts are set by a standardized toll schedule that applies to all of BATA's bridges. Different types of vehicles pay different base-toll amounts. Two-axle vehicles pay a two-dollar base toll to cross the bridges.[94]

[87] Veh. Code, §§ 40262, 40262.5, and 40267.
[88] Veh. Code, § 40262.5.
[89] Veh. Code, § 40262.
[90] Sts. & Hy. Code, § 30950 Metropolitan Transportation Commission: Financial Statements for the years ended June 30, 2006 and 2005, 33.
[91] Sts. & Hy. Code, §§ 188.6(b)(2), 30601, 30886, 30950.2, 30950.3 30952; http://bata.mtc.ca.gov/about.htm; see also Metropolitan Transportation Commission: Financial Statements for the years ended June 30, 2006 and 2005, 4, 9, 33, 34, 43, and 52.
[92] Sts. & Hy. Code, §§ 30884, 30890, 30891, 30893, and 30894, 30912, 30952, and 30958.
[93] Bay Area Toll Authority Long-Range Plan, December 2006, 2; Metropolitan Transportation Commission: Financial Statements for the years ended June 30, 2006 and 2005, 52, 55, 61, 64, 65, 75; Cal. Streets & Highways Code sections 188.10, 188.6(b)(2), 30101, 30101.8(b), 30102.5, 30103. 30918, 31010, 30889.3(b), 30920, 30960, 30961; Toll Bridge Program Oversight Committee's September 30, 2007 Toll Bridge Seismic Retrofit Program Report, 11.
[94] Sts. & Hy. Code, §§ 30916(b), 30921.

Larger vehicles pay higher tolls.[95] BATA can – after consultation with Caltrans – offer discounted rates to two-axle commuters and/or high-occupancy vehicles, but only if the decrease will not impair BATA's ability to pay its bond obligations.[96] BATA cannot increase any of the toll amounts that are set forth in the toll schedule unless the increase is necessary to fund BATA's bond-debt obligations.[97]

(2) Seismic Retrofit Program Surcharge: All vehicles crossing any BATA-operated bridge must also pay a two-dollar seismic-retrofit surcharge that helps to fund the reconstruction and reinforcement of five Bay Area bridges – including the Bay Bridge – and two former toll bridges in Southern California.[98] BATA can only change the surcharge if an increase is necessary to fund BATA's surcharge-related bond-debt obligations, or to complete the seismic-retrofit projects that the surcharge funds ("SRP Projects").[99]

While BATA could charge registered drivers of two-axle vehicles <u>less</u> than they currently pay to cross BATA-operated bridges, current law would not permit BATA to charge unregistered drivers <u>more</u> than the current bridge toll. Furthermore, BATA does not have current statutory authority to charge non-preregistered or non-prepaid drivers an administrative fee or convenience charge to cover the additional costs associated with video tolling. Adding such a charge without specific legislative authorization likely would be considered an illegal attempt to circumvent the statutory prohibition against raising tolls for a purpose that current law does not permit.

[95] Sts. & Hy. Code, § 30916(b).
[96] Sts. & Hy. Code, § 30102.5, 30103, 30916(c) and (d), 30918.
[97] Sts. & Hy. Code, § 30102.5, 30103, 30916(c) and (d), 30918.
[98] http://bata.mtc.ca.gov/about.htm; http://bata.mtc.ca.gov/tolls/index.htm; Cal. Streets & Highways Code §§ 188.10, 188.5, 188.6, 30101, 31010, 30961.1.
[99] Sts. & Hy. Code, § 31011(a).

6.0 Miscellaneous Legal Issues and Considerations.

6.1 Confidentiality Procedures.

Vehicle Code section 1808.47 provides that any "person" with access to confidential or restricted information from the DMV "shall establish procedures to protect the confidentiality of those records" including all steps necessary to prevent the release of such information to a third party. Vehicle Code section 470 provides that a "person includes a natural person, firm, copartnership, association, limited liability company, or corporation."

6.1.1 Issue: Applicability of the Statute.

Section 1808.47 requires any "person" with access to confidential or restricted information from the DMV to establish certain confidentiality procedures. Whether BATA is a "person" governed required to comply with this code section is the preliminary legal question raised by the statute. A relevant rule of statutory construction is that the word "includes" is not ordinarily a word of limitation;[100] but is rather a word of enlargement.[101] Therefore, a statutory definition of a thing as "including" certain things typically does not limit the meaning to the inclusions.[102] As applied here, the term "person" in the protective context of section 1808.47 may be reasonably interpreted to include BATA as a recipient of confidential or restricted information. Therefore BATA will be required to establish such procedures.

6.1.2 Issue: Retention and Security.

BATA will need to maintain the confidential or restricted information of each individual toll user to calculate billable charges, send invoices and create a challengeable record of toll use in the event of a disputed billing, among other things. Vehicle Code section 1808.47 mandates that BATA develop procedures in order to ensure such records remain confidential.

We suggest that BATA consider comprehensive security procedures in order to (i) ensure compliance with Vehicle Code section 1808.47, and (ii) increase public confidence in the protection of individual, personal information in BATA's possession.

6.2 Related Technology: Automated Enforcement Systems.

California currently allows automated enforcement systems[103] to photograph violators of red light laws.[104] The photographic record as well as the confidential information obtained from the

[100] *Flanagan v. Flanagan* (2002) 27 Cal.4th 766, 774-75.
[101] *Ornelas v. Randolph* (1993) 4 Cal.4th 1095, 1101.
[102] *People v. Western Air Lines* (1954) 42 Cal.2d 621, 639.
[103] Veh. Code, § 210 (defining "automated enforcement system" as "any system operated by a governmental agency, in cooperation with a law enforcement agency, that photographically records a driver's responses to . . . an official traffic control signal described in Section 21450, and is designed to obtain a clear photograph of a vehicle's license plate and the driver of the vehicle").

DMV may be used only for purposes described in the automated enforcement law and are not subject to public disclosure under the CPRA.[105] As in the case of toll violators under current California law, the registered owner of the vehicle is the default liable party for a red light violation.[106]

A 2001 Superior Court ruling in San Diego, California granted a motion to dismiss hundreds of red light camera citations.[107] Importantly, the photographs were deemed inadmissible because the automated enforcement program administered in San Diego lacked sufficient oversight by the relevant government agency over the private operator of the system as required by the authorizing statute. This case does not raise issues with the reliability of the technology or the extent to which confidential personal information is used in the course of administering an enforcement program based upon camera technology; however, it suggests that, if there is any recommendation for the system is to be managed and maintained by a private operator, adequate oversight mechanisms need to be included in the contracts and implemented by the parties.

6.2.1 Issue: Image Capture, Scope of Target.

BATA's current tolling system sends a photo image of the license plate of a vehicle observed evading a toll collection site to the registered owner of the vehicle and the proposed video tolling system could be similarly limited. However, there does not appear to be any impediment in existing law that limits the ability of BATA to photograph both the license plate and the driver of the vehicle passing through a toll collection site. Vehicle Code section 210 provides that any "automated enforcement system," such as a red light camera or rail crossing camera, must obtain a clear photograph of the vehicle's license plate and the driver of the vehicle for identification purposes.[108] Automated parking control programs administered by the City and County of San Francisco are required to angle cameras "so as to capture video images of parking violations" and not **other** drivers, vehicles and pedestrians.[109] Importantly, the statute contains no prohibition against photographing the driver of the vehicle in connection with obtaining a license plate image.[110]

We do not understand BATA has any interest in including photographs of the driver of a vehicle passing through a toll collection site, in addition to capturing the license plate image. However, BATA does not appear to be barred by current law from considering the advantages of capturing such additional images if that should become an issue.

[104] Veh. Code, § 21455.5(a).
[105] Veh. Code, § 21455.5(e).
[106] Veh. Code, § 21455.5(f).
[107] *People v. Allen* (2001) order excluding evidence, D579275.
[108] Veh. Code, § 210.

[109] Veh. Code, § 40240.

[110] Practically speaking, this is less likely to happen because the violation at issue under Vehicle Code section 40240 is a parking violation and the driver is more than likely not in the vehicle.

6.2.2 Issue: "Extending the Credit of the State".

Article XVI, section 6, of the State Constitution provides that "[t]he Legislature shall have no power to give or to lend, or to authorize the giving or lending, of the credit of the State . . ."[111] The question is whether post-paid video tolling raises the constitutional credit issue because the state makes a prohibited "loan" of public funds to a driver in the amount of the toll charge for the period of time between passing through the video toll plaza and paying the invoiced charges.

It is possibly arguable that the delay between the service (going over the bridge) and the invoicing and payment is not really an extension of credit, but the language of the Constitution appears broad enough to argue the opposite as well.

Nevertheless, the prohibition against giving or lending government property or credit to private persons does not preclude expenditures or appropriations that are made for a "public purpose."[112] The public purpose must be more than merely in the interest of the governmental entity, but must be "in furtherance of [its] particular public purpose."[113] While most cases interpreting this section deal more specifically with outright gifts, as opposed to extensions of credit, the public purpose doctrine has also been applied to the issue of claimed credit extensions.[114]

BATA's public purpose is to administer the toll collection and revenue distribution from state-owned Bay Area toll bridges.[115] By implementing video tolling, BATA is selecting a means by which to fulfill its purpose of administering toll collection. Therefore, a limited private loan or extension of credit incidental to toll collection, if any, would be for a bona fide public purpose of the public agency, and not barred by the constitutional prohibition against advancing public monies for private benefit.

6.3 Issue: Notice of Violation; Time Limits for Issuance.

Vehicle Code section 40254(a) provides that an agency must send the registered owner of a vehicle found to have evaded tolls a notice of toll evasion within 21 days from the date of the violation.[116] If accurate information concerning the identity and address of the registered owner is not available within the 21 days, the agency has an additional 45 calendar days to obtain the information and send the proper notice. The agency has 90 calendar days from the violation to send a notice of toll evasion for "repeat violators" – i.e. any registered owner issued more than 5 violations in any calendar month within the preceding 12-month period.

[111] Cal. Const., art. XVI, § 6.
[112] *Redevelopment Agency of City of San Pablo v. Shepard* (1977) 75 Cal.App.3d 453, 457; see also *Bd. of Sup'rs of City and County of S.F. v. Dolan* (1975) 45 Cal.App.3d 237, 243.
[113] *Golden Gate Bridge and Highway Dist. v. Luehring* (1970) 4 Cal.App.3d 204; 208-10.
[114] See *City of Montclair v. Donaldson* (1962) 205 Cal.App.2nd 201, 206.
[115] Sts. & Hy. Code, § 30950 *et seq*.
[116] Veh. Code, § 40250(a)

Unlike the current toll violation process provided by Vehicle Code section 40254, BATA's Video Tolling Project could require the additional administrative step of billing toll users who do not have pre-established tolling accounts with BATA. This potential administrative delay involved with this additional procedural step raises the concern that statutory time limits for issuing notices of toll violation may not be feasible if the agency must collect the registered vehicle information, issue a bill, wait for payment and, in the event of non-payment, issue a notice of toll violation all in the 21 day period (or as extended by statute).

Importantly however, current law requires that a notice of toll evasion be sent within 21 days of the date of the violation. There are two schools of thought on violation occurrence:

- If the violation is considered to have occurred when the vehicle passes the tolling point without paying with cash or a transponder, a video tolling invoice would need to be processed and mailed quickly enough that a person who did not pay the invoice could still be issued a notice of toll evasion within 21 days of the original transaction. This could be done if a video toll invoice was issued for each transaction or each day's transactions, but would be difficult and costly due to the volume of invoices that would require expedited processing, as well as the potential customer reaction to the many individual invoices and short payment period, the potential for receipt of invoice payments after the deadline, and the subsequent violation notices required within the 21-day timeframe. It would not be possible at all if video toll transactions were batched and billed weekly or monthly.

- If the violation is considered to have occurred when the driver does not pay their video toll invoice by the due date, a notice of toll evasion would need to be issued within 21 days of the invoice due date. This would be true even if video toll transactions were batched and billed weekly or monthly, because the due date of the invoice would establish the point of violation for all included transactions.

The key to resolving this issue lies in BATA determining what they will enforce as the point of violation. Vehicle Code Section 23301 states that a vehicle passing a tolling point "immediately becomes liable for such tolls…". For video tolling, this statute appears to leave open the option of a registered owner satisfying their liability by paying an invoice, per procedures laid out by BATA. Vehicle Code Section 23302(a) states that it "is unlawful for any person to refuse to pay tolls…", and establishes that passage without cash or transponder payment is "prima facie evidence" of a violation. However, it does not specify that in passing without cash or transponder payment, the driver has refused to pay tolls – only that there is rebuttable evidence that they have violated. These generalities leave open to BATA the option of considering non-payment of a video tolling invoice to be the point of violation, and establishing video tolling and subsequent violation procedures accordingly.

For purposes of the demonstration project, it should be sufficient that BATA establish procedures to agree that use of the video toll lane is not prima facie a toll violation, but for any permanent project the statute should be changed for clarification. The issue addressed here is a subset of the earlier issue. Theoretically, someone who uses the lane and fails to pay the charge could argue that the violation took place when they went through the toll booth.

However, so long as procedures are defined and the system is properly signed to establish the fact that there is no violation to use the lane unless there is a failure to pay later, it seems to us remote that such an argument could be sustained.

The 45-day extension and 90-day time period provided to give BATA time to investigate otherwise incomplete registered owner information and for repeat violators, respectively, likely do not apply in the context of video tolling. This is because, as noted above, the clock on the notice periods provided under current law is triggered by an event of violation. For a video tolling demonstration project to work under the current law, BATA must consider an event of violation the failure to timely pay invoiced toll charges (see Section 4.0, "Collection Methodology"). The 45-day extension would not apply to a video tolling project using either registered accounts (whether pre- or post-paid) or an unregistered post-paid method.

In the case of pre-paid registered accounts, BATA would debit the toll user's pre-paid account using information voluntarily provided by the accountholder to pay the toll charges, thereby avoiding a toll evasion violation and any applicable violation notice.

Nor would the 45-day extension period apply in the event that BATA adopts an unregistered post-pay method because a necessary precondition for a violation to have occurred – i.e. failure to timely pay a video tolling invoice – would require that BATA must have already obtained registered owner information in order to have sent an invoice (now delinquent and in violation) to that individual. Under current law, an extension period for sending out a notice of toll violation is only permitted for reason of incomplete information on the part of the issuing agency. For registered accountholders, BATA would have the information necessary to invoice the toll user on file and no extension period for notice of any subsequent violation could apply. Even in the event that a registered account contained inaccurate or incomplete information, no extension period for a notice of violation could apply if BATA could not send an invoice at the outset. For toll users that choose not to register with BATA, the failure to locate the registered owner effectively precludes the event of violation because no invoicing or subsequent failure to timely pay said invoice, could occur. Current law does not contemplate a process of issuing invoices, only notices of violation. New legislation would be required to account for the administrative process required by a video tolling project using post-pay invoicing of toll users.

The 90 calendar day period to issue a notice of violation to a repeat violator <u>might</u> not apply because it would require 5 violations of nonpayment in a single month. If failure to pay each individual <u>toll charge</u> is considered a discrete event of violation for nonpayment, a toll user who failed to pay timely, for example, a monthly invoice listing more than five toll charges could be considered a "repeat violator." In that case, BATA would have 90 calendar days to issue a notice of violation. Conversely, the failure to pay a single <u>invoice</u>, irrespective of the number of toll charges assessed therein, may be considered a discrete event of violation for nonpayment. In this latter case, if BATA chooses to invoice on a monthly or even weekly basis, failure to timely pay such invoices would not occur 5 times in one month, preventing BATA from using the 90-day "repeat violators" period for issuing notices of violation.

6.3.1 Issue: DMV Disclosure Request; Repeat Violators.

We understand that BATA currently requests disclosure of DMV records for each toll evasion violation authorized under existing law.[117] However, existing law and the On-line Access Memorandum of Understanding between the DMV and BATA neither permit nor prohibit BATA from retrieving vehicle registration information from its own records contained in the FasTrak database, instead of the DMV, in order to identify, locate and notice a repeat violator or, in the context of video tolling, invoice repeat toll users who do not have preregistered video tolling account information on file with BATA.

The Vehicle Code does not provide a general procedure for the DMV to follow in responding to records requests from other agencies. Vehicle Code section 40250 *et seq*. – the toll violation procedure applicable to BATA – does not contain any requirement that a DMV request for disclosure be made for each violation. Section 40254(a) only refers to the information request and retrieval process in the context of a delay in obtaining the information, permitting a notice of violation extension "if accurate information concerning the identity and address of the registered owner is not available to the processing agency within 21 days of the violation . . . ." This section does not give greater detail as to how the information should be obtained for individual or repeat violations.

Although Vehicle Code section 1810.3 details the process by which the DMV may provide specified information to law enforcement agencies, it does not have any such requirement and is inapplicable to BATA's DMV disclosure procedure. Section 1810.3 only applies to help law enforcement identify vehicles that have been reported to have been in traffic accidents.

Vehicle Code section 1808.47 provides that "no agent shall obtain or use confidential or restricted records for any purpose other than the reason the information was requested." This provision does not appear to bar BATA from accessing its own records for a subsequent violation or video toll use because the purpose for the original DMV request for information (to identify, locate and notice the registered owner of a toll violator or user) is the same purpose for any subsequent citation (or any subsequent toll charge in the context of video toll use without a preregistered BATA account).

Finally, it may be possible that Vehicle Code section 40254(e), which requires the processing agency "use its best efforts to obtain accurate information concerning the identity and address of the registered owner for the purpose of forwarding a notice of toll evasion violation," could be interpreted to mean that BATA must obtain such information from the DMV for each event of violation as the "best" practice. However, section 40254(e) does not expressly require such a procedure nor indicate whether an agency's "best efforts" may take economic feasibility or other considerations into account.

An important caveat: To the extent that BATA relies on information in its existing database, there is no guarantee that the information in the FasTrak database reflects updated and correct registered owner information associated with a certain license plate as vehicles may be sold and

[117] Veh. Code, § 23302.

re-registered at any time. Therefore, there is some risk of retrieving outdated information if BATA uses the FasTrak database as its only initial source of registered owner information in order to notice a toll user rather than obtaining the information directly from the DMV. This risk may undermine the conclusion that BATA is using its "best efforts" to obtain accurate information regarding registered owner identity and address for the purpose of forwarding a notice of toll evasion violation.

7.0 Legislative Recommendations

We believe that, for the purposes of implementing a video tolling demonstration project on one of the seven Bay Area bridges, BATA will not need legislation to amend existing law. However, without changes, there will be some limits on the flexibility with which the program could be implemented. In order to implement the Video Tolling Project fully with greater flexibility, BATA could seek legislation to address the following issues:

- Authorization to Use Video Tolling Technology: BATA has broad authority to collect tolls, operate and maintain the seven Bay Area bridges, including toll facilities, and is responsible for the design and construction of improvements on those bridges. Based on this broad grant of authority, we believe BATA is authorized to use video tolling technology for a demonstration project on one or more of the bridges. However, BATA should consider seeking amendments to the Vehicle Code to establish a statutory procedure for identifying, locating and invoicing users of a video tolling vehicular crossing. The procedure could parallel the existing process established in Vehicle Code section 23300 *et seq*. for toll violators, taking into account the particularities of the video tolling technology, including modified time limits for BATA to issue invoices and notices of toll violation to registered owners.

- Prima Facie Evidence of a Violation (Vehicle Code § 23302): To address the presumption in current law, that entering a vehicular crossing without sufficient cash, a transponder, or other electronic toll device constitutes a toll violation, BATA should consider seeking legislation amending the Vehicle Code to reflect that, notwithstanding any other provision of law, there shall be no such prima facie evidence determination of a toll violation with respect to vehicular crossings using a video tolling system for toll collection and invoicing. The refusal to pay tolls would continue to attach civil and criminal liability. However, the mere presence of a vehicle without cash or a transponder device in a toll crossing alone would no longer be prima facie evidence of an unlawful refusal to pay tolls.

- Differential Pricing: BATA is not permitted by current law to charge certain types of drivers more than other drivers for tolls and/or BATA's toll-collection costs. Although BATA could construct a demonstration project around this aspect of California law by charging drivers with BATA accounts less than drivers who fail to establish accounts with BATA as discussed above, for the future BATA might seek legislative authorization to impose a convenience fee on non-preregistered drivers and/or to implement full differential pricing. Furthermore, under current law, BATA's authority to impose administrative fees is limited to those costs incurred by the agency in the enforcement of a toll violation. Therefore, BATA could not move forward with a video tolling demonstration project that incorporated an administrative fee imposed upon toll users to recoup the costs associated with sending invoices of toll charges or other aspects of video tolling, including license plate image review. New legislation would be required to permit BATA to impose administrative fees or higher tolls on drivers who do not establish tolling accounts with BATA, thereby accounting for the possibility of higher

administrative costs associated with video tolling while charging drivers of vehicles with BATA accounts the current bridge toll.

- California Public Records Act (Gov. Code, §§ 6250 *et seq.*): To foreclose any possibility that the CPRA could apply and require BATA to disclose personal information contained in video tolling project files, BATA could seek legislation to expressly provide that video toll collection customer information, including payment information and trip data, is confidential and not subject to disclosure under the CPRA.

ATTACHMENT C:

Task 3.0 Concept of Operations

Technical Memorandum – Final

BATA Video Tolling Demonstration Project

Task 3.0: Concept of Operations

July 23, 2008

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DOCUMENT CONTROL PANEL		
File Name:	*Concept of Operations*	
File Location:		
Deliverable Number:	3.0	
Version Number:	5	
Name		**Date**
Created By:	Bonds	6/19/08
	Bausher	6/30/08
Reviewed By:	Dillard	6/29/2008
	Kristlibas	7/3/08
	Kristlibas	7/31/08
	Bausher	8/1/08
	L Lee (BATA)	8/4/08
	Various BATA / ACS	9/3/08
Modified By:	Dillard	7/6/08
	Bonds	7/11/08
	Dillard	7/23/08
	Dillard	8/8/08
Completed By:	Dillard	9/18/08

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1.0 Introduction

This Concept of Operations applies to the Bay Area Toll Authority (BATA) Video Tolling Demonstration Project, including the potential full-scale BATA implementation of Video Tolling across the seven Bay Area bridges administered by BATA. The video tolling demonstration project will evaluate the feasibility and practicality of augmenting BATA's current cash and electronic toll collection methods with Video Tolling.

1.1 Purpose of Document

The purpose of this Concept of Operations is to communicate the operational needs and expectations of the proposed video tolling operation, and to express those needs in terms of a recommended operations protocol and supporting system that will meet them. This document will also help build consensus among user groups and developers. Parts of the document are suitable to support outreach, and others may be summarized for a press release or informational brochure. Stakeholder feedback on this document will help establish the functional requirements for the Video Tolling system.

1.2 Project Context

The full context of BATA's Video Tolling Demonstration project includes analysis of the current environment, selection of a video tolling approach for demonstration, selection of a toll facility in which to implement the pilot, and a six-month evaluation phase. If the evaluation period demonstrates sufficient benefits to BATA and its customers, the demonstrated video tolling operation may then be implemented full-scale across all seven bridges.

Prior to this deliverable, four other task deliverables have been provided to BATA, focusing on various aspects of BATA's current environment. This Video Tolling Concept of Operations document now swings the focus in a forward-looking direction, laying out the potential approaches and options recommended to supplement BATA's current environment with video tolling.

This deliverable will be followed by financial impact analysis, conversion planning, selection of a facility for the demonstration, and development of an implementation schedule and budget.

1.3 Document Overview

Section 2.0 of this document references the previous deliverables of this project, and includes issues and objectives that are driving the shift toward video tolling. An overview of the proposed approach follows in Section 3.0, with a discussion of the assumptions necessary to the analysis.

A summary of recommended business policies and rules necessary to support video tolling is included in Section 4.0. A more detailed walk-through of the operational concepts associated with video tolling is provided in Section 5.0.

Section 6.0 is comprised of several scenarios, told in a narrative, short-story fashion. These scenarios illustrate the potential perspectives on video tolling that might occur in the various stakeholder communities.

Section 7.0 summarizes the analysis relative to this operational concept, including traffic diversion and pro / con analysis.

2.0 Project Background and Objectives

2.1 Current Environment

Previous task deliverables describing the existing environment are as follows:

- Task 1.0 – Video Tolling Concepts
  An overview of the current and planned future use of video tolling within the toll industry, including interviews with several agencies already using, or planning to use, video tolling to supplement their electronic toll collection programs.

- Task 2.0 – Legal and Legislative Review
  An analysis of current California statutes that may impact or support the implementation of video tolling.

- Task 4.0 – Facilities Review
  A physical review of BATA's seven facilities and their supporting infrastructure, with an eye toward the identification of physical factors that could impact video tolling implementation.

- Task 5.0 – Technical Review
  A review of the existing systems and applications that BATA currently uses to enable their tolling program. This review includes interfaces and other BATA projects currently in development that might affect a video tolling implementation.

As a result of the analysis that went into these earlier deliverables, a variety of key findings have been identified. These findings have been carried forward into this analysis and addressed wherever practical as part of the ultimate video tolling implementation. Key findings include:

- Industry patterns, based on the business practices of other video tolling agencies. These include:
  - The use of post-paid invoicing by 4 of 7 agencies interviewed
  - The use of differential pricing by 5 of 7 agencies
  - No requirement for pre-registration by 5 of 7 agencies
  - The use of video as a complementary approach to ETC
  - Reductions in cost, and increases in efficiency, of video image processing

- Legal constraints to BATA's implementation of video tolling, including:
  - Current statutes addressing the definition of a toll violation
  - The lack of current statutes to support charging a separate video tolling fee
  - Specific statutory definition of the video tolling process and constraints
  - More specific statutory definition of privacy protection for video tolling data

- Physical limitations to be addressed, including:

- Potential issues with front and rear camera mountings, to be addressed under the new Violation Enforcement System (VES) contract
- The possible need for video toll-related approach and gantry signage
- Possible traffic capacity issues

- Potential technical systems and communications issues, including:
  - Impacts on existing image storage and communications bandwidth as a result of larger image file sizes and potential increases in image volume
  - Potential impacts on BATA's Department of Motor Vehicles (DMV) server, as a result of increased DMV lookups for video tolling
  - System modifications to support video toll-related fees
  - System modifications to support video transaction processing and management, post-paid accounts, user interfaces for registration and invoice management, and other related functions

2.2 Project Objectives

The primary objective of the video tolling project is congestion relief, as indicated by the project definition and funding under the State of California's Traffic Congestion Relief Program. However, other objectives follow close behind, including the potential reduction of operating costs typically associated with cash toll collection. Additional objectives include social equity and the provision of more toll payment options to the driving public.

One means of addressing both congestion relief and operating cost goals would be through reduction of cash toll collection. Fewer drivers paying cash results in both quicker passage through toll plazas and less operating expense to staff and manage cash lane operations. Improved throughput in cash and ETC lanes also reduces the amount of time vehicles spend waiting in the toll plazas. To that end, this document and others to follow will focus in part on the shift from cash payment to video tolling. Maintenance and growth of the current ETC customer base along with continued and improved methods for enforcement of violations will also be key objectives.

Because this is a demonstration project, BATA's initial focus and efforts will be on minimizing system and operational modifications and their associated costs. Modifications to the operation and supporting systems must also be kept independent and fully reversible, so they can operate in parallel with existing functionality and be removed (reversed) in the event full-scale video tolling implementation is not pursued.

At a more detailed level, the project will need to address the issues and constraints noted in key findings from the earlier tasks. Integration with other existing systems, as well as upcoming implementations of new systems, will have to be factored into the schedule. For example, the VES is currently being replaced, and is expected to be completed later in 2008. The existing ATCAS system will also be replaced, but is not expected to be completed and operational until late 2009 or 2010.

3.0 BATA's Video Tolling Approach

In order to establish a unique means of identifying BATA's specific proposed video tolling system, the term 'BATA VT' is used throughout this document. This is a generic term reflecting the types of video tolling to be demonstrated and potentially implemented system-wide by BATA, but is not intended for use as a long-term program name.

BATA VT, as described in this document, will include the following methods of video tolling:

- Option 1: REG/PRE/BAL – Pre-registered, pre-paid video tolling based on debiting toll amounts from a pre-established account balance. Also referred to as VT1 tolling.
- Option 2: REG/PRE/CC – Pre-registered video tolling based on charging the customer's credit card for each toll transaction. Also referred to as VT2 tolling.
- Option 3: UNREG/POST – Unregistered, post-paid (invoiced) video tolling. Also referred to as VT3 tolling.

Prior definitions for several types of video tolling were developed for the Task 1.0 deliverable. However, based on discussions with BATA since that deliverable was finalized, the original Option 2 (REG/POST, pre-registered post-paid video tolling) will not be pursued. This option would have allowed customers to pre-register for post-paid / invoiced video tolling. However, further examination of this option showed that it would be relatively costly, requiring full image review, DMV lookup, and invoicing, but would provide only a small benefit due to the necessity of pre-registration. As a result, it has been dropped from consideration.

In its place, BATA will consider a derivative of Option 1, in which REG/PRE video tolling is used without requiring a pre-paid account balance or replenishment method to improve customer convenience. Instead, the new Option 2 will involve charging the video toll customer's credit card on file for payment of each transaction. Appendix A reflects the modified video tolling definitions, which will be pursued going forward. These options will be further evaluated within this document and the following financial impact analysis, conversion plan concept, and demonstration facility recommendation, leading up to BATA selection of tolling methods and identification of a facility for the demonstration project.

Business policies and processes unique to each video tolling option will be described in the following sections, along with associated specification of requirements for a variety of functional areas of focus. An overview of the BATA VT concept is shown in **Figure 1** below.

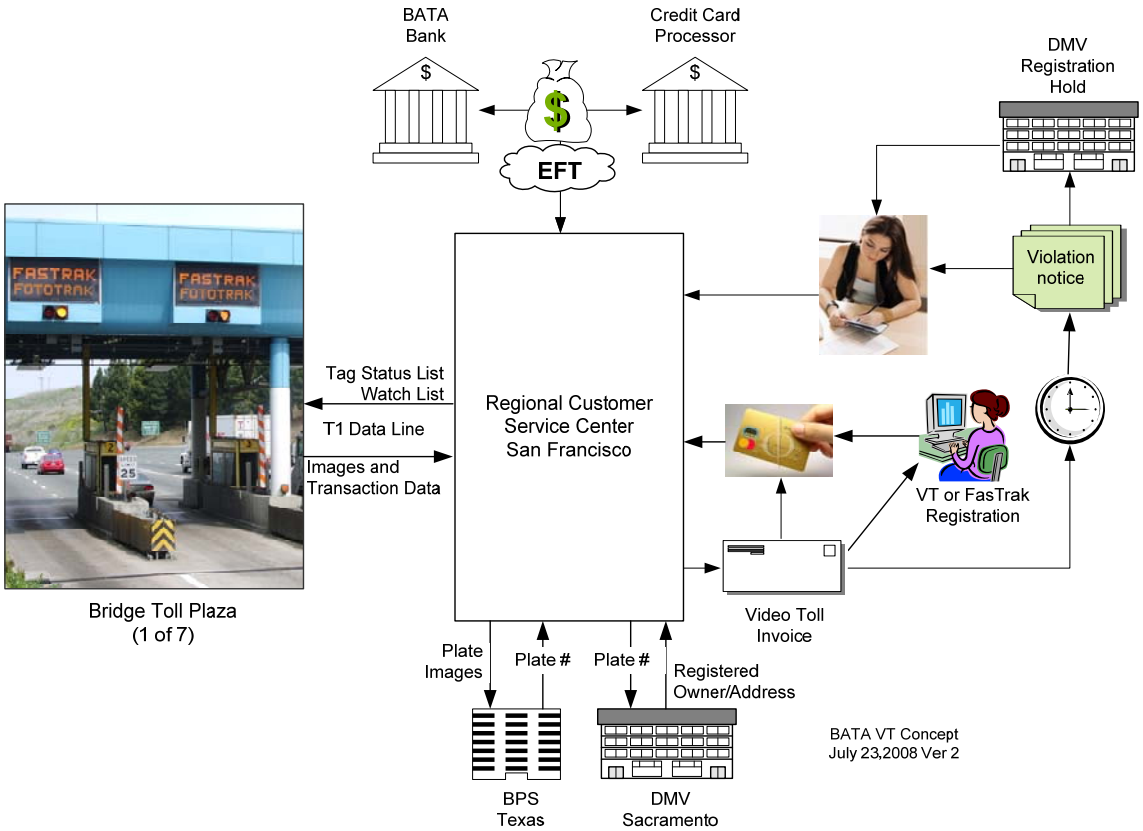

Figure 1: BATA VT Operational Concept

3.1 General Program Description

BATA VT will allow users of BATA's bridges to pay their tolls without using a FasTrak transponder or stopping to pay cash. This will be accomplished by taking a picture of the vehicle's license plate as it travels through a toll plaza. The resulting images will be used to determine the vehicle's license plate number. Because cameras are installed in every lane, video tolling will also be available in every lane. This includes lanes currently designated for FasTrak, Cash, HOV, or any combination of the three.

Generally speaking, the three potential video tolling options would add three new possible methods of payment for customers:

- **Option 1 – REG/PRE/BAL using a BATA VT account balance:** Customers would pre-register their license plate number and vehicle information on a BATA VT account in the Regional Customer Service Center (RCSC) system. As part of that registration, they would also fund the account and provide a method of payment, such as a credit or PINless debit card, from which their account would be replenished. Their method of payment would then be charged a pre-set replenishment amount when their account balance fell below a minimum level. The minimum account balance and replenishment

amount would be based on the number of vehicles and license plates registered, but would be lower than the amount typically required for a FasTrak account.

- **Option 2 – REG/PRE/CC using a credit card on file:** Customers would pre-register their license plate number and vehicle information in the RCSC system. As part of that registration, they would also provide a method of payment, such as a credit or PINless debit card, to which their tolls would be automatically charged as they are incurred. The customer would not be required to carry a balance on account.

- **Option 3 – UNREG/POST:** Customers would not be required to pre-register. Instead, they would simply drive through a toll facility as needed without stopping to pay the toll. An image of their license plate would be captured, read, and converted to the appropriate string of letters and numbers for further processing by the system. If the license plate number could not be matched to an existing ETC, VT1, VT2, or VT3 account, the license plate number would be sent to DMV with a request for the name and address of the vehicle's registered owner. This DMV inquiry would only be necessary the first time a driver passes through using VT3 – once the account was created, it would be treated as an existing account. Based on the name and address returned by the DMV, the system would create a new BATA VT3 account. That account would be invoiced on an ongoing basis for any tolls created by the vehicle bearing that license plate, with the invoices sent to the registered owner's name and address. Unpaid invoices would convert to violations after a specified period of time, and the violation process would proceed as it currently does from that point on.

BATA could choose to implement one or a combination of the above alternatives, as they are not mutually exclusive. Each progressive option, moving forward from Option 1, goes further toward shifting traffic from both cash and violations to video tolling, providing more payment options to the public, and presumably relieving traffic congestion and reducing toll plaza operating costs. However, the implementation costs, back office operating costs, and risks associated with each progressive option also increase along the same scale. As a result, it will be necessary for BATA to achieve a balance between benefits, costs, and risks in their final selection of video tolling options.

3.2 Assumptions

In order to analyze the video tolling options, some assumptions were necessary and should be recognized. Assumptions made during the development of this document include the following:

- For this initial implementation of video tolling, the current Advanced Toll Collection and Accounting System (ATCAS) will be used. If video tolling is then implemented across BATA's facilities, video tolling implications will also have to be factored into planning and development for the future ATCAS II implementation.

- The new Violation Enforcement System (VES) will be installed on the demonstration facility prior to the deployment of the video tolling demonstration. This will require close coordination and monitoring between this project and the VES replacement project.

- The new VES will meet its required performance specifications. It is understood that any new system may have initial performance issues during installation requiring system tuning, but it should be noted that initial issues with the new VES will impact the successful monitoring and evaluation of the video tolling demonstration.

- Any legislative or legal constraints to the deployment of video tolling will be addressed by BATA in a timely manner to allow for video tolling demonstration deployment.

- The RCSC Vector back office system will be modified as necessary to support the implementation of video tolling. The existing ATCAS will not be modified. Vector modifications will be conducted under a separate change order to the BATA / ACS contract.

4.0 Recommended Business Policies

In order to develop new or modified policies, it is first important that BATA's current business policies and rules be well understood. Modifications to existing business policies and the addition of new business policies will be necessary to enable video tolling.

For example, it is important to understand what information is required from a potential customer to establish each type of video tolling account.

- Registration for Option 1, REG/PRE/BAL, would require the same information as a FasTrak account. This would include name, address, phone numbers, email (where applicable), PIN for online and automated phone access, and payment method information. Payment methods could include cash and check replenishment, similar to a FasTrak account.

- Option 2, REG/PRE/CC, would be subject to similar policies and procedures as Option 1, so registration for Option 2 would require the same types of customer information. Option 2 accounts would not be automatically replenished like FasTrak accounts, so payment information would be used differently, but it is still necessary. Also, cash and check replenishment methods, which are allowed on FasTrak and BATA VT Option 1 accounts, would not be allowed on Option 2 accounts.

- Option 3, UNREG/POST, does not require pre-registration, so no information would be required in advance. Name and address information for the registered owner of the vehicle, based on the license plate number, would be initially acquired from the DMV and used to create a BATA VT Option 3 (invoiced) account.

In line with the general approach described in the previous section, a recommended set of business policies is included here. These policies are delineated by option, including BATA's current business policies, to allow for comparison and discussion in support of BATA's upcoming decisions.

Table 1, below, provides a side-by-side comparison of business policies necessary to enable video tolling with the corresponding policy for the existing operation. Additional detail is provided in the full Business Policies document, which is attached to this document as Appendix B.

Table 1: Recommended Business Policies

	Business Policy	Current BATA / Regional CSC Policies	BATA VT Option 1:	BATA VT Option 2:	BATA VT Option 3:
		effective October 1, 2006	REG/PRE/BAL	REG/PRE/CC	UNREG/POST
1	General				
2	Terms & Conditions	New Regional CSC license agreement	Add VT T&Cs	Add VT T&Cs	Add VT T&Cs
3	Privacy Policy	New Regional CSC privacy policy	Revise for VT data	Revise for VT data	Revise for VT data
4	Account Types				
5	Prepaid Accounts	Private, Business, Non-Revenue, Anonymous	New Pre-Paid - Private, Business, Non-Revenue and Anonymous	New Credit Card-Paid – Private, Business, and Non-Revenue	New Post-Paid - Private; Business if system can identify
6	Commercial Post Paid Accounts	N/A	N/A	N/A	N/A
7	Account Policies				
7a	Account Registration Information	Vehicle Info - license plate number, year, make, model, color	Vehicle Info - license plate number, year, make, model, color	Vehicle Info - license plate number, year, make, model, color	N/A
		Personal Info - name, address, phone #s, email, PIN for online/IVR, replen method, signature / online authorization for pre-authorized payments	Personal Info - name, address, phone #s, email, PIN for online/IVR, replen or payment method, signature / online authorization for pre-authorized payments	Personal Info - name, address, phone #s, email, PIN for online/IVR	N/A
		Payment Method Info - credit / PINless debit card, cash/check	Payment Method Info - credit / PINless debit card, cash/check	Payment Method Info - credit / PINless debit card	N/A
7b	Account Establishment	Can be registered and valid up to 12 months prior with no activity	Can be registered and valid up to 12 months prior with no activity	Can be registered and valid up to 12 months prior with no activity	Automatically created from DMV data within 5 days after activity
7c	Payment Locations	Website, Phone, Mail, Fax, Walk-in	Website, Phone, Mail, Fax, Walk-in	N/A	Website, Phone, Mail, Fax, Walk-in

8	Prepaid Toll Account Opening Balance	Credit Card Account **-** $25 per tag	$10 per vehicle	$0	N/A
		Cash/check Account **-** $50 per tag	$20 per vehicle	N/A	N/A
8a	Replenishment / Advance Payment Methods	Credit Card, PINless Debit Card, Check, Cash	Same as FasTrak	Direct Charge - Credit, PINless Debit only	N/A
8b	Post-Payment Methods	N/A	N/A	N/A	Credit, PINless Debit, Check, Cash
9	Replenishment Amount	**Private:**			
		Credit card - $25 per tag min.	$10 per vehicle	N/A	N/A
		Cash/check - $40 per tag min.	$20 per vehicle	N/A	N/A
		or 1-month average based on previous 90 days usage	Same as FasTrak	N/A	N/A
		Business:			
		Credit card - $25 per tag min.	$10 per vehicle	N/A	N/A
		Cash/check - $40 per tag min.	$20 per vehicle	N/A	N/A
		or 45-day average based on previous 90 days usage	Same as FasTrak	N/A	N/A
10	Replenishment Threshold	Credit Card Account **-** $15 min. or	$5 per vehicle	N/A	N/A
		2-week average use based on previous 90 days	Same as FasTrak	N/A	N/A
		Cash/check Account **-** $30 min. or	$10 per vehicle	N/A	N/A
		2-week average use based on previous 90 days	Same as FasTrak	N/A	N/A
11	Tag Deposit	Credit Card Account **-** $20 per tag, waived for first 3 tags	N/A	N/A	N/A

		Cash/check Account - $20 per tag	N/A	N/A	N/A
12	Max number of tags	None	N/A	N/A	N/A
12b	Max number of vehicles	N/A	None	None	**One**
13	Lost / stolen tag maximum liability	$0 after notification with proof, No maximum	N/A	N/A	N/A
13b	Lost / stolen vehicle maximum liability	NA	$0 after notification with proof, No maximum	$0 after notification with proof, No maximum	$0 after notification with proof, No maximum
14	Low Balances	Credit Card Account - Automatic replenishment	Same as FasTrak	N/A	N/A
		Cash/check Account - Send notice requesting replenishment;	Same as FasTrak	N/A	N/A
		In-lane display shows low balance message	N/A	N/A	N/A
14b	Invoice / Statement Info	N/A	N/A	N/A	Invoice Period, Transaction Details, Associated Fees, Defense Affidavit
15	Account Suspension	Immediate tag suspension when account balance is less than zero	Plate Suspension	N/A	N/A
16	Account Revocation	Negative Balance for 90 days or No activity for one year	Same as Fastrak	Same as Fastrak	None
17	Reciprocity				
18	Toll Discounts apply to customers of other toll facilities	N/A	N/A	N/A	N/A
19	Guarantee of tolls to other toll agencies based on Regional CSC tag and plate files	Yes	No	No	No
20	Account Fees				

21	Additional Statement Fee	1. $1 for monthly paper statements	Same as FasTrak	Same as FasTrak	Same as FasTrak, if provided
		2. $1 statement regeneration	Same as FasTrak	Same as FasTrak	Same as FasTrak, if provided
		3. $7 for disk (business and commercial accounts only)	Same as FasTrak	Same as FasTrak	Same as FasTrak, if provided
21a	Video Toll Processing / Invoice Fee	N/A	$TBD	$TBD	$TBD
22	Bad Check Fee	$25	Same as FasTrak	Same as FasTrak	Same as FasTrak
23	Tag Replacement Charges	$20 interior	N/A	N/A	N/A
		$20 exterior	N/A	N/A	N/A
24	Infrequent User Fee	None	None	None	None
25	Account Maintenance Fee	None	None	None	None
26	Tags Fees/Sales	None	N/A	N/A	N/A
27	Violation Policies				
28	Toll Evasion	<u>All Violations</u>	Same as FasTrak, if toll can't be deducted from pre-registered account	Same as FasTrak, if toll can't be charged to pre-registered payment method	Same as FasTrak, if invoice not paid within payment terms
		1st Notice			
		Toll + $25 penalty			
		2nd Notice			
		Toll + $70 penalty			
		Exceptions:			
		1. If the violation is determined to be the fault of the toll agency.			
		2. For 1st time offense, a non-customer can open a FasTrak account and the $25 penalty will be waived.			

		3. For FasTrak account holders in good standing, toll-only will be posted to the account balance. If the account balance is less than the amount of the toll, the account balance must be brought to the opening balance amount prior to posting the violation toll amount.			
		Processing fee of $3 for DMV registration holds, when applicable.			
29	Additional Video Tolling Policies				
30	Invoicing	N/A	N/A	N/A	Monthly
	Number of Notices sent before escalating to Violation	N/A	N/A	N/A	One
	Invoice Payment Timeframe	N/A	N/A	N/A	Within 15 days of invoice date; if no payment, then escalates to violation
	Conversion Options	N/A	Allow conversion to FasTrak	Allow conversion to FasTrak or REG/PRE/BAL	Encourage conversion to FasTrak, REG/PRE/BAL or REG/PRE/CC

5.0 Plan of Operations

Based on the general approach and business rules summarized in the previous sections, it is possible to define preliminary plans for video tolling operations. These plans will include business processes and other areas of focus necessary for development of changes to the existing operation and supporting systems.

5.1 Business Processes

In order to effectively evaluate each of the potential video tolling models, it is important to understand how each would fit into and impact BATA's current tolling process.

5.1.1 Current Process

At a high level, BATA's current business process is depicted in **Figure 2** below. This process reflects the typical approach to ETC tolling, including customer registration for a FasTrak account prior to using BATA's facilities. Although this process doesn't reflect every detail of BATA's current operation, it reflects the key elements pertinent to the video tolling discussion.

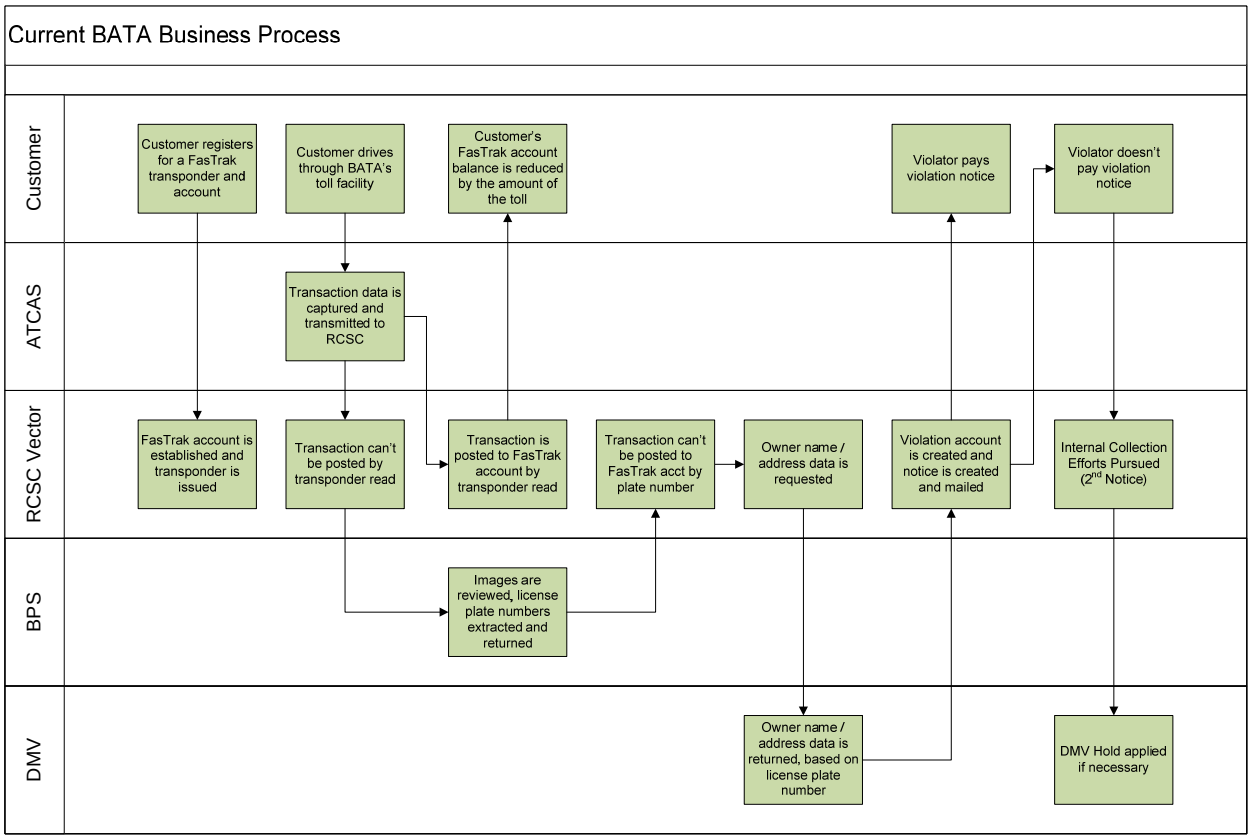

Figure 2: Current BATA Business Process

The parties listed down the left side are the more prominent stakeholders in BATA's process. They include the customer / vehicle driver; BATA's ATCAS system; the RCSC and supporting

Vector back office system; BPS, who serves as the image review contractor; and the California or other state DMV.

5.1.2 New Process – Option 1: REG/PRE/BAL

Figure 3 below depicts BATA's current process with the addition of Option 1, REG/PRE/BAL video tolling. The video tolling account type to support this option is indicated as a BATA VT1 account. A VT1 account would be similar to a FasTrak account, as it requires a pre-paid minimum balance and replenishment method, but it would not include the use of a transponder. This account type would provide incentives for customers to register as a VT1 accountholder by requiring less money on account (as compared to a FasTrak account), and should be an attractive option for customers currently paying cash because they do not want to tie up $25 per vehicle for a FasTrak account and transponder.

Activities modified to reflect video tolling are indicated in darker green boxes with white text. Note that the registration process changes, to allow for the registration of vehicles without transponders on VT1 accounts. The transaction is then posted to the VT1 account by plate number instead of transponder.

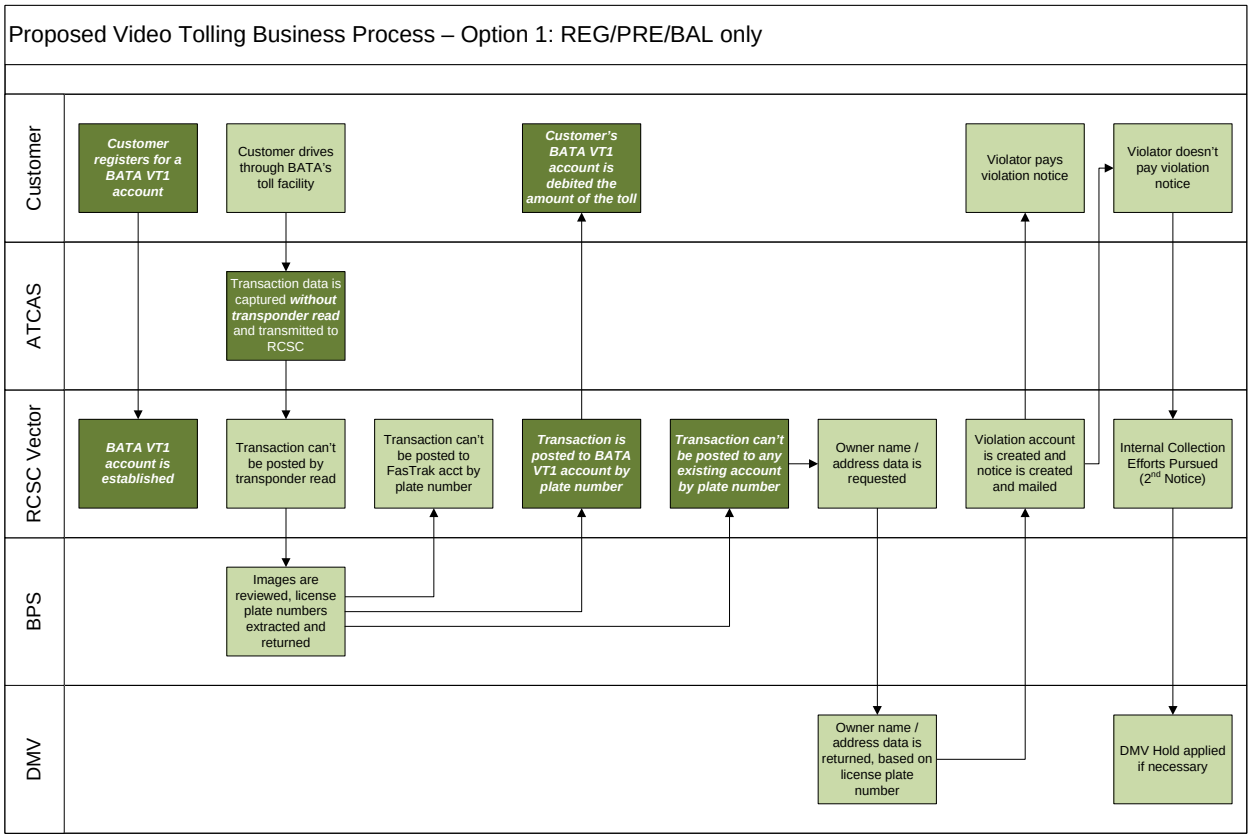

Figure 3: Option 1 REG/PRE/BAL Business Process

This process is similar to the manner in which BATA currently v-tolls / i-tolls transactions with invalid transponder reads against FasTrak accounts, but is instead applied to a video tolling account with no transponders. The toll transaction amount is debited from the pre-paid account balance, and once the account balance reaches the minimum threshhold, it is replenished via the customer's indicated method of payment.

Option 1 should require the least amount of modification to BATA's current operating procedures and underlying systems. However, it may also provide the least benefit, particularly with regard to the project's congestion relief and operating cost reduction objectives. This will be explored further during analysis in a later section of this document, as well as following deliverables of the project.

5.1.3 New Process – Option 2: REG/PRE/CC

The next video tolling alternative, Option 2 – REG/PRE/CC, would be most useful for providing customers who are willing to pre-register with the added capability of having their toll transactions hit their credit or PINless debit card directly. It does not require a transponder, similar to Option 1, but also does not require a minimum balance on account. The account for this type of video tolling is indicated as a BATA VT2 account. The business process required to enable Option 2 is illustrated in **Figure 4** below.

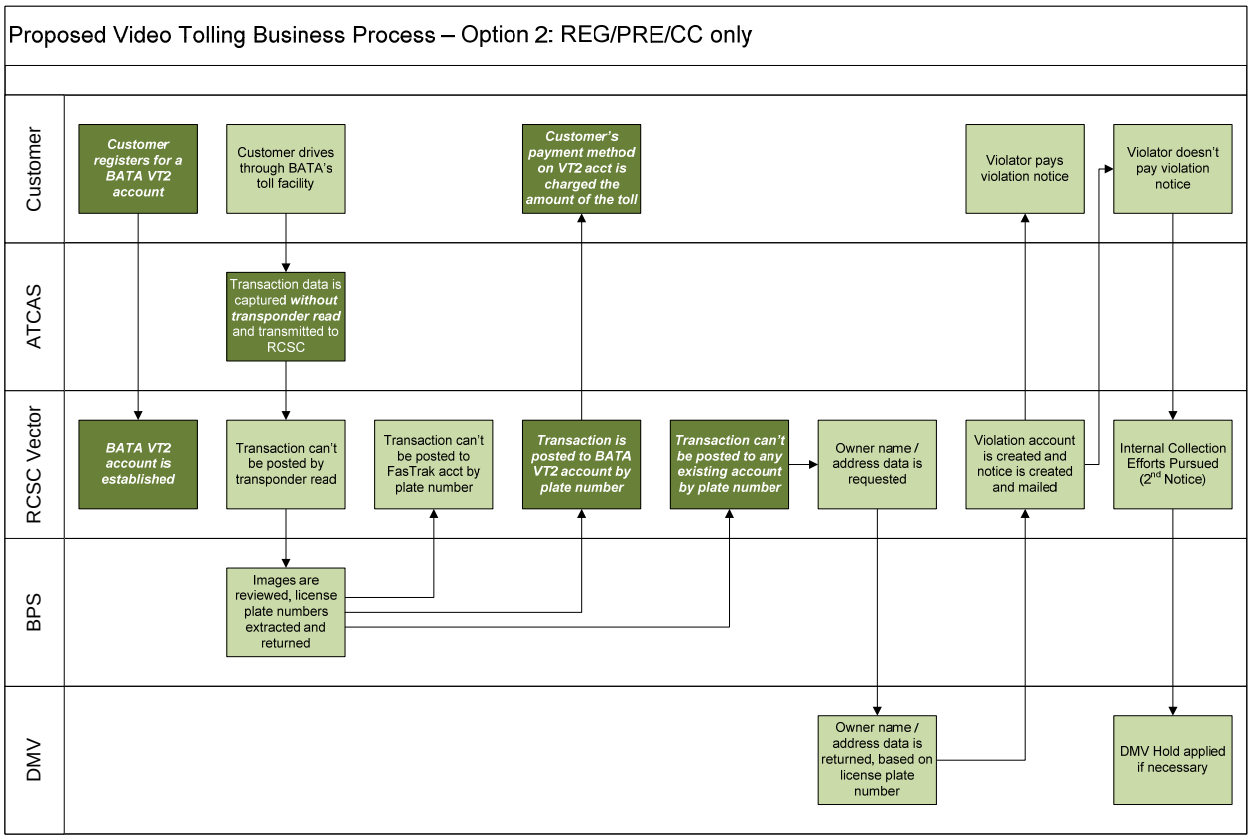

Figure 4: Option 2 REG/PRE/CC Business Process

The most noticeable drawback to this arrangement may be credit card fees. Depending on BATA's current arrangements with their credit card providers, this option might cost BATA unnecessarily high per transaction credit card fees. However, BATA could recoup these costs by including the credit card fees in the administrative fee charged to the video tolling customer. Other than that, implementation costs for Option 2 should be similar to Option 1.

Option 2 may have a slightly higher return on investment than Option 1. It should capture the percentage of current cash-payers and violators who haven't registered because they're not willing to pre-pay and carry a balance on a FasTrak account. BATA could also increase the audience captured through the judicious application of administrative fees, which will not only recoup costs but also impact the choices made by potential video tolling customers. Nonetheless, the audience captured by this option is still expected to be lower than an unregistered option, by the nature of the process.

5.1.4 New Process – Option 3: UNREG/POST

The last alternative – Option 3, UNREG/POST video tolling – may be the most costly option to implement. However, the nature of this process creates a situation where all drivers previously considered violators are now customers until their invoices go unpaid for a specified period of time. The account used for this type of video tolling is indicated as a BATA VT3 account. The Option 3 business process is illustrated in **Figure 5** below.

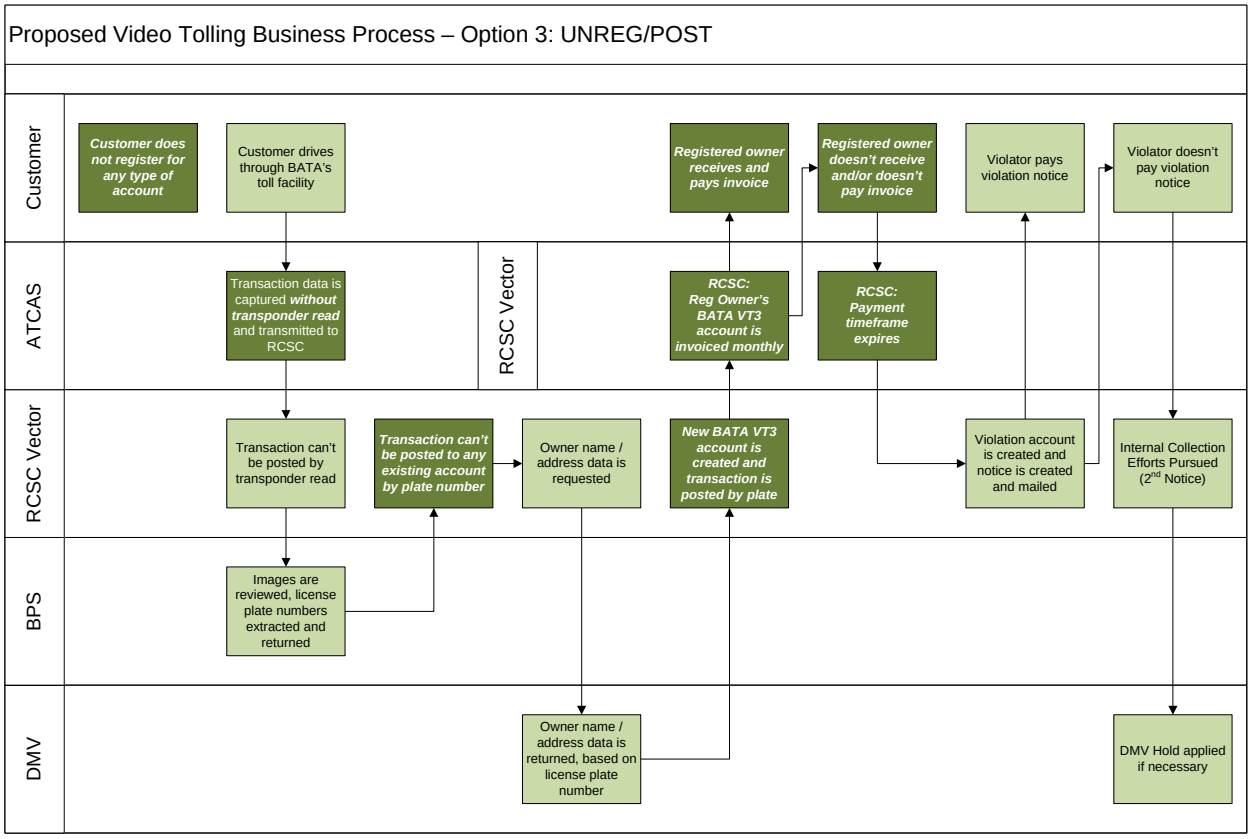

Figure 5: Option 3 UNREG/POST Business Process

It is important to note that, with each progressive alternative, the point of customer payment comes later in the process. This implies increased processing costs, due to the necessity of additional steps before the customer can be billed. In this case, Option 3 video tolling requires image review, DMV lookup, and invoicing before payment can be received. Although this is the most costly operational model for video tolling, it remains to be seen whether it approaches the cost of cash toll collection. That point will be examined in the Task 6.0 Financial Impact Analysis.

The increased back office operational cost of Option 3 is offset by the potential audience captured – the entire current set of today's violators, plus any drivers that may shift from cash collection. If a significant portion of the current cash-paying toll audience also moves to video tolling, this option could be expected to provide the highest level of benefit with regard to project objectives.

5.1.5 New Process – Options 1, 2, and 3 Combined

With consideration for all of the options described above, it is still possible that BATA might choose to implement all three of the described alternatives as a single video tolling program. Were that to be the case, the resulting business process would look as illustrated in **Figure 6** below.

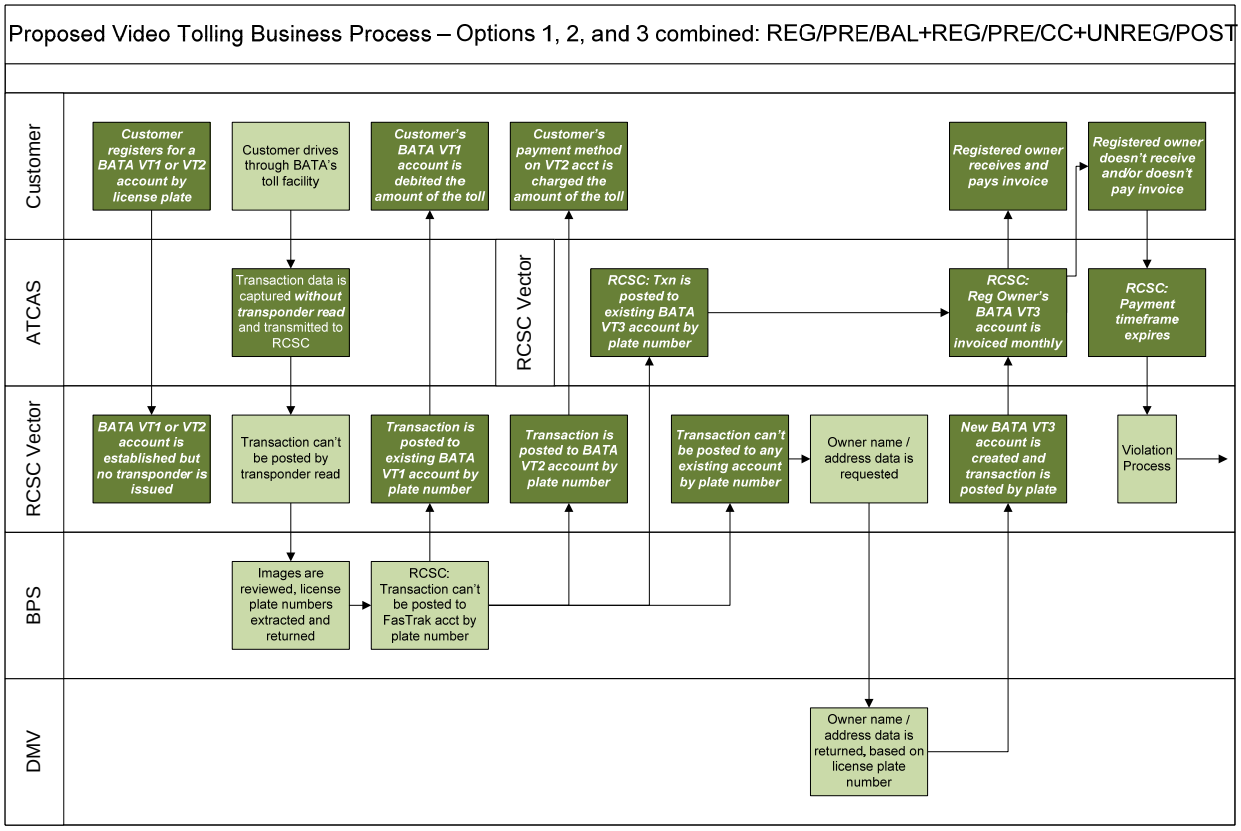

Figure 6: All Options Business Process

The elimination of any single option would simplify this process somewhat. Generally speaking, however, as long as any combination of pre-registered and post-paid options are included, the process will be similar to that shown in Figure 6 above.

5.2 Functional Areas of Focus

Each of the following key business areas may function differently depending on the video tolling options chosen. In order to better illustrate these impacts, the following sections will summarize each area independently across the various options.

5.2.1 Video Tolling Program Eligibility

Generally speaking, BATA's programs would be open to anyone with the desire to participate, as long as they're willing to provide the necessary information and the minimum funding to set up an account. The new video tolling options would not deviate from this general rule, but each would have specific prerequisites for enrollment:

- VT1 tolling requires full enrollment information, similar to a FasTrak account. It would also require the customer to fund a small minimum balance of $10 per vehicle and provide a replenishment method.

- VT2 tolling also requires full enrollment information, but would not require a pre-funded account balance. Instead, the customer would be required to provide a valid credit card or PINless debit card for toll charges.

- VT3 tolling has no eligibility requirements, as the accounts are set up based on DMV information.

5.2.2 Registration Methods

With the exception of VT3 tolling, which doesn't require registration, all registration methods supported by BATA should allow for registration of any type of account. FasTrak, VT1, and VT2 registration should all be possible by internet, phone, mail, fax, or in person at a walk-in facility. This should hold true whether the customer is registering on their own initiative, or as the result of receiving a video tolling invoice or violation notice.

5.2.3 Account Closure and Refunds

Because VT1 accounts are require pre-registration and pre-funding, they may also be closed and require customer refunds of the remaining balance to be processed. The procedures for processing these refunds should be similar to those used to refund FasTrak account balances, and because VT1 accounts are pre-registered, volumes should also be proportionate.

VT2 and VT3 accounts may be closed, but since no account balance is maintained, refunds are not required.

5.2.4 Administrative Fees

Each video tolling option added to the current process carries with it additional operational processes and therefore additional associated costs. For example:

- VT1 tolling requires image review before the associated license plate can be matched to an account for posting.

- VT2 tolling requires image review, as well, but also requires more frequent instances of credit card processing and associated fees.

- VT3 tolling requires image review, DMV lookup, invoice creation, processing, and mailing, and invoice payment processing.

Cash and ETC toll rates are generally calculated to cover the costs of collecting the tolls plus some amount for debt service, facility maintenance and improvement, and other overhead expenses. To ensure that BATA is not forced to absorb the additional costs of video tolling, it is important that the agency have the ability to recoup these additional operational costs through a higher toll rate, an additional administrative fee, or both. BATA has chosen to pursue the addition of administrative fees for video tolling options.

In addition, the additional fees may also serve as incentive to keep a higher percentage of customers using the more efficient method of collecting tolls – the FasTrak transponder-based program.

5.2.5 Lane Enforcement Methods

Typical lane enforcement related to tolling is focused primarily on public safety, generally less so on toll violation enforcement. In BATA's case, some toll enforcement efforts have taken place, resulting in citations to drivers passing tolling points without either paying cash or carrying a valid, mounted transponder, per current California statute.

With the addition of video tolling, the current premise regarding what constitutes a toll violation will change, and as a result, lane enforcement criteria will be much less clear. Although BATA does not currently use violation lights in their toll plazas, these and other lane-based indicators of a violation in progress may no longer be counted on to clearly reflect true violations. Lane enforcement efforts in video tolling facilities must shift to the back office, based on unpaid transactions, rather than flagging each individual driver not paying in the lane.

5.2.6 Transaction Processing

Within the current process, as illustrated earlier in Figure 2, a transaction may take one of two main paths – posting to a FasTrak account by transponder read, or posting to a FasTrak account by license plate. The latter is referred to as v-tolling or i-tolling, depending on how it is accomplished, but is typically used when a transponder is invalid at the time of toll crossing but valid at time of posting (v-tolling), or a transponder doesn't read correctly for any of a number of reasons (i-tolling). Posting by license plate requires the additional image review steps to identify the vehicle before it can be posted, but a v-toll or i-toll still posts at the ETC toll rate because it may in fact be correcting a toll system error in the lane, or a failure in the transponder itself.

Transaction processing under Options 1 and 2 is different from the current process only because the transaction posts to a VT1 or VT2 account, instead of a FasTrak account. The FasTrak posting takes precedence, but if the transaction can't be posted to a FasTrak account by transponder or by plate, it will be checked next against VT1 accounts, followed by VT2 accounts. All three processes – current, Option 1, and Option 2 – require image review to identify the license plate number. The system must have the ability to check each option in succession before proceeding to post the transaction or continue to the violation phase.

Transaction processing under Option 3 represents the most significant departure from the current process. In addition to image review and sequential checking for an account match by license plate, a VT3 transaction must also go through DMV lookup for initial set-up of a VT3 invoice account, to identify the registered owner of the vehicle and retrieve their name and address information, followed by invoicing at that name and address.

Regardless of the option implemented, order of precedence for transaction posting must be maintained by the system. Transactions should always be matched against ETC accounts first,

followed by VT1, VT2, and then VT3 accounts. This ensures that the customer will be charged the lowest possible rate associated with their transaction.

5.2.7 Image Review Procedures

For video tolling, image review does not necessarily have to vary from the current procedures employed for identifying v-tolls, i-tolls, and violators. In fact, continuing to employ the same consistent image review process regardless of the potential use of the resulting information will allow image reviewers to function as efficiently as possible. Image review volumes may increase, depending on the percentage of cash tolling customers that shift to video tolling. Improvements or modifications to the image review process should be taken across the board, in the interest of improving all reviewed images, rather than focusing specifically on video tolling.

It should also be noted that the new VES currently being installed will include Optical Character Recognition (OCR) capabilities at the lane. As a result, BATA may choose to pass some percentage of images through based on OCR reads alone, reducing the amount of human review required. This could lower the cost of image review for all options.

5.2.8 DMV Lookups – In and Out of State

As with image review, the DMV lookup process should not necessarily vary for video tolling by in state customers. The volume of requests may increase, due to a shift of current cash-paying customers to video, but the process is otherwise the same. Video tolling is recommended for out of state vehicles, where negotiated out of state DMV agreements allow. This will reduce uncollectable transactions, just as pursuit of out of state violations would.

BATA's current out of state plate percentages currently average around 2% of total transactions. These transactions are not currently pursued, but BATA is in the process of developing out of state agreements and plans to begin processing them as soon as September 2008. As a result, BATA's out of state transactions will be sent to their respective agencies or vendors for lookup, and will be processed along with the in state transactions, thus adding to video tolling volumes. BATA does not expect to have agreements with all other states, so transactions created by vehicles from those states where BATA does not have lookup ability will continue to be uncollectable.

Although initially DMV lookups may increase, it is important to note that over time a larger percentage of license plates will come to exist on accounts in BATA's database. As a result, because lookups are only necessary when a license plate does not exist on an account, the volume of lookups may actually decrease over time.

5.2.9 Billing Methods

Only the VT3, or Option 3, method of video tolling has an associated billing method. In this case, billing will be done by invoice on a regular periodic basis. Based on other agencies' video tolling models and customer familiarity with monthly billing cycles, monthly invoicing is assumed, with the transactions for the previous month aggregated on each invoice. The first

invoice on a newly created account would be sent within 3 to 5 days of the initial transaction. However, this is subject to BATA legal counsel decisions regarding the point of violation and the 21-day timeframe for issuance of a violation notice.

If it is determined that the point of violation occurs when the vehicle drives through the lane without paying via cash or transponder, and a violation notice must be issued within 21 days of that date and time to be eligible for DMV hold, a determination will also need to be made regarding the billing period.

Because all other options are automatically either debited from the associated account or charged to the method of payment on file, no billing methods are required.

5.2.10 Payment Methods

Customer payment methods vary by the video tolling option.

- Current FasTrak customers can pay by credit card, PINless debit card, check, or cash to set up and replenish their accounts.
- VT1 accounts are nearly identical to FasTrak accounts in this aspect, as they are funded and replenished in the same manner, only at lower amounts. All payment types should be accepted.
- VT2 accounts require a direct method of payment for the toll charges, instead of an account replenishment method. As a result, only credit or PINless debit card payment methods can be accepted.
- Because VT3 accounts allow for post-payment based on an invoice, all payment methods can be accepted – credit card, PINless debit card, check, and cash.
- Payment methods in all cases will be restricted by the customer contact method (e.g., cash should only be accepted in person, and cash and paper checks can't be paid over the phone or internet).

5.2.11 Payment Timeframes

The only option with a payment timeframe to be specified is Option 3, UNREG/POST, video tolling. A VT3 account will create invoices, which will have a pre-specified payment timeframe included on them. The current assumed timeframe is 15 days, based on a typical customer scenario. However, this will be dependent on BATA legal counsel decisions regarding the point of violation and the 21-day time period for the issuance of a violation notice.

If it is determined that the point of violation is when the vehicle drives through the lane without paying via cash or transponder, and a violation notice must be issued within 21 days of that date and time to be enforceable, a determination will also need to be made regarding the payment timeframe in conjunction with the billing period to ensure that a subsequent violation notice can still be issued within 21 days.

The other options are automatic debits to a FasTrak or VT1 account, or automatic charges to the credit card associated with a VT2 account, so no payment timeframe is associated.

5.2.12 Money Handling

Because payment types for video tolling are the same as those for FasTrak accounts, no procedural modifications for money handling are required for video tolling. Volumes of cash handled by the plazas may be reduced in direct proportion to reductions in cash tolling, and back office payment receipts across the spectrum of payment types may correspondingly increase, but functionally these areas should operate no differently than they do today.

5.2.13 Violation Enforcement

The primary difference in the violation enforcement cycle as a result of the video tolling options lies in the point at which a violation is created. Each option is injected into the process after the point of posting to FasTrak accounts, but before the point of violation issuance, so the violations process happens later in the process with each video tolling option added.

However, with the exception of VT3 tolling, this should not have a significant impact on the violations process. Assuming that the necessary infrastructure and image review resources are in place to support video tolling, both VT1 and VT2 transaction posting will follow image review, as the current v-toll / i-toll process does, and will be accomplished by the system without any significant delay. The VT3 process, however, injects DMV lookup, invoicing cycle times, invoice creation and mailing, and payment timeframe allotments into the process ahead of the violation, requiring a considerable delay prior to violation issuance.

Following the initiation of the violations process, however, the steps in the process are not altered.

5.2.14 Customer Service Requirements

It is difficult to predict exactly what impact video tolling will have on customer service levels. During and for some time following initial video tolling implementation, increases in questions and complaints resulting from customer confusion is normal and should be expected, as with any new program or change to program functionality. The Customer Service Center will need to ramp up for that eventuality and be prepared to handle significantly increased phone calls, mail, and web-based inquiries. More importantly, the CSC should ensure that it has the system capacity to accommodate a surge in phone calls and web inquiries.

After three to four months, customer service requirements should level out and conform more closely to previous patterns recognized by the FasTrak customer service program, although potentially at higher volumes since some cash customers will join the ranks of accountholders supported by the RCSC.

5.2.15 Staffing and Training Impacts

The most significant impacts to existing BATA and Caltrans staff will come in the toll plazas, where potential reductions in cash toll collection will require less toll collection staff. However, corresponding increases in back office staffing, to review additional image volumes, process invoices and invoice payments, and provide support to an increasing volume of customers, may balance out this presumed reduction in staffing. As a result, cross-training and relocation of toll collection staff may lessen negative impacts to the staff.

6.0 Operational Scenarios

This section provides user scenarios under the video tolling system. The scenarios are presented through the eyes of the different users in order to anticipate the experience each of them could have with the new system.

6.1 FasTrak User (Todd)

Todd works as a medical equipment service technician. His typical day involves traveling between different hospitals in the area, maintaining and repairing expensive and critical hospital equipment. Todd needs to be able to service as many hospitals as possible in a day, and spending time in congested traffic can mean the difference between four and six appointments. Todd has been a FasTrak user for years and loves the convenience and time savings it provides. Since BATA started to allow video tolling, Todd has noticed that there are more cars going through the FasTrak lanes without transponders. He has also noticed that the lines are much shorter for the mixed use lanes, and the backup of vehicles into the toll plaza approach doesn't impede his progress like it sometimes used to. Todd is happy that the plazas are operating more efficiently and that he is not impacted by the lines and congestion caused by other drivers.

6.2 Option 1: REG/PRE/BAL Driver (John)

John works as an accounting manager for a local firm in Palo Alto. John's work and lifestyle usually don't require him to travel much, so he hasn't wanted to invest in a FasTrak transponder in the past. He uses the toll bridges infrequently and has never minded sitting in line to pay cash at the plaza on the rare occasion when he does. Recently, he has had to travel more frequently to assist his mother in Union City, but still doesn't want to clutter up his car with a transponder. So when BATA started video tolling, he immediately called the Regional Customer Service Center and signed up for a pre-paid account.

Now when he travels, he can get into any lane and pass straight through the plaza. As he drives through, the tolling system debits the account he has set up with BATA. When the account funds are close to being depleted, it automatically replenishes the account using the credit card he has on file there. He also gets a monthly account reconciliation statement by e-mail. John knows that his account will be billed for the toll plus an administrative fee, but the convenience, lack of lines, and ability to drive without worrying about a transponder really meets his usage requirements.

6.3 Option 2: REG/PRE/CC Driver (Diane)

Diane is a human resources coordinator for a downtown San Francisco company. She also lives in the city, as do most of her friends, so neither her work nor her lifestyle has ever required much travel outside the downtown area. As a result, she's never signed up for a FasTrak account, not wanting to tie up her hard-earned money in an account she would rarely use. She usually just sits in line and pays cash for the toll whenever she needs to drive across the bay.

Recently, however, BATA started a new program called video tolling, which doesn't require money on account. This idea appeals to Diane, who would prefer to not to sit in line. She signs up for a video tolling account at the website online, providing a credit card that the system will use to charge her tolls when she does use the toll bridges.

Now when Diane needs to cross the bay, she can get into any lane and drive straight through the toll plaza, only slowing down for safety. As she passes, the system takes a picture of her license plate, finds her account, and uses the credit card on file there to charge her toll transactions. She can go online at any time to see her transactions and print a receipt, but she also sees the charges on her monthly credit card statement. She knows that she's paying more than just the toll amount, since BATA charges an additional fee for this service, but it's worth it to Diane to keep from having her money tied up in a FasTrak account.

6.4 Option 3: UNREG/POST Driver > REG/POST/BAL Driver (Jeanne)

Jeanne works for a small company near her home in Berkeley and is currently working on a new advertising campaign with another firm near Chinatown. Jeanne typically uses alternate forms of transportation such as biking or the bus as her primary mode of transportation, but since her meeting is further away and she has meeting materials to carry, she decides to drive across the Bay Bridge into San Francisco.

As Jeanne is traveling towards San Francisco, she notices that traffic is very heavy. Since Jeanne is an infrequent user of the toll bridges in the area, she has never signed up for a FasTrak transponder, so she's worried that the long cash lines will cause her to be late for her meeting. Then she remembers that BATA recently started a video tolling program and will send you an invoice in the mail for your tolls. Crossing her fingers and hoping that she doesn't get a violation notice instead, Jeanne drives through the FasTrak lane, avoiding the congestion and making her appointment on time.

Jeanne later receives an invoice in the mail for her usage of the toll bridge. The invoice includes the toll amounts for her bridge usage plus an administrative fee, all of which she has 15 days to pay. The invoice makes clear that toll charges not paid within the specified 15 days

will become violation notices, with an added $25 penalty per transaction for each violation. The invoice also gives her several options to consider for making her payment:

1.) She can register for a FasTrak transponder account. This provides the lowest per use costs (tolled amount), but requires $25 per transponder up front to set up the account and requires her to maintain a balance in the account and place a transponder on her vehicle. If she registers for FasTrak, her amount due will be reduced to tolls only and the administrative fee will be waived.

2.) She can register for a VT1 video tolling account, which would allow her to continue using the toll bridges without a transponder. She would still have to set up the account with a minimum balance, but it's less than a FasTrak account at only $10 per vehicle. She would also have to provide a method of payment so her account could be replenished whenever the balance got too low to cover her tolls. The toll amount would be the same as the ETC rate, except there would be an administrative fee.

3.) She can register for a VT2 video tolling account, which would allow her to continue using the toll bridges without a transponder and also would not require her to maintain a balance on account. Instead, she could provide a credit or PINless debit card, and the system would charge her tolls to the provided card each time she drove. This would require an administrative fee to cover the processing costs for the added convenience.

4.) She can pay the invoiced amount directly and continue as a VT3 video tolling customer. Her account information would remain as provided by the DMV. There is no transponder required, no balance on account, and no credit card needed. While the toll rate per use would be the same as ETC, there would be a higher administrative fee to offset the agency's additional processing and invoicing costs.

Realizing that she will be traveling downtown more frequently and doesn't want to repeatedly go to the trouble of paying invoices, Jeanne looks at the difference in cost and decides to register for a VT1 video tolling account. The invoice indicates that she can register by internet, phone, or by mailing or faxing in her information, so she goes to the website and enters her personal, vehicle and credit card information. She can choose to pay her current invoice at the same time, including the VT1 administrative fees. Now she can go online to view her account and transaction information at any time, and can drive through any lane she chooses, saving time and money.

6.5 Option 3: UNREG/POST Driver (Tracy)

Tracy is a student at San Francisco State University and works locally at a restaurant to help pay for school. She recently visited some friends in Oakland. When crossing the bridge, she realized that she didn't have enough cash to cover the toll amount, so she used the new video tolling system even though it would cost her a little more. Just like Jeanne, she received an invoice a couple of weeks later at her apartment.

Being a student with tight cash flow, as well as an infrequent bridge user, she didn't want to tie up any of her money in an account. After reviewing the payment options, she decides to pay the notice and remain a VT3 customer even though it costs a little more per transaction.

Since then, Tracy has occasionally used other toll bridges. Most of the time she has enough cash in hand to pay the toll at the plaza, but when she doesn't, she doesn't worry - she just pays the invoice when it is received.

6.6 Option 3: UNREG/POST Driver > Violator (Veronica)

Veronica works as a teacher at a high school in Richmond. She doesn't have a FasTrak account, but recently when she was running late for a school event in San Rafael, she drove through the toll plaza of the Richmond-San Rafael Bridge.

Veronica, like Jeanne and Tracy, received an invoice in the mail informing her that she owed a fee for using the bridge. Unlike Jeanne and Tracy, however, Veronica decided to ignore the notice. It was such a small amount – surely they wouldn't track her down just for $4?

Once the allotted 15 days for payment expired, the transaction on Veronica's invoice became a violation and she received a violation notice in the mail. Now she is faced with not only the toll amount and administrative fee, but also an additional $25 penalty for the violation. Realizing it was not a good idea to ignore the notice, she pays and decides to open a video tolling account so that this type of situation doesn't happen again.

7.0 Analysis

7.1 Traffic Diversion Forecasting

Because a large part of the video tolling premise relates to shifting transactions from cash and violations to video, it is important to forecast the potential impact of video tolling on the total transaction base. This is necessary for projecting traffic impacts, and is critical for analyzing financial impacts. However, predicting the potential redirection of traffic from cash toll collection and violations to video tolling is difficult, at best. Nonetheless, based on available information regarding the experience of other agencies with similar, but not identical, configurations, some conclusions have been drawn.

Each type of video tolling can be expected to divert a different volume of traffic to video tolling. For example:

- VT1 tolling can be expected to result in the least diversion from cash to video, and little or no diversion from violations to video. The audience captured with this option would be primarily customers who didn't want to mount a transponder on their vehicle or were concerned about tying up $25 per vehicle on a FasTrak account.

- VT2 tolling might divert a slightly higher percentage of cashpayers to video, as it requires no money on account. This would capture the remainder of the group that was concerned about tying up money on account, but would be somewhat offset by the fact that these customers would be required to provide a credit card or PINless debit card for toll payment. In addition, the toll rate plus fees might need to be somewhat higher, to cover the potential increase in overall credit card fees resulting from the smaller and more frequent credit / debit card charges.

- VT3 tolling would divert the entire existing volume of violators initially to video tolling customers. However, this should not be taken to imply that all current violators will be converted to paying customers by video tolling, as a certain percentage of violators will continue to procrastinate or not pay at all, regardless of what you label them or what type of notice you send them. VT3 will, nonetheless, give the "accidental" violator better options for resolving their transactions prior to them becoming violation notices with higher penalties. It should also divert some percentage of current cashpayers, due to the automatic nature of the process, but the actual amount of this diversion will be difficult to predict.

Of course, any potential projections would be subject to a variety of altering factors, including traffic volume growth, ETC program growth beyond current forecasts, and system improvements or failures altering v-toll / i-toll or uncollectable percentages. In addition, potential diversion to video will vary by location, based on the demographics, income levels, travel patterns and other factors prevalent in the traffic on any given toll bridge.

The administrative fees established in support of video tolling will have perhaps the most significant impact on diversion, as they create incentive for current drivers to try different methods of payment. Some will do so in the interest of time savings, as they currently do for the FasTrak program in the absence of an ETC discount. Others will be willing to convert to video tolling to avoid having to carry cash, sit in lines to pay, or tie up their money in a FasTrak account.

To illustrate the potential diversion resulting from the addition of video tolling, **Table 2** below has been developed as a basis for several possible scenarios. Based on values from the Task 4.0 deliverable, the Current Values segment of the table reflects the average current breakdown of transactions across Cash, ETC, and Non-Cash/Non-ETC payment methods on the left.

Table 2: Projected Toll Collection Diversion

Current Values								
All Transactions				Non-Cash / Non-ETC Transactions				
Cash Transactions	ETC Transactions	Non-Cash/ Non-ETC Transactions	Total	V-toll /I-toll Transactions	Uncollectable Transactions	Video Toll Transactions	Violation Notices	Total
40.9%	48.7%	10.4%	100.0%	7.6%	1.8%	0.0%	1.0%	10.4%
Projected Values								
All Transactions				Non-Cash / Non-ETC Transactions				**** Potential Violation Notices (30% of VT)
* Remaining Cash Transactions	** ETC Transactions	Non-Cash/ Non-ETC Transactions	Total	*** V-toll / I-toll Transactions	Uncollectable Transactions	Potential Video Toll Transactions	Total	
40.0%	50.4%	9.6%	100.0%	7.6%	1.8%	0.2%	9.6%	0.1%
35.0%	50.4%	14.6%	100.0%	7.6%	1.8%	5.2%	14.6%	1.6%
30.0%	50.4%	19.6%	100.0%	7.6%	1.8%	10.2%	19.6%	3.1%
25.0%	50.4%	24.6%	100.0%	7.6%	1.8%	15.2%	24.6%	4.6%
20.0%	50.4%	29.6%	100.0%	7.6%	1.8%	20.2%	29.6%	6.1%
15.0%	50.4%	34.6%	100.0%	7.6%	1.8%	25.2%	34.6%	7.6%
10.0%	50.4%	39.6%	100.0%	7.6%	1.8%	30.2%	39.6%	9.1%
5.0%	50.4%	44.6%	100.0%	7.6%	1.8%	35.2%	44.6%	10.6%
0.0%	50.4%	49.6%	100.0%	7.6%	1.8%	40.2%	49.6%	12.1%

Note: All percentages indicate % of total transactions.

Note 2: Analysis assumes full use of unregistered / post-paid video tolling to derive Potential Video Toll Transaction percentages. Otherwise, that percentage could be attributed to Potential Violation Notices instead.

Note 3: Current Values based on Weekday Averages from Table 1 in the Task 4.0 deliverable.

* Values indicate percent of cash toll collection remaining after one year, across a possible range of 0% to 40%.

** Projected ETC Transactions includes 3.4% average forecasted growth over one year, as indicated by Table 3 in the Task 4.0 deliverable.

*** Projected V-toll / I-toll and Uncollectable percentages were held consistent to current values, lacking any known driver to change them.

**** Projected violation notice based on an assumed percentage of 30% unpaid video toll invoice transactions.

The Non-Cash/Non-ETC value is then further broken down on the right, into v-toll / i-toll, uncollectable, video toll, and violation percentages, based on input from BATA also used in the Task 4.0 deliverable. The video toll value in this area is set to 0.0%, as video tolling is currently not in use. As noted in earlier documents, the V-toll / I-toll transaction percentage includes

transactions that could not be posted to a FasTrak account at the time of toll crossing (i.e., either due to transponder misread or invalid transponder status) based on a transponder read, but were later posted to the appropriate FasTrak account based on the license plate number. Uncollectable transactions include those that can't be pursued due to unreadable images or other factors. The remainder are currently processed as violation notices.

In order to use these numbers to project the potential impact of video tolling, a variety of assumptions had to be made. These assumptions include the following:

- Projections were made based on an assumed one year timeframe. This would ostensibly allow time for the video tolling implementation to stabilize and start producing reliable numbers.

- ETC percentages were assumed to grow at the average rate projected in Task 4.0, and that number was held constant for all scenarios. This factor could be impacted by the introduction of video tolling fees, as well as by marketing and outreach done to promote the video tolling program or additional efforts to promote FasTrak itself. However, increases in the ETC usage should not be considered detrimental to BATA's overall tolling program, as ETC is generally considered the most cost-effective way to collect tolls. Significant decreases in program ETC rates are unlikely, as general program growth is well-established, but any imbalance in toll rates or policies that makes video tolling seem advantageous also carries the risk of negatively impacting ETC participation to some extent.

- V-toll / I-toll and Uncollectable percentages are tied more closely to the toll plaza and violation enforcement systems than to any specific type of tolling. As a result, the percentages in those areas were held constant at current levels for all scenarios. Because a new VES is being installed, and a new ATCAS lane system will follow, these numbers may very well change, but lacking dependable projections at this point, it is not possible to predict the direction or magnitude of those changes.

- Potential Video Toll Transactions were forecasted based on the total Non-Cash/Non-ETC transactions minus V-toll / I-toll and Uncollectable percentages. This model assumes that unregistered tolling is deployed, and that all current violation transactions immediately become video toll transactions. If that is not the case, the Potential Video Toll Transactions column actually reflects the Potential Violation Notices instead.

- Potential Violation Notices are based on an assumed 30% of unpaid video toll invoice transactions. This number is especially difficult to predict, due to lack of a comparable precedent in the toll industry. However, since video tolling efforts in Texas are currently resulting in 45 to 60% payment of video invoices without a complete violation enforcement process in place, a conservatively higher estimate of 70% paid video invoices was assumed for this exercise. The remaining 30% would then convert to violation notices, to be pursued in the same manner that violations are currently.

Based on these assumptions and the resulting data reflected in Table 2, several scenarios may be visualized, as described in the following sections.

7.1.1 Scenario 1: VT1/VT2/VT3 & No Cash

In Scenario 1, all three types of video tolling (VT1, 2, and 3) are implemented and cash collection is completely eliminated in the plazas. As a result, the line in Table 2 reflecting 0.0% Remaining Cash Transactions illustrates the potential results, derived as follows:

- With the elimination of cash collection, cash vehicles will end up in the Non-Cash/Non-ETC category, causing it to jump to 49.6% of total transactions.
- The ETC program is not heavily promoted along with the video tolling implementation, so growth remains standard at 3.4% over one year, increasing to 50.4% of the total transactions.
- Breaking down the Non-Cash/Non-ETC percentage of 49.6%, v-toll / i-toll and uncollectable percentages remain steady, leaving 40.2% of total transactions to be processed as video toll transactions.
- 70% of the total video toll customers invoiced pay their invoices at this stage, leaving 30% to be pursued as violators. As a result, 12.1% of the total transactions end up on violation notices, to be further pursued using DMV Hold and collections processing.

Based on approximately 350,000 transactions per day average across all seven bridges, this would mean that about 176,000 would be paid with ETC, 26,600 would be v-tolled / i-tolled to ETC accounts, 6,300 would be uncollectable, almost 141,000 would be processed as video tolls, and over 42,000 of those would become violation notices.

This could, in fact, be a somewhat conservative estimate. For example, installation of the new VES could improve the v-toll / i-toll or uncollectable numbers, further adding to the video toll transactions to be processed. However, such changes would be in the single digit percentages, and can't reliably be predicted at this point.

Growth of the ETC program should be emphasized at this point, to make the most efficient use of the agency's resources. It is unlikely that the ETC program will see so little impact as a result of the addition of video tolling, so some of the potential video tolling and violation growth might be absorbed by the ETC program. Regardless, as long as the agency sets video tolling fees at an appropriate level to recoup their operating costs, this level of video tolling would not necessarily be impossible to manage.

7.1.2 Scenario 2: VT1 / VT2 Implementation Only

Now that the most extreme scenarios have established the outer boundaries of the potential video tolling range, these last three scenarios will explore what is hopefully a more realistic take on the potential video tolling options.

Scenario 2 explores the potential impact of deploying only pre-registered video tolling options. These are the least costly and risky options to pursue, in direct contrast to unregistered, post-

paid video tolling. However, as previously noted, the audience for pre-registered video billing is considerably smaller.

For the purposes of this exercise, data from a 2004 MTC FasTrak Bay Area Commuter Survey was used. This survey of 1,200 bridge users without FasTrak indicates that:

- Among this group, by far the most common reason cited for not subscribing to FasTrak was "Infrequent Bridge Usage" at 63.5% of respondents.
- Despite the many public concerns about privacy, only 2.2% of respondents cited "Privacy Concerns" as one of their reasons for not signing up.
- Likewise, carpooling or use of other types of transportation was cited by only 1.7% of respondents.
- 16.3% of respondents said that they don't see the benefit, just aren't interested, or had no particular reason for getting FasTrak.
- The remainder cited either lack of information (e.g., unaware it was available, didn't know it was free, didn't know how to sign up) or inconvenience (e.g., process too cumbersome, not convenient, haven't gotten around to it) as reasons for not subscribing to the FasTrak program.

Presumably, the majority of these respondents are among the approximately 41% who either pay cash or violate, under the current system. While deploying unregistered video tolling and eliminating cash would convert them all to video tolling, at least initially, it is less clear how many of them would convert on their own initiative when cash options are still available, especially if they are restricted to pre-registered video tolling only.

One assumption must be made with regard to pre-registered video tolling: if cash tollers and/or violators currently don't choose to sign up for FasTrak, it will take incentive beyond that which is currently provided by FasTrak to entice them to sign up for a VT1 or VT2 account. Since FasTrak currently doesn't have a discounted toll rate and requires an up-front payment to establish the minimum account balance, the only current incentive is time savings in the lanes.

Based on the information currently at hand, this exercise assumes that no more than 25% of current cashpayers will convert to VT1 or VT2. Since cash currently amounts to approximately 40% of total transactions, this would mean that 10% of total transactions would be diverted from cash to video tolling. To approximate the potential impacts, the line in Table 2 beginning with 30% Remaining Cash Transactions will be used.

- 30% cash and 50.4% ETC resulting from one year's average growth will leave 19.6% Non-Cash/Non-ETC transactions.
- Removing the constant 9.4% of transactions attributable to v-tolls / i-tolls and uncollectables leaves 10.2% of transactions to be processed as video tolls.
- Assuming again that 70% of those receiving video toll invoices pay them, this results in 3.1% of total transactions eventually ending up as violation notices.

Based on that same 350,000 transactions per day average, this would mean that about 105,000 would be paid with cash, 176,000 with ETC, 26,600 would be v-tolled / i-tolled to ETC accounts, 6,300 would be uncollectable, almost 36,000 would be processed as video tolls, and over 10,000 of those would become violation notices.

It is important to note that as cash percentages drop and video toll percentages proportionately increase, the percentage of violations also increases because it's based on unpaid video toll invoices. As a result, the percentage of violations after only a 10% drop in cash collection is 2% of total transactions higher than it was. All-electronic tolling, a term sometimes used to describe ETC plus video tolling without cash, does not necessarily reduce violations or the need to pursue them. Instead, it reduces the cost of collecting tolls across the board, based on the reduction in overhead costs necessary for cash toll collection.

7.1.3 Scenario 3: VT3 Implementation Only

Scenario 3 focuses on implementation of unregistered video tolling only. VT3 will be the most costly option to pursue, based in large part on the up-front implementation costs of modifying the back office system to support video toll accounts and invoicing. However, the audience captured will include all of the current violators, at least initially, and potentially some percentage of the cashpayers, as well. As such, VT3 is a customer-friendly option, meant to appeal to the majority of violators who are honest and intend to pay their bills, as well as current cashpayers who might not mind bypassing the cash lines, but haven't taken the time to sign up for FasTrak.

The primary appeal of unregistered video tolling to the driving public is the "try before you buy" concept. Often a driver will begin using video tolling when they are in a hurry and can't afford to be stuck waiting in the cash lines, only to discover that it works and the monthly invoice is very convenient. As a result, those who don't eventually convert to ETC or pre-registered video tolling end up using video tolling as a sort of public utility – there for their use when they need it, and easily paid with a monthly check. In the meantime, it doesn't cost them anything up-front and doesn't require their attention in any fashion.

Based on this scenario, more cash tollers can be expected to begin using video tolling over time than initially. As a result, within a year after implementation, cash collection may gradually dwindle to lower percentages than could otherwise be accomplished with any type of pre-registered program. Many of those who began as VT3 video tollers may convert to VT2, VT1, or even FasTrak participation over time, but that is a desirable result, due to the increased reliability of the information provided when a customer voluntarily registered. The important factor here, however, is that cash toll collection, with its associated high overhead costs, is gradually supplanted.

A small percentage, typically 10% or less of total transactions, will continue to pay with cash as long as the option is available, especially where cash tolling was well-established prior to the addition of electronic tolling. These are some of the drivers with privacy concerns and those who are more comfortable with "traditional" methods. The remainder, however, are potential converts to video tolling, if agencies can motivate them with incentives and convenience.

For the purposes of this exercise, we'll assume that 20% continue to pay cash after one year's time, while the ETC program's standard growth brings it to 50.4% of total transactions. As a result, 20.2% of total transactions are processed as video tolls, and 6.1% eventually become violations.

Again based on 350,000 average transactions per day, this would mean that about 70,000 would be paid with cash, 176,000 with ETC, 26,600 would be v-tolled / i-tolled to ETC accounts, 6,300 would be uncollectable, over 70,000 would be processed as video tolls, and about 21,000 of those would become violation notices.

7.1.4 Scenario 4: Implementation of all VT Options

Combining all three video tolling options, pre-registered and unregistered, pre-paid, direct charge, and post-paid, would appear to provide the most "bang for the buck" with regard to conversion of violators and cash customers to video tolling. Due consideration must be given to the costs of the VT3 implementation, as well as the limited audience captured by the VT1 and VT2 options.

The percentage of cash toll collection should not necessarily be different from Scenario 3, based on the addition of VT1 and VT2 options, since the same base set of cash customers may convert either way. VT3 has the capability of converting more over time, as drivers "try before they buy", plus the advantage of treating all violators as video tollers until their invoices go unpaid. As a result, any predictions made for Scenario 3 could just as easily apply to Scenario 4.

7.2 Pros and Cons

In order to provide a consistent comparison of the three video tolling options, **Table 3** below addresses a standard list of factors for each option.

Table 3: Pros / Cons Comparison

Factor	BATA VT Option 1: REG/PRE/BAL		BATA VT Option 2: REG/PRE/CC		BATA VT Option 3: UNREG/POST	
	Pro	Con	Pro	Con	Pro	Con
Customer Convenience		Pre-registration		Pre-registration	No Registration	
Audience Served		Willing to pre-register, but doesn't want tag, pre-paid balance		Willing to pre-register, but doesn't want tag, pre-paid balance	All previous violators, some cashpayers	
Congestion Relief		Lowest	Medium		Highest	
Reduced Cash Operating Costs		Lowest	Medium		Highest, but offset by higher back office processing costs	
Social Equity		Lowest		Lowest	Medium	
Additional Processing Required	Image Review only		Image Review only			Image Review and DMV Lookup
	No Invoicing		No Invoicing			Invoicing
Processing Cost	Lowest - image review		Medium - image review plus credit card fees			Highest - IR, DMV, Invoicing
Potential Customer Fee	Lowest		Medium			Highest
Ability to Contact Customers	More accurate for honest customers	Customer can provide fake info, cause double processing	More accurate for honest customers	Customer can provide fake info, cause double processing	Official DMV address	DMV addresses are buyer-driven, certain % will be out of date
		DMV check required before violation notice		DMV check required before violation notice	No re-check before violation notice	
RCSC / Vector Modifications	VT1 account structure only		VT2 account structure, direct charge option			Post-paid account structure, invoicing
Web / IVR Modifications	Pre-registration		Pre-registration		Invoice Payment	
Implementation Cost / Risk	Lowest		Medium			Highest
Violation 21-day Timeframe	Can meet		Can meet			Difficult to meet
Marketing / Outreach Requirements		Higher		Higher	Lower	

Some of the items listed above are self-evident or have been discussed at length in earlier sections of this document, but others may need further clarification.

7.2.1 Project Objectives

For example, as the primary objective of this project, the ability of each option to meet congestion relief objectives is key. Due to the limited audience projected to be captured by VT1, it also carries the lowest potential for relieving congestion. Because VT2 allows customers to video toll without carrying a balance on account, it may result in a slightly higher rate of conversion, but still not significantly higher. VT3 provides the most promise in this area, as it gradually reduces the amount of cash collection over time. Removal of the constraints caused by either having to pay cash or violate will free many to make use of video tolling, resulting in a

potentially larger shift from cash, conversion of more cash lanes to electronic, and eventually a more free flow of traffic through the plazas.

Until financial impacts can be assessed, it must be assumed that the option diverting the most traffic from cash toll collection will also best support the project objective of reducing cash collection operating costs. VT3 has the highest potential for diverting traffic from cash collection, as discussed earlier, but also has the highest potential back office operating costs, which will offset the savings to some extent. This includes potential banking fees, which may decrease at plazas due to the reduced amounts of cash being handled, but increase in the back office due to increased volumes of cash and checks used to pay VT invoices. Both the estimated processing costs and implementation costs for VT3 will be higher than either of the other two options. This is due entirely to the multiple steps necessary to process a VT3 transaction, and the initial process and system modifications necessary to support those steps.

Social equity may also be addressed most effectively by VT3, which allows lower-income drivers without credit/debit cards or bank accounts to pay in response to an invoice. However, the necessity of routing these transactions through the most intensive level of processing in order to issue that invoice may also require that the toll plus administrative fee is higher than other methods of video tolling, reducing the social equity benefits. Nonetheless, VT1 requires an up-front payment and money held on account, and VT2 requires a credit / debit card, which will limit participation by low-income or unbanked drivers.

7.2.2 Legal and Legislative Issues

It is important to keep in mind that current statutes require violation notices to be delivered to violators within 21 days of the violation occurrence in order to be eligible for DMV hold, should the violation go unpaid for a specified period of time. Legal opinions are still being developed regarding the applicability of this statute in conjunction with video tolling, and the potential impacts of either decision. Since neither VT1 or VT2 tolling requires invoices to be mailed or returned payments processed, this should not be an issue for those two options.

A related legal issue is definition of the actual point of violation. VT3 tolling will have a more difficult time meeting the 21-day requirement if legal counsel comes to the conclusion that the violation occurs when the violator drives through the plaza, beginning the 21 day cycle. This would, in essence, establish that all video tollers are also statutory violators even before they receive their invoices, in direct contrast to BATA's intent for the addition of video tolling.

The other major issue in the legal area is the ability for BATA to charge administrative fees to recoup the costs of video processing. Differential administrative fees can create significant incentive for customers to use new options, in addition to any potential time savings recognized.

7.2.3 Marketing and Outreach Requirements

Although any or all of the three video tolling options could be implemented without marketing and/or public outreach, it would limit the success of the program. In particular, VT1 and VT2 would be virtually invisible to the potential customers without some sort of promotion. VT3

would gradually become visible, as violators received invoices and people began to ask questions, but the other two options have no similar method of gradual introduction.

In addition, it will be beneficial to continue promoting the ETC / FasTrak program, to avoid backsliding in that area once video tolling catches on. Also, it will be important that the potential audience understands that violations will still be pursued following the new options if transactions remain unpaid.

7.2.4 System Modifications

One of the most significant items driving implementation costs for video tolling will be the potential system modifications. Since it is assumed, at this point, that all modifications will be made to the RCSC back office system (Vector), further analysis in the following documents will require input from the vendor providing and maintaining that application (ACS State and Local Solutions). Dependencies on ACS will exist in the project budget, project transition plan, and development / implementation schedule.

As part of the demonstration implementation, it is important that all necessary modifications are made in such a manner that they can operate in parallel with the current system, without disrupting processing for those locations where video tolling has not been implemented. Modifications must also be reversible, to allow for the possibility that BATA might decide after the demonstration project not to proceed with full-scale implementation.

Several areas of analysis were included in the Task 5.0 deliverable with regard to systems and infrastructure modifications outside of Vector. These include image storage and transmission capacities across the Interface Server, DMV Server, and associated infrastructure, image review capabilities, and actions necessary to maintain the current ATCAS as the system of record for toll transaction data.

In addition to areas noted above, the ACS Vector system will require other modifications to support video tolling, based on the option(s) pursued. **Table 4** below provides a summary of these modifications.

Table 4: Potential System Modifications for Video Tolling

System Modification Matrix			
VT Option	**Option 1 / VT1: REG/PRE/BAL**	**Option 2 / VT2: REG/PRE/CC**	**Option 3 / VT3: UNREG/POST**
System Function			
Account Registration Capabilities	Add the ability for a customer to register via all current registration methods, resulting in a new or updated VT1 account.	Add the ability for a customer to register via all current registration methods, resulting in a new or updated VT2 account.	N/A
Account Creation	Add the ability for the system to create a new VT1 account based on the customer's registration information.	Add the ability for the system to create a new VT2 account based on the customer's registration information.	Add the ability for the system to create new VT3 accounts based on DMV name/address information returned for transactions not automatically postable to any other type of account.
Account Structure	Configure the VT1 account to allow only registration of vehicles with no transponders, and to require a $10 initial account balance, a $5 minimum account balance, and a method of replenishment.	Configure the VT2 account to allow only registration of vehicles with no transponders, to require no account balance or method of replenishment, but to require either a valid credit or PINless debit card to which toll transactions can be charged as they occur.	Configure the VT3 account to allow for automatic system registration of vehicles with no transponders, and to require no account balance or method of replenishment.
Transaction Processing	Add the ability for the system to check transactions not automatically postable to ETC accounts against VT1 accounts, and to post the transaction to and debit the transaction amount from a matching account.	Add the ability for the system to check transactions not postable to ETC or VT1 accounts against VT2 accounts, and to charge the credit / debit card on file in the matching account for the transactions.	Add the ability for the system to check transactions not postable to ETC, VT1, or VT2 accounts against existing VT3 accounts, and to post the transactions to the matching account for later invoicing.
Exception Processing	Add the ability for the system to handle pre-defined exceptions to VT1 transaction processing, such as inadequate account funding, failure of replenishment methods for the account, and potential VT1 suspension by plate instead of transponder.	Add the ability for the system to handle pre-defined exceptions to VT2 transaction processing, such as the failure of the credit / debit card on file and potential VT2 suspension by plate instead of transponder.	N/A

Account Conversion Capabilities	Add the ability for a customer or CSR to convert a VT1 account to a new or existing FasTrak account, requiring the additional information and/or payments required, and the ability for the CSR or system to waive or modify associated fees according to pre-determined rules.	Add the ability for a customer or a CSR to convert a VT2 account to a new or existing VT1 or FasTrak account, requiring the additional information and/or payments required, and the ability for the CSR or system to waive or modify associated fees according to pre-determined rules.	Add the ability for a customer or a CSR to convert their VT3 account to a new or existing VT2, VT1, or FasTrak account, requiring the additional information and/or payments required, and the ability for the CSR or system to waive or modify associated fees according to pre-determined rules.
DMV Lookup	N/A	N/A	Add the ability for the system to route license plate information from transactions not automatically postable to any existing account to DMV for retrieval of registered owner name/address data, and then use that data in the automatic creation of new VT3 accounts.
Account Invoicing	N/A	N/A	Establish invoicing cycles within the system conforming to BATA's desired invoicing period, and the ability of the system to generate video tolling invoices according to those cycles.
Invoice Delivery	N/A	N/A	Add the ability for the system to support printing and mail delivery of video toll invoices based on the account information.
Invoice Aging	N/A	N/A	Add the ability for the system to track issued invoices and trigger subsequent violation notices and activity based on the age of the issued invoice on which a transaction was listed.
Undeliverable Invoice Handling	N/A	N/A	Add the ability for the system to accept and track information related to undeliverable name / address information on invoices.

Invoice Payment Processing	N/A	N/A	Add the ability for the system to accept payments in all acceptable forms for VT3 invoice charges, and to update the status of associated VT3 account balances and transactions. Include the user interfaces necessary for back office personnel to process, post, and track those payments.
Conversion to Violations	Ensure that the system processes routes unpaid / unpostable transactions into either VT3 or violations processing, if VT3 is not implemented.	Ensure that the system processes routes unpaid / unpostable transactions into either VT3 or violations processing, if VT3 is not implemented.	Add the ability for the system to convert video tolled transactions into violation transactions based on the age of the associated issued invoice, and to initiate the violations noticing process for those transactions.
Customer Service	Add the ability for CSRs to view and modify VT1 account information according to pre-defined rules from system screens, in response to calls, email, mail, fax, or walk-in communication with customers.	Add the ability for CSRs to view and modify VT2 account information according to pre-defined rules from system screens, in response to calls, email, mail, fax, or walk-in communication with customers.	Add the ability for CSRs to view and modify VT3 account information according to pre-defined rules from system screens, in response to calls, email, mail, fax, or walk-in communication with customers.
Web Interfaces	Add the ability for customers to access their VT1 accounts online, including the ability to view and print current transactions and payments, statements and receipts, the ability to change customer, vehicle, and payment method information, and the ability to convert their account to a FasTrak account.	Add the ability for customers to access their VT2 accounts online, including the ability to view and print current transactions and payments, statements and receipts, the ability to change customer, vehicle, and payment method information, and the ability to convert their account to a VT1 or FasTrak account.	Add the ability for customers to access their VT3 accounts online, including the ability to view and print current transactions, invoices, payments, and transactions moved to violations, the ability to change customer information, the ability to convert their account to a VT1, VT2, or FasTrak account, and the ability to make invoice payments.
IVR Interfaces	Add the ability for customers to access their VT1 accounts by phone to check transaction, balance, and payment information, to modify customer, vehicle, and payment method information, where possible, and to convert their account to a FasTrak account.	Add the ability for customers to access their VT2 accounts by phone to check transaction and payment information, to modify customer, vehicle, and payment method information, where possible, and to convert their account to a VT1 or FasTrak account.	Add the ability for customers to access their VT3 accounts by phone to check balance and payment information, to modify customer information, where possible, and to convert their account to a VT1, VT2, or FasTrak account.

Video Tolling Fees	Add the ability for the system to store and modify a VT1-associated administrative fee, and to apply an administrative fee per individual VT1 transaction.	Add the ability for the system to store and modify a VT2-associated administrative fee, and to apply an administrative fee per individual VT2 transaction.	Add the ability for the system to store and modify a VT3-associated administrative fee, and to apply an administrative fee per individual VT3 transaction and/or VT3 invoice.
Integration with Other Systems	Add the necessary interfaces to connect video toll processing to other systems, if any are required beyond those currently in place.	Add the necessary interfaces to connect video toll processing to other systems, if any are required beyond those currently in place.	Add the necessary interfaces to connect video toll processing to other systems, if any are required beyond those currently in place.
Report Modifications	Make revisions across the system, including lane / transaction-related data, back office processing data, and associated financial data, to support both separate and integrated reporting on VT1 activity.	Make revisions across the system, including lane / transaction-related data, back office processing data, and associated financial data, to support both separate and integrated reporting on VT2 activity.	Make revisions across the system, including lane / transaction-related data, back office processing data, and associated financial data, to support both separate and integrated reporting on VT3 activity.
Logging and Audit Data	Make revisions across the system to support auditability of all new and revised VT1 system functions.	Make revisions across the system to support auditability of all new and revised VT2 system functions.	Make revisions across the system to support auditability of all new and revised VT3 system functions.
User Security	Make system and/or configuration modifications necessary to provide appropriate user access to new and revised VT1 functions.	Make system and/or configuration modifications necessary to provide appropriate user access to new and revised VT2 functions.	Make system and/or configuration modifications necessary to provide appropriate user access to new and revised VT3 functions.

Appendix A: Revised Video Tolling Definitions

Category	Identifier	Other Names	Registration	Pre-/Post-Paid	Tag	Transaction Posted By	Invoiced	Terms
ETC	ETC	Standard ETC	Pre-Reg	Pre-Paid	Tag Read	Tag	No	Standard ETC transaction, posted directly to a valid transponder-based account.
	REG/PRE/READ	V-Tolling (TxDOT); V-Tolling / Violation tolling (BATA)	Pre-Reg	Pre-Paid	Tag Read	Tag	No	Tag is read on invalid transponder-based account (in lane); Account becomes valid between toll transaction creation and transaction posting (e.g., account is replenished, other issues are cleared up). System posts transaction to valid account.
	REG/PRE/NORD	I-Tolling (Image tolling) (TxDOT, BATA); Pay by Plate (TxDOT); V Tolling (General industry)	Pre-Reg	Pre-Paid	Tag Exists, but No Tag Read	Image / Plate	No	After image review or thru the sweep process, license plate matches a plate associated with a valid transponder-based account. System posts transaction to matched account.
		M-tolling (Manual tolling) (TxDOT); V-Tolling (General industry)	Pre-Reg	Pre-Paid	Varies	Manual Correlation	No	Customer calls CSC to clear up account issue that resulted in an invoice or violation. CS Rep manually posts transaction to account.
VT-PRE	Option 1: REG/PRE/BAL	Pay by Plate, I-Tolling (TxDOT); Toll by Plate (FTE), Pre-Registered Video Tolling (NCTA)	Pre-Reg	Pre-Paid	No Tag	Image / Plate	No	Same as REG/PRE/NORD, but associated account is not transponder-based. Only possible where agency allows creation of license plate-based accounts, with no transponders. May be referred to as I-Tolling / Pay by Plate because system will post transactions in the same manner. May also be specified for use by a specific type of customer (e.g., fleet, rental company, etc.) or a specific duration (e.g., day pass).
	Option 2: REG/PRE/CC	Pay by Plate, I-Tolling (TxDOT); Toll by Plate (FTE), Pre-Registered Video Tolling (NCTA)	Pre-Reg	Credit Card-Paid	No Tag	Image / Plate	No	Same as REG/PRE/BAL, but associated account does not require a minimum balance. Instead transactions are charged directly to a credit/debit card. May be referred to as I-Tolling / Pay by Plate because system will post transactions in the same manner. May also be specified for use by a specific type of customer (e.g., fleet, rental company, etc.) or a specific duration (e.g., day pass).
VT-POST	REG/POST	Fleet Tolling (MDX)	Pre-Reg	Post-Paid	No Tag	Image / Plate	Yes	Same as REG/PRE, but not requiring customer pre-payment. Meant to capture audience that doesn't want tag, infrequent user that doesn't want money held on account, etc. May also be specified for use by a specific type of customer (e.g., fleet, rental company, etc.).
	Option 3: UNREG/POST	Video Tolling (ETR 407); Video Billing, Pay by Mail (TxDOT); Unregistered Video Tolling (NCTA)	Un-Reg	Post-Paid	No Tag	Image / Plate	Yes	After image review, license plate does not match any existing account, or matches an existing license plate-based account. If no account, a new plate-based account is created using customer name/address retrieved from DMV. Transactions are invoiced and customer pays in arrears. These are the remainder of the "violators", accidental / occasional and intentional, but are given the option of acting as "customers" and paying an invoice first.
RENTAL	RENTAL	Rental Car Tolling; Third Party Video Tolling	Un-Reg	Post-Paid	No Tag	Image / Plate	Varies	Process dependent on agreement negotiated between agency and third-party provider. Services currently provided by ATS/PlatePass, Rent a Toll, various rental car companies.

Appendix B:
BATA Video Tolling Business Rules

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1.0 Introduction

This document includes the compilation and documentation of the Bay Area Toll Authority (BATA) Video Tolling Business Rules. These business rules shall serve as guidelines for daily operations of BATA's toll facilities, supported by the Advanced Toll Collection and Accounting System (ATCAS) and the new Violation Enforcement System (VES), and BATA's FasTrak® Customer Service Center (CSC), supported by the ACS Vector system. BATA's systems and operations shall provide a place and process in which customers' video toll accounts can be established, serviced and maintained according to the following policies and rules.

The business rules for BATA's video tolling operation will be further developed within this document as the demonstration project and any subsequent operation is designed, deployed, operated, and maintained. As such, it will be updated as BATA's policies and rules evolve, and may at some point be separated from the project's task-oriented deliverables, becoming a stand-alone, living document.

2.0 FasTrak Customer Service Center (CSC)

BATA's FasTrak CSC and supporting ACS / Vector system shall be able to comply with and support the following business rules, which address the various components of the video tolling operation.

2.1 Account Types & Definitions

BATA's video tolling accounts will be characterized according to Revised Video Tolling Definitions, as included in Appendix A to the Task 3.0 deliverable.

2.2 VT1 Account Creation

In order to establish a VT1 account, a customer must provide the following information:

- Name
- Address
- Phone Number(s) – for customer contact (home, office, mobile)
- License Plate(s) – State and number/letters for each vehicle on the account
- PIN for account online and IVR access
- Notification Delivery Method preference (mail or email)
- Email Address (optional, or required if selected for preferred notification method)
- Payment Method
- Replenishment Method
- Signature verbiage and line for pre-authorized payment

The CSC shall automatically assign an appropriate account number to the account. Once a customer establishes an account, the account shall be immediately available for use. The CSC shall support a four digit Personal Identification Number (PIN) associated with the account for the customer to access account information via the website and call center. Applications containing incomplete required fields shall not be processed.

2.3 VT2 Account Creation

In order to establish a VT2 Account, a customer must provide the following information:

- Name
- Address
- Phone Number – for customer contact (home, office, mobile)

- License Plate(s) – State and number/letters for each vehicle on the account
- PIN for account online and IVR access
- Notification delivery method preference (mail or email)
- Email Address (optional, or required if selected for preferred notification method)
- Credit / debit card information for toll transaction payment
- Signature verbiage and line for pre-authorized payment

The CSC shall automatically assign an appropriate account number to the account. Once a customer establishes an account, the account shall be immediately available for use. The CSC shall support a four digit Personal Identification Number (PIN) associated with the account for the customer to access account information via the website and call center. Applications that contain incomplete required fields shall not be processed.

2.4 VT3 Account Creation

A new VT3 account shall be created using the license plate number captured in the transaction image and the associated registered owner's name and address information retrieved from the DMV. The system shall post the current transaction containing this license plate number to the new VT3 account. Because the system creates the VT3 account, each VT3 account can include only one vehicle. A VT3 account should never be created for a license plate already listed on any other type of account.

2.5 License Plate Image Processing

When a vehicle passes through a bridge toll lane without either paying cash or registering a valid transponder read, the VES shall capture images of both the vehicle's front and rear license plates for use in video tolling and subsequent violation enforcement. The system will utilize Optical Character Recognition (OCR) to read all license plate images prior to manual image review. BATA may choose to allow image reads with confidence ratings above a pre-determined level to pass through to transaction processing without human review. For those not passed through in this manner, up to four images shall be transmitted to the CSC for review for each video toll transaction. Images shall be manually reviewed for license plate and state identification and the license plate number used for video toll transaction processing. Images rejected during the review process shall be categorized and reported to BATA.

2.6 Initial Transaction Processing

The system shall attempt to post all imaged transactions to FasTrak accounts through a license plate matching process. If matched to a license plate currently listed on an existing FasTrak account, these transactions will be posted as I-Tolls (if the tag was not read in the lane) or V-Tolls (if the tag was read and the account was not in good standing when the transaction was created, but the account is funded and in good standing by the time the transaction posts).

If a matching FasTrak account is not found, the system shall attempt to post the transaction to VT1 accounts. If a matching license plate number is not found within the VT1 accounts, the system shall attempt to post the transaction to VT2 accounts. If a matching license plate number is not found within the VT2 accounts, the system shall attempt to post the transaction to VT3 accounts.

2.7 DMV Lookup

If a transaction cannot be posted to an existing FasTrak, VT1, VT2, or VT3 account, the vehicle's license plate number shall be forwarded electronically to the DMV to obtain the

registered owner's name and address. Only the first VT3 transaction for a customer's license plate shall be sent to DMV for account creation. Once a license plate number is associated with an existing FasTrak, VT1, VT2, or VT3 account, DMV lookup is no longer required.

In addition to in state DMV database lookups, BATA shall have the ability to use other agency or commercially available databases to identify out of state license plates. This capability is under development and is expected to be available in September 2008.

2.8 Account Conversion

With each invoice, VT3 customers will be given the opportunity to convert their video tolling account to other video tolling account types offered by BATA, or to a FasTrak account, at any time. The CSC shall accommodate customers and encourage them to undertake this process.

VT2 accounts can be converted to VT1 or FasTrak accounts. VT1 accounts can be converted to FasTrak accounts. This process could be communicated via public education and marketing information, information on account statements, and conversion links on account maintenance / review web pages.

VT3 accounts can be converted to VT2, VT1, or FasTrak accounts. Since VT3 customers receive communications about their transactions through an invoice, their options for conversion would be included on or with the invoice, leading them to initiate conversion activity via the mail, phone, walk-in, or website.

In each case, the system shall automatically adjust the administrative fees for outstanding transactions on the current account to the fee amounts associated with the new account type. The required information for the new account type shall be entered by the customer or assisting CSR prior to conversion, or the process shall not be initiated or completed within the system.

Customers shall be required to provide appropriate identification when converting their video tolling accounts. This may be accomplished through a PIN, password, or other means of verification determined to be acceptable by BATA. Account information shall only be released to the account holders or authorized users.

2.9 Payment Methods

2.9.1 General

The CSC shall accommodate and support payments for all account types through the same interfaces as with FasTrak, as follows:

- CSC walk-in center – Credit / debit card, check, or cash
- CSC phone – Credit / debit card
- Web – Credit / debit card
- Fax – Credit / debit card
- Mail – check or credit/debit card

2.9.2 Credit Card

The CSC shall accept the same major credit cards that are accepted for FasTrak, as follows:

- Visa
- Master Card
- American Express

- Discover

Manual credit card payments shall be processed at the CSC. The FasTrak website shall require that the customer provide a valid credit card number, expiration date, and three-digit security code number from the back of the card when using a credit card as a payment method.

2.9.3 Debit Card

Currently, a debit card that does not require a PIN for payment is supported by the CSC payment processing unit and website. As with FasTrak, manual debit card payments shall be processed at the CSC. The FasTrak website shall require that the customer provide a valid debit card number, expiration date and three-digit security code number from the back of the card when using a debit card as a payment method.

2.9.4 Cash and Check

Cash and check payment methods shall be supported by the CSC payment processing unit. In the event that a partial payment is received in the mail, payment will be applied to the oldest transactions, skipping any transactions in dispute until they are resolved.

2.10 VT1 Account Replenishment

The CSC shall support both automatic and manual replenishment of VT1 Accounts. If the customer selects the Automatic Replenishment feature, the customer will be required to acknowledge and approve the Customer Agreement which will include the right to charge to the credit/debit card if that payment method is selected.

After a VT1 account has been set up, the customer can go into their account andprovide a secondary credit/debit card to be used if the primary card fails.

2.10.1 Replenishment Threshold

The replenishment threshold for VT1 accounts using a credit / debit card for automatic replenishment is $5.00 per vehicle. Once the account reaches the $5.00 level, the system will automatically charge the established replenishment amount to the customer's credit/debit card.

The replenishment threshold for VT1 accounts using cash / check payment for manual replenishment is $10.00 per vehicle. Cash/check customers are responsible for keeping their account current, but the FasTrak program will attempt to notify them in accordance with current policies.

2.10.2 Replenishment Amount

VT1 customers that have signed up for Automatic Replenishment must keep an active credit/debit card on file and are charged, at minimum, $10.00 per vehicle to replenish their account when it reaches the threshold amount as established in the previous section. The system will automatically perform account analysis to calculate the 1-month average toll usage based on the previous 90 days usage, adjust the replenishment amount to correspond with the usage rate, and charge the customer's credit/debit card the resulting amount when they reach the threshold, approximately once a month.

Cash/check customers are responsible for keeping their account current. Cash customers will be charged, at minimum, $20.00 per vehicle to replenish their account when it reaches the threshold amount as established in the previous section. The System will automatically perform

account analysis to calculate the 45-day average toll usage based on previous 90 days, adjust the replenishment amount to correspond with the usage rate, and require the customer to submit the resulting amount when they reach the threshold, approximately once a month.

2.11 VT2 Transaction Payment

The credit / debit card provided by a VT2 customer at registration will automatically be charged the amount of the customer's tolls for each day.

After a VT2 account has been set up, the VT2 customer can go into their account and provide a secondary credit/debit card to be used if the primary card fails.

2.12 VT1 and VT2 Account Statements

As with FasTrak, the CSC shall support quarterly or monthly statements to be mailed or emailed to all VT1 and VT2 customers. The system shall electronically store statement history for each account online. These statements shall be stored according to BATA's retention policy and readily accessible by any CSR. Prior and current monthly account statements shall be accessible by Video Account holders online via the interactive website.

All email statements (monthly or quarterly) and quarterly paper statements shall be free. For all other statements, fees will be assessed. Statement information will be available for free on the FasTrak website.

Although VT3 customers will not receive paper or emailed statements, they will be able to access transaction and invoice information and pay invoices from the website, based on information included on their invoices.

2.13 VT3 Video Tolling Invoices

The CSC shall support the generation and mailing of invoices to VT3 account customers.

The customer shall have 15 days from the invoice date to respond with payment or disputes. If the customer does not respond within the 15-day time period, the system shall convert the unpaid transactions on that invoice to violations and initiate violation processing for each violation transaction.

Each VT3 invoice shall list the itemized transactions for the invoice period, and shall include the following information:

- Invoice period begin and end dates
- Date, time and location each transaction occurred, for each license plate on the account, within the stated invoice period date
- Transaction posting date
- Toll rate billed for each transaction
- Associated fee(s) for each transaction
- Total amount due for all transactions within the stated invoice period
- Total invoice fee due
- Total amount due on the account (total transaction and fee amounts for the period)
- Payment method options
- CSC contact information (address, phone number, and web address)
- Previous payments received

- Note informing customers that any unpaid invoices will be converted to violations, and penalties will be assessed
- Defense Affidavit
- Payment coupon with credit card/debit card authorization
- Instructions on how to convert to other account types offered by BATA

Transactions shall be reflected on the customer's video tolling invoice based on the dates when they were posted to the customer's account, which may not necessarily be the same as the date the transactions occurred. However, the transaction detail will reflect the date the transaction occurred.

Customers shall be charged a fee per transaction, which shall be itemized and included in the customer's monthly invoice total. Invoices for all VT3 accounts shall be batch-generated for mailing once every month.

2.14 Fees and Charges

Each type of Video Account is subject to all of the fees shown in the following table:

Account Type	Fees Subject to
VT1 Account	Video Toll Processing Fee
	Additional Statement Fee
	Bad Check Fee
VT2 Account	Video Toll Processing Fee
	Additional Statement Fee
	Bad Check Fee
VT3 Account	Video Toll Processing Fee
	Invoice Processing Fee
	Bad Check Fee

Table 2 – Video Account Fees and Charges

The CSC shall support all of the fees as indicated below:

- Video Toll Processing Fee – Each video toll transaction shall be charged a transaction fee to cover operational expenses.
- Additional Statement Fee – As with FasTrak, emailed (monthly or quarterly) statements and paper (quarterly) statements shall be sent at no charge. Monthly paper statements may be mailed to VT1 and VT2 customers upon request for a charge of $1.00 for monthly paper statement, $1.00 for statement regeneration, and $7.00 for disk.
- Invoice Processing Fee – The fee applies to VT3 accounts to cover additional operational expenses for initial DMV lookup and account creation, plus monthly invoicing and payment processing costs.
- Bad Check Fee – A $25 fee imposed by the CSC should a customer's check be returned to the CSC due to insufficient funds.

All fees associated with video tolling accounts shall be configurable system parameters. All fees and transaction charges shall be automatically billed to all video tolling account holders.

BATA approved guidelines shall be followed in waiving of fees. A customer must contest the imposition of a fee or charge in writing before a fee can be waived.

- If a contested fee or charge is rescinded for a customer's credit/debit card payments, the rescinded amount shall be credited back to the customer's account or credit/debit card, in accordance with BATA's policies.
- If a contested fee or charge is rescinded for a customer's cash / check / money order payments, the credited amount of the rescinded fee shall be credited to the customer's account or mailed to the address on file for the customer's account, in accordance with BATA's policies.

2.15 Accounts Adjustments & Credits

The CSC shall allow credits and/or adjustments to tolls by authorized personnel, according to rules established by BATA. As with FasTrak, all requests for toll credits and/or adjustments must be made in writing within 30 days of the transaction date.

2.16 Customer Service

The CSC shall accommodate processing video tolling related customer service functions through the following interfaces:

- CSC walk-in center
- CSC phone
- Website
- Fax
- Mail

2.17 Account Maintenance

2.17.1 General

It is the customer's responsibility to notify the CSC any time there are changes in their account information. Customers may change their account information by contacting the CSC (via walk-in center, phone, web, mail, or fax). The system will provide acceptable security and allow customers to review the status of their accounts, update their information, and contact the CSC with questions or comments.

The CSC shall support customer account maintenance functions for all Video Account types via the following interfaces:

- CSC walk-in center
- CSC phone
- Web
- Fax
- Mail

2.17.2 Account Notifications

As with FasTrak, video tolling account maintenance notifications shall be sent to the customers by mail, or possibly by email in the future. Credit card expiration notification shall be mailed to customers one (1) month prior to the card expiration. Credit card and debit card failure notifications shall be mailed to a customer if the credit / debit card the CSC has on file for the account fails. Other notifications shall be mailed as required by BATA.

2.18 Accounts Closures and Refunds

As with FasTrak, a customer wishing to close their video tolling account shall be required to contact the CSC to request that their account be closed.

The letter must contain the customer's account information, including any required security identification. A new Account Closure Form shall be created for video tolling customers, or the existing form shall be revised.

The account closure request will be manually processed by a CSR. The account closure process will be initiated upon receipt of the request, and the account will be invalid for transactions created after that date. A waiting period of two weeks will be required to ensure that all transactions created prior to the closure date have been processed through the account before closing.

Any balance remaining on VT1 accounts after the two week waiting period will be mailed to the address on file for the account.

Accounts still open after one year with no activity shall be automatically closed by the system. Any balance remaining on a closed VT1 account shall be mailed to the address on file for the account.

2.19 Reports

The CSC system application shall provide complete operational and financial reports for all video tolling accounts. This shall include separate reports specific to video tolling account types, as well as integrated reports reflecting video tolling activity in the context of all transaction activity.

3.0 Violation Enforcement Processing

The violation enforcement process will not change based on the inclusion of video tolling, with the exception of process initiation.

Because video tolling transactions will be processed prior to violations, transactions will not be considered violations until they remain unpaid 15 days after the invoice date on which they were included. At that point, each unpaid transaction moves from the video tolling account to a violation account, becomes a separate violation transaction, and processing proceeds in the same manner as is currently done.

4.0 Terms, Acronyms, Abbreviations & Definitions

The following abbreviations, acronyms, and terms are used in this document:

Term/Abbreviation	Definition
Account Analysis	Analysis conducted on a customer account to review the frequency and amount used with automatic replenishment.
Administrative Fee	Any fee that is imposed by BATA for the processing of a video tolling transaction.
BATA	Bay Area Toll Authority
CSC	**Customer Service Center.** The facility that establishes and maintains accounts for BATA FasTrak® and video tolling account customers.
Defense Affidavit	Form used to request a dismissal or reassignment of a video toll transaction. A defense affidavit is used when the customer believes that the transaction was charged in error or that a valid reason exists for not paying it, including prior sale of the vehicle, vehicle rented or leased by another party, or a stolen vehicle.
Operator	Any person who is in actual physical control of a vehicle.
Registered Owner	Any person who holds legal title to a vehicle or a person who is a conditional vendee, lessee, or mortgagor of a vehicle. A person is a conditional vendee, lessee, or mortgagee when that person is in possession of a vehicle that is the subject of an agreement for the conditional sale or lease thereof with the right of purchase upon performance of the conditions stated in the agreement and with an immediate right of possession vested in the conditional vendee or lessee or, in the event a mortgagor of a vehicle, is entitled to such possession.
Toll Amount	The amount of money due to BATA based on the toll schedule.
Valid FasTrak Customer	A holder of a valid FasTrak account in good standing (i.e. a balance above a CSC established minimum). The customer may be a BATA customer or a customer of a system for which a reciprocity agreement is in effect.
VES	**Violation Enforcement System.** The equipment and processes used to capture electronic images of potentially violating vehicles.
Violation	Passage of a vehicle through at toll lane without proper payment.

ATTACHMENT D:

Task 4.0 Facilities Review

Technical Memorandum – Final Report

BATA Video Tolling Demonstration Project

Task 4.0: Facilities Review

August 15, 2008

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DOCUMENT CONTROL PANEL		
File Name:	*Technical Memorandum – Facility Review*	
File Location:		
Deliverable Number:	4.1	
Version Number:	4	
Name		**Date**
Created By:	Smith	5/13/08
Reviewed By:	Johns, Wuestefeld	5/14/08
	L. Lee	5/26/08
	Dillard	5/29/08
	Moradi	6/9/08
	Dillard	6/16/08
	Bausher	6/26/08
	L. Lee	7/7/08
	L. Lee	8/4/08
Modified By:	Smith	6/6/08
	Johns	6/16/08
	Johns	6/24/08
	Dillard, Bausher, Yang	6/26/08
	Dillard, Yang	7/11/08
	Johns	7/24/08
Completed By:	Dillard	8/15/08

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1.0 Introduction

1.1 Purpose of Memorandum

This Technical Memorandum provides a review of toll plaza facilities serving the following seven state-owned bridges administered by BATA, as shown in Figure 1-1:

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

The primary intent of the facility review is to document existing conditions and identify potential physical limitations, constraints and restrictions that may affect the implementation of video tolling at any one of these seven facilities. The key elements reviewed include plaza geometrics, lane equipment, traffic data, and other video tolling related observations noted during the site visits.

This review will help determine the potential ease or the level of difficulty for an initial demonstration project implementation, with the overriding consideration of avoiding changes to the existing lane and plaza equipment wherever possible. The sole exception to that intent is the replacement of the existing violation enforcement system (VES), which is already in progress under separate contract. The new VES will include lane LPR (License Plate Recognition) processors for each lane and a violation network server (VNS) for each plaza that connects to an existing Interface Server. A contract has been awarded to TRMI Systems Integration for procurement of the new VES, which will include the installation of front cameras in all lanes. Upon successful completion of the TRMI Contract, each lane is expected to be capable and enabled to perform video tolling. Associated software and database table modifications to the existing Interface Server and the Regional Customer Service Center (RCSC) system, which processes electronic toll collection (ETC) and violation transactions, will be addressed under another task.

This Technical Memorandum therefore provides an initial identification of physical constraints that could impact video tolling on the seven bridges. The identified constraints will be factored into bridge selection recommendations for the demonstration project in Task 8.0.

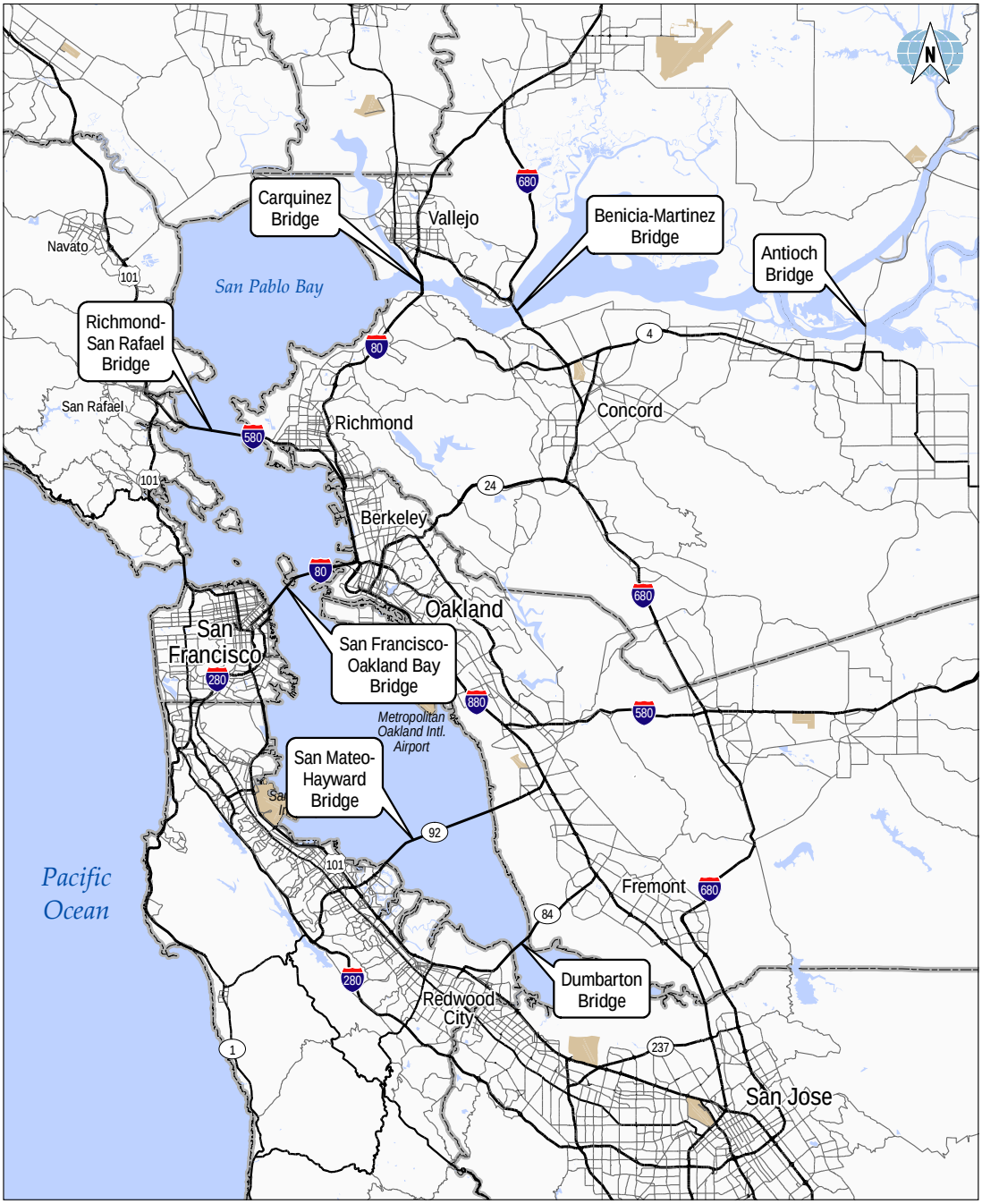


Figure 1-1: Facility Location Map

1.2 General Methodology

The Task 4.0 Technical Memorandum is organized to first discuss the various data elements collected and analyzed during the review. This discussion establishes past and current use of each plaza facility, plaza capacity constraints, FasTrak® program participation, and travel time savings. The second area of focus is a technical review of each facility, documenting design elements, geographic layouts, installed equipment, and identification of potential issues for video tolling implementation.

Each plaza facility services three primary user groups, distinguished by the method of payment: Cash, ETC, and Violations (i.e., v-tolls, i-tolls, violations, and uncollectables). Data collected by BATA was used to establish the percentage distribution of these three payment types at each toll plaza. The assessment was limited to peak periods (5:00 to 10:00 am and 3:00 to 7:00 pm weekdays) in order to focus on the highest levels of congestion. During peak periods, drivers will expect the most visible relief from queues and congestion, and thus will also be more likely to pay by video tolling, even at a premium rate. This section also includes commentary regarding the potential shifts between transaction type categories with the addition of video tolling.

ETC toll booth and ETC approach lane capacities were analyzed based on recent toll plaza traffic counts and industry-standard maximum throughput capacities. This is necessary to ensure that any increase of traffic through the ETC lanes, as a result of video tolling, could be accommodated. Where capacity constraints will not allow for potential video toll-related growth, other mitigating measures may be required.

FasTrak market penetration data was analyzed for each toll plaza to identify current growth trends. Available monthly data for net FasTrak account openings (i.e., new account openings minus account closures) was analyzed from 2004 to 2008. This information provides a baseline for assessing the affect video tolling may have on future FasTrak enrollments.

Comparing travel time data before and after implementation of the video tolling demonstration will provide a means of assessing impacts to the operating performance of each facility. Travel time data was collected by BATA as part of the FasTrak Strategic Plan implementation. It is assumed that the travel time experienced by a video toll patron will be similar to that of a FasTrak patron, since it is likely that video tolling vehicles will use the ETC lanes. The baselines established in this document will be used to assess the impacts of the video tolling implementation.

The facility review included toll plaza site reconnaissance to document existing conditions at each existing plaza facility using photographs, drawings and notes. Digital pictures were used to prepare detailed cash and FasTrak lane drawings showing location and juxtaposition of all installed signs, toll and surveillance equipment. Digital pictures, as-built drawings and commercial mapping sources were used to prepare bridge toll plaza layouts, including approach and departure mainline lanes. These drawings depict plaza geometrics and through lanes onto the bridge structure. The same sources of information were used to

prepare plan and elevation views of plaza lane configurations at the time of the facility review. These drawings, in conjunction with the detailed lane layout drawings, show vertical and horizontal clearances and the means used to channelize traffic. Appendices C through I contain the detailed facility drawings for each toll facility. Any potential issues posed by the existing plaza facilities for video tolling, assuming the successful completion of the VES Replacement contract, are addressed in detail in Section 3.0 of the report.

2.0 Data Collection and Review

2.1 Toll Plaza Peak Period Transactions

Allocating current drivers into cash, FasTrak and violations establishes the potential pool from which prospective video tolling customers will emerge. Each group has unique characteristics that will affect their travel decisions. Table 1 presents a summary of peak period percentages for Cash, FasTrak and Violation transactions for each toll plaza, based on April 2008 data provided by BATA. This data does not include HOV traffic. Weekday peak periods are defined for the purposes of this report to be 5:00 – 10:00 am and 3:00 – 7:00 pm.

A few key observations related to peak period data:

- The weekday peak period percentage of FasTrak transactions exceeds 50% for the four toll plazas nearest to the metropolitan areas (San Francisco-Oakland Bay, Dumbarton, Richmond-San Rafael, and San Mateo-Hayward). ETC penetration drops off on the East Bay facilities (Carquinez, Benicia-Martinez, and Antioch), as those roadways enter more rural areas. Of these three, Benicia-Martinez has the highest ETC percentage, most likely due to the new Open Road Tolling (ORT) lanes that were implemented in August 2007.

- The average weekday Violation rate for the seven toll plazas is 10.4%, of which approximately 2.8% are “true violations” (i.e., noticed violations plus uncollectables). The remainder is comprised of v-tolls and i-tolls (transactions posted to FasTrak accounts by plate number, including failed tag reads). With the implementation of the new VES, the percentage of collectable violation transactions (the “capture rate”) could be expected to increase, as image legibility and violation transaction handling are expected to significantly improve. The addition of front license plate image capture via the deployment of front cameras should also have a positive impact, by allowing for an additional attempt at the identification of a vehicle when the back plate is unreadable.

- The average Violation rate at the Benicia-Martinez Bridge toll plaza is the highest at 12.6%, compared to the 9 to 11% range of the other facilities. This is due to lane equipment issues identified with the implementation of the new ORT lanes. BATA has been working closely with the transponder reader manufacturer to resolve the problem.

Table 1: Transaction Type Distribution (Peak Period)

Toll Plaza	Time Period	Date	Percent Cash Transactions	Percent FasTrak Transactions	Percent Violations
Antioch	Weekday (PM Peak Period*)	4/15/2008	55.6%	35.1%	9.3%
Benicia - Martinez	Weekday (PM Peak Period*)	4/15/2008	38.7%	48.6%	12.6%
Carquinez	Weekday (PM Peak Period*)	4/15/2008	47.9%	42.5%	9.6%
Dumbarton	Weekday (AM Peak Period*)	4/15/2008	35.4%	55.4%	9.2%
Richmond - San Rafael	Weekday (AM Peak Period*)	4/15/2008	39.8%	49.7%	10.5%
San Francisco-Oakland Bay	Weekday (AM Peak Period*)	4/15/2008	35.4%	55.6%	9.1%
San Francisco-Oakland Bay	Weekday (PM Peak Period*)	4/15/2008	39.6%	50.2%	10.2%
San Mateo - Hayward	Weekday (AM Peak Period*)	4/15/2008	33.7%	53.7%	12.5%
Weekday Averages			**40.9%**	**48.7%**	**10.4%**

* AM Peak Period based on hours of 5:00 - 10:00 AM, and PM Peak Period based on hours of 3:00 - 7:00 PM.

Note: Data does not include HOV traffic.

This data establishes a baseline for the distribution of traffic in the current environment, which can be compared to the same data after video tolling is implemented in order to assess impacts.

Projected values and estimated costs will be provided as part of the Task 3.0 Concept of Operations and Task 6.0 Financial Impact Analysis.

2.2 Toll Plaza Capacity Data and Analysis

Another aspect of BATA's toll operation that warrants analysis is the reserve capacity available in the ETC booths and associated ETC approach lanes. In light of the project's congestion relief objective, it is especially important not to introduce measures that might actually worsen traffic congestion, based on the constraints of the existing facilities.

To estimate reserve capacity levels, current peak period ETC data was analyzed. Appendix A, Toll Plaza Capacity Analysis, contains details of the analysis, and Table 2 below reflects a summary of the analysis results.

Table 2: Toll Plaza Capacity Summary (Peak Period)

Bridge	Peak Period	Peak Hour	Peak Hour Reserve ETC Booth Capacity	Peak Hour Reserve ETC Approach Lane Capacity
Antioch	3pm - 7pm	5:00 PM	79.6%	85.7%
Benicia-Martinez	3pm - 7pm	5:00 PM	30.5%	30.5%
Carquinez	3pm - 7pm	5:00 PM	52.6%	37.1%
Dumbarton	5am - 10am	8:00 AM	15.6%	1.5%
Richmond-San Rafael	5am - 10am	8:00 AM	35.9%	10.2%
SFOBB (from I-80/I-580)	5am - 10am	8:00 AM	see note [a]	see note [a]
	3pm - 7pm	5:00 PM	55.3%	21.7%
SFOBB (from I-880)	5am - 10am	8:00 AM	see note [a]	see note [a]
	3pm - 7pm	5:00 PM	69.8%	36.7%
San Mateo-Hayward	5am - 10am	8:00 AM	16.5%	41.6%

Note [a]: Due to metering lights during the AM peak hour, there is no reserve capacity at SFOBB.

The following considerations are important to note:

- Metering lights at the San Francisco-Oakland Bay Bridge (SFOBB) are turned on during the a.m. peak period. While metering is critical to the operation of the bridge, it also backs up traffic upstream into the SFOBB toll plaza and beyond, essentially negating the impact of any congestion relief measures attempted there. Metering lights are typically not turned on during the p.m. period.

- Peak period reserve capacities in the ETC booths at both the Dumbarton and San Mateo-Hayward Bridges are lower than the rest, indicating that these bridges are approaching maximum throughput capacity. Careful consideration should be given to keeping video tolling in balance with potential congestion on these facilities.

2.3 Existing FasTrak Data

2.3.1 Historical and Forecasted FasTrak Participation

Another means of monitoring video tolling impacts is to evaluate a baseline of historical and forecasted peak period ETC usage. This baseline can then be compared to ETC usage after video tolling implementation. Appendix B, FasTrak Trendlines, plots the historical percentages of peak period ETC usage from mid-May 2004 to mid-April 2008. A logarithmic trendline is used to project usage growth for each bridge out to May 2009. Table 3 provides a snapshot of the April 2008 actual to May 2009 projected ETC usage and the implied growth rate for each bridge toll plaza.

Table 3: Percentage Peak Period ETC Usage and Growth Rates

Toll Plaza	4/15/2008 ETC Usage	Projected (5/04/2009) ETC Usage	Yearly ETC Usage Growth Rate
Antioch	40.8%	45.0%	3.9%
Benicia-Martinez	56.9%	58.0%	1.0%
Carquinez	42.5%	46.0%	3.2%
Dumbarton	49.5%	50.0%	0.5%
Richmond-San Rafael	54.4%	58.0%	3.3%
San Mateo-Hayward	53.1%	54.0%	0.8%
San Francisco - Oakland Bay (AM Peak Period)	42.4%	50.0%	7.0%
San Francisco - Oakland Bay (PM Peak Period)	53.0%	61.0%	7.4%
Averages	**49.1%**	**52.8%**	**3.4%**

* Note: Both current and projected ETC usage data includes HOV traffic and violations.

2.3.2 Historical FasTrak Account Enrollments

In order to determine what impacts video tolling could have on the level of FasTrak enrollments in the future, a review of historical data is also necessary. Figure 2-1 shows the monthly net increase (new accounts minus closed accounts) in FasTrak accounts from April 2004 to April 2008. There were significant increases in net new accounts opened in July

2004, January 2007, and July 2007. The first two increases were due to toll rate increases and temporary toll discounts for FasTrak users, while the July 2007 increase was due to the major FasTrak improvements implemented as part of BATA's FasTrak Strategic Plan.

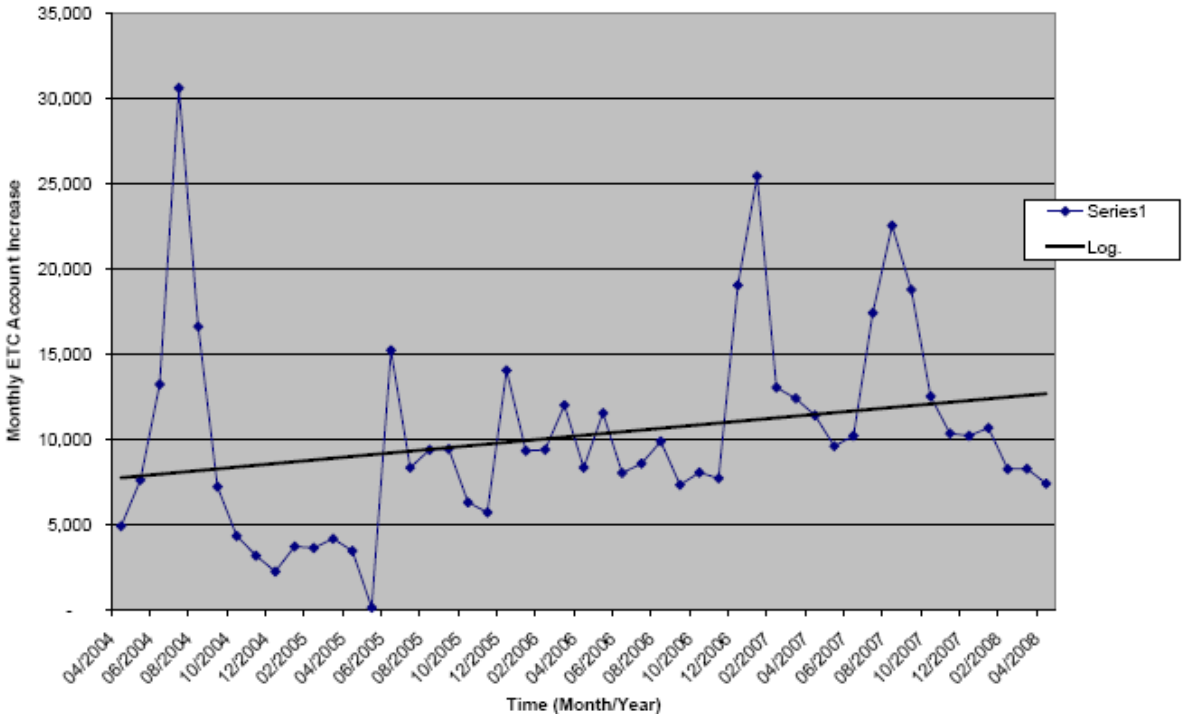


Figure 2-1: 2004 – 2008 Monthly ETC Account Net Increase

Care must be exercised when developing video tolling operating policies and procedures to protect the existing investment in FasTrak hardware, software, equipment and operational policies and procedures. Higher accuracy and lower transactional unit costs are distinct agency advantages of ETC over video tolling. However, this cost advantage can be negated by transponder inventory and fulfillment costs. Conversely, the user is predominately interested in lower toll and travel times and increased transaction convenience. Given the expected equality of travel time for FasTrak and video tolling users, a toll rate differential or associated video toll fee would provide a means of protecting the ETC investment.

Current FasTrak users who travel two or three times a month or less are considered at higher risk of converting to video tolling. For these infrequent FasTrak users, the customer would benefit from moving to video tolling because they avoid maintaining a prepaid balance or having to make one-time payments to keep the account open. In general, operational policies and procedures should be considered to ensure that there are sufficient incentives for them to remain in the FasTrak Program.

2.4 Travel Time Analysis

In order to determine what impacts video tolling could have on traffic operations at the toll plazas, it is necessary to compare peak period travel times before the implementation of video tolling with travel times after implementation. Existing travel time data was collected in July 2008 and was provided by BATA. The travel time data for each bridge is illustrated in Figures 2-2 through 2-13 on the following pages.

As shown in the figures, peak period travel times for FasTrak vehicles are generally lower than for cash vehicles, as expected. The highest travel time experienced by FasTrak vehicles is on the Bay Bridge during the AM peak period, when the metering lights are turned on. Travel times for FasTrak vehicles approaching from I-80 is about 8 minutes from the University on-ramp to the metering lights (about 3.8 miles). This translates to an average speed of about 30 mph. Conversely, the lowest travel time experienced by FasTrak vehicles is on the Dumbarton Bridge during the AM peak period. For these vehicles, it takes less than 2 minutes to travel from the Paseo Padre Parkway to the toll plaza (about 1.4 miles). This translates to an average speed of about 45 mph.

During the PM peak period, the highest travel time experienced by FasTrak vehicles is on the Benicia-Martinez Bridge, with a travel time of about 4 minutes between the Arthur Blvd on-ramp and the I-780 on-ramp (about 3.8 miles). This translates to an average speed of about 60 mph.

It is important to note that the data used for this analysis was collected in July, when traffic volumes are typically lower due to school vacations. In addition, gasoline prices were at their highest, resulting in further reduced travel. As a result, this data may reflect comparatively less congestion than typically occurs during the majority of the year. Additional data may be collected in order to establish a new baseline prior to implementation of the video tolling demonstration.

Since one of the objectives of video tolling is to relieve traffic congestion, “before” data will need to be compared to “after” data to determine whether this objective is met. It is expected that video tolling will result in lower travel times for cash vehicles, as more vehicles move out of the slow-moving cash lanes and into the faster-moving FasTrak/Video tolling lanes. However, it is important to ensure that this shift does not negatively impact the FasTrak lanes such that it results in increases in travel times for ETC/Video tolling vehicles.

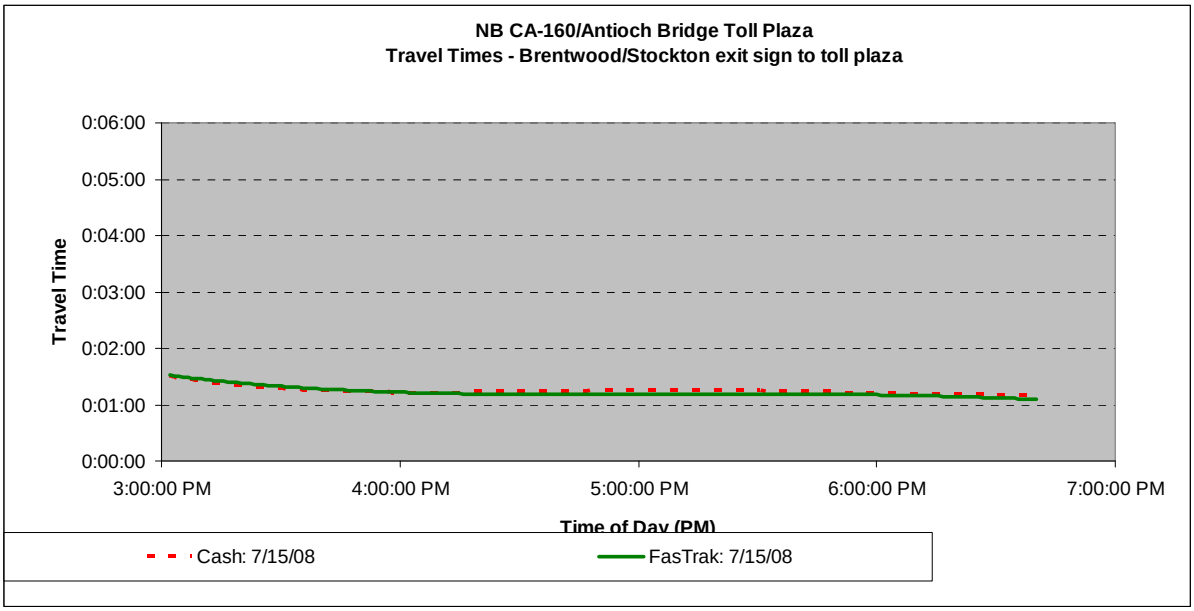


Figure 2-2: Antioch Bridge Travel Time

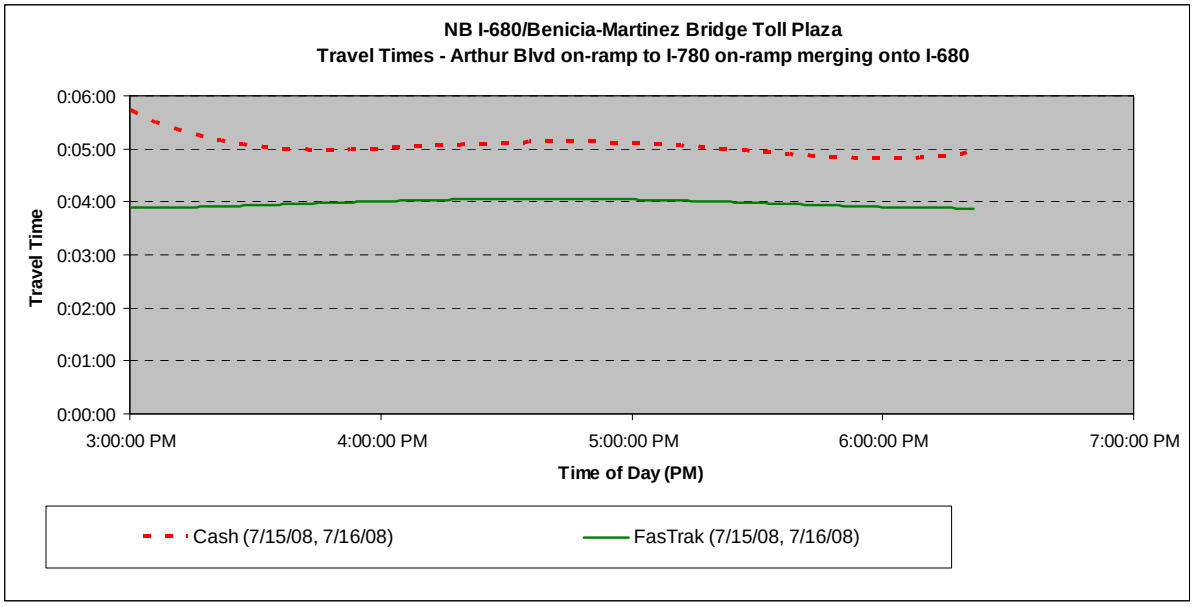


Figure 2-3: Benicia-Martinez Bridge Travel Time

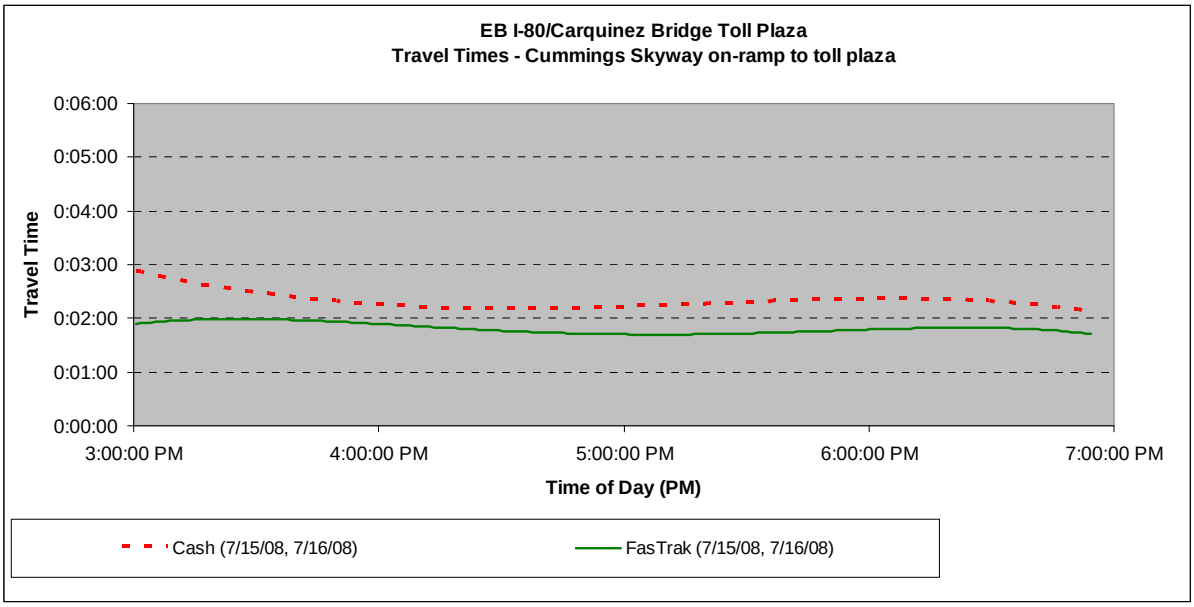


Figure 2-4: Carquinez Bridge Travel Time

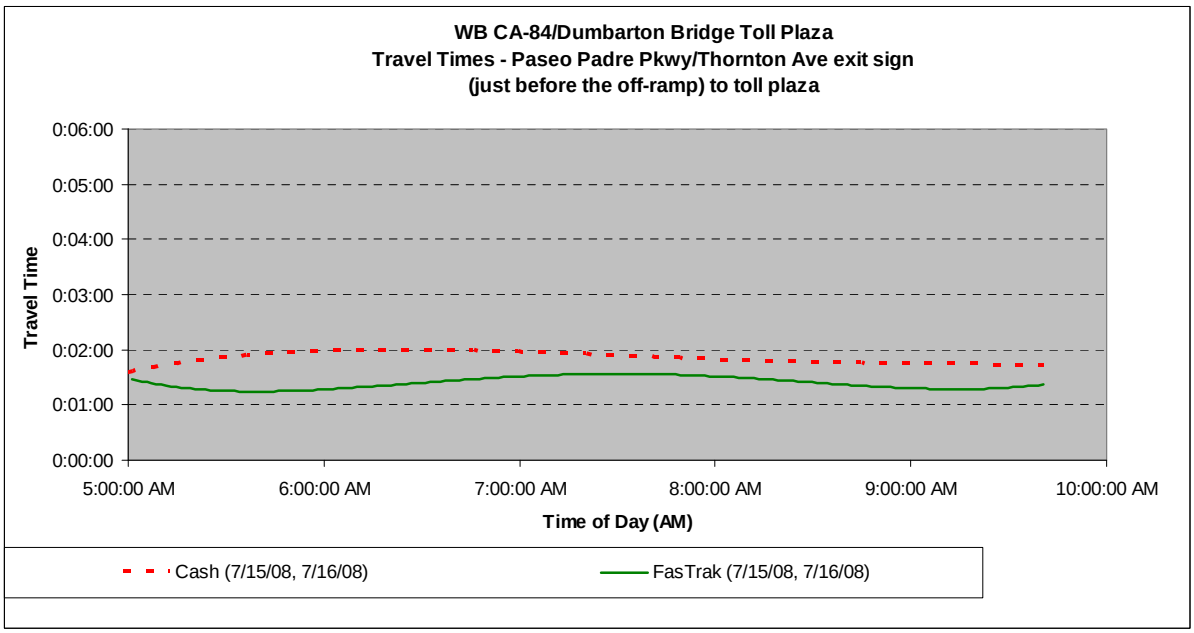


Figure 2-5: Dumbarton Bridge Travel Time

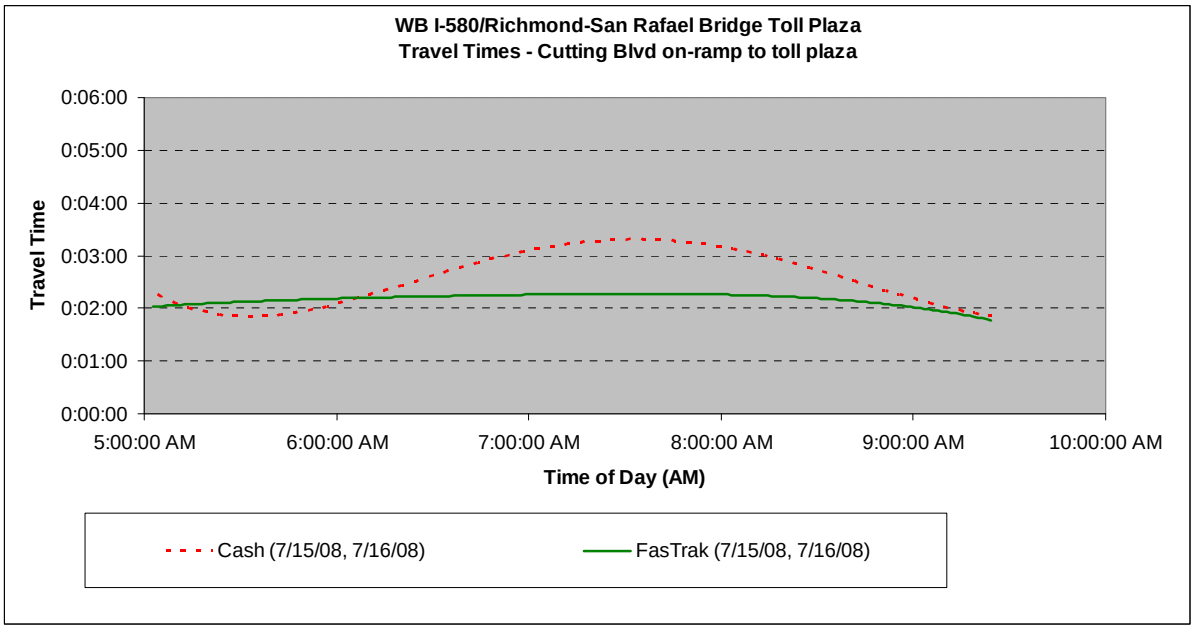


Figure 2-6: Richmond-San Rafael Bridge Travel Time

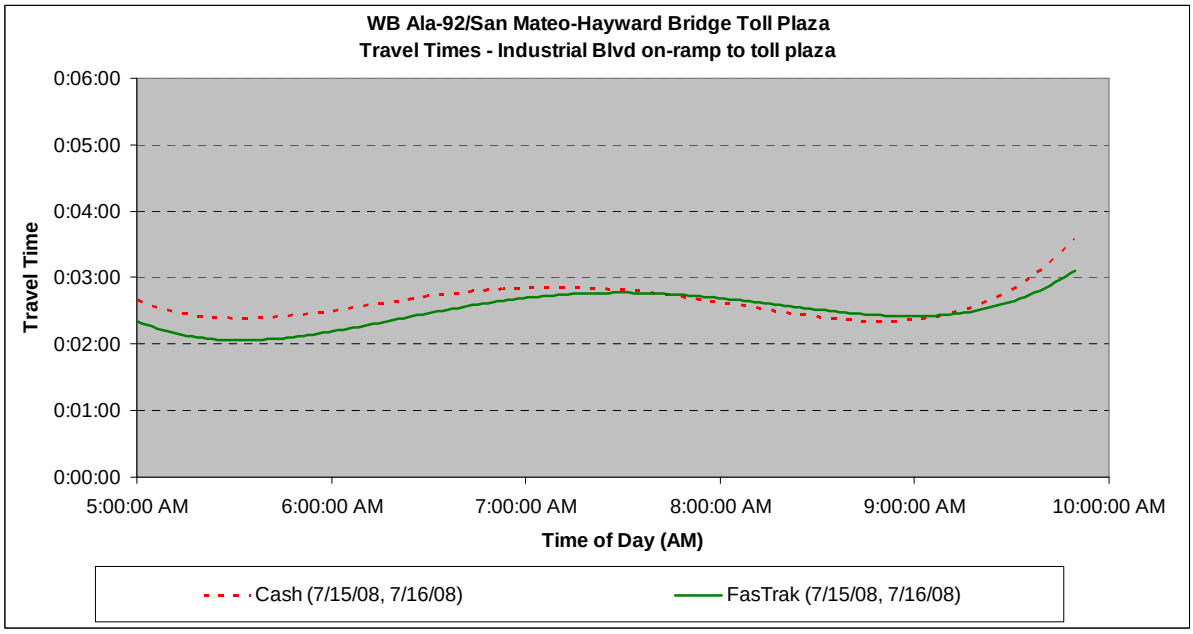


Figure 2-7: San Mateo-Hayward Bridge Travel Time

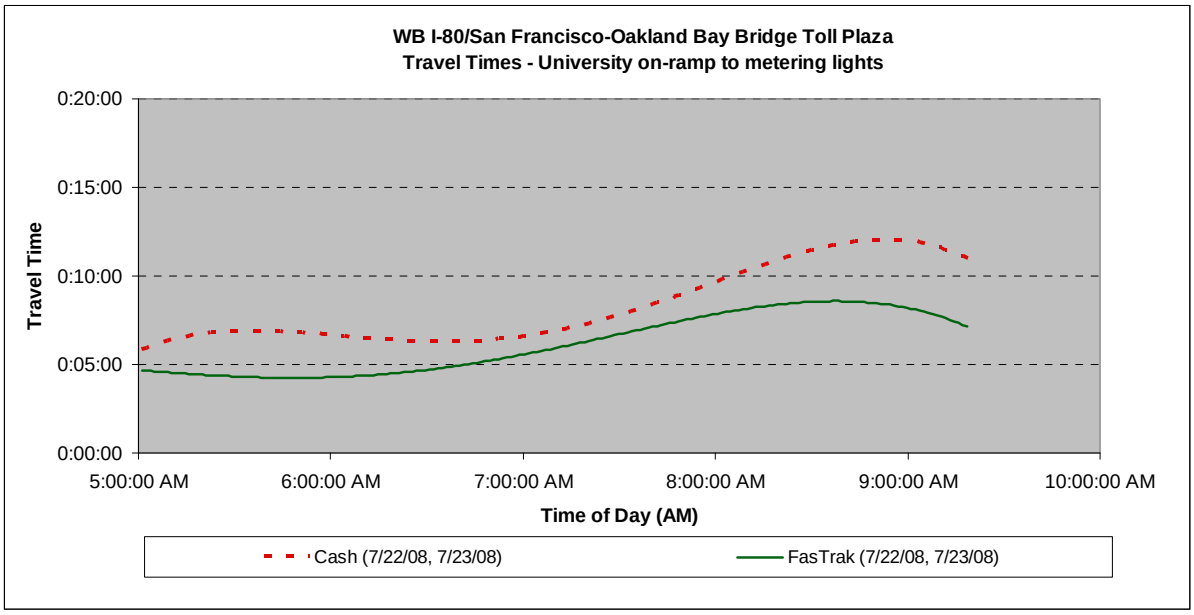


Figure 2-8: SFOBB WB I-80 Travel Time (AM)

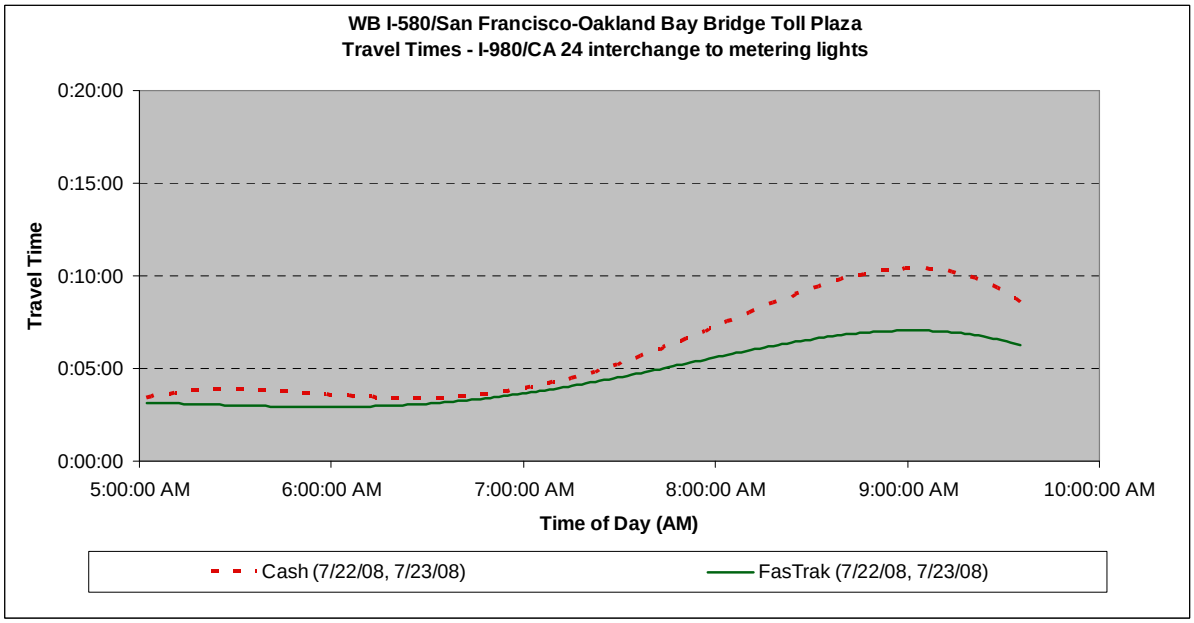


Figure 2-9: SFOBB WB I-580 Travel Time (AM)

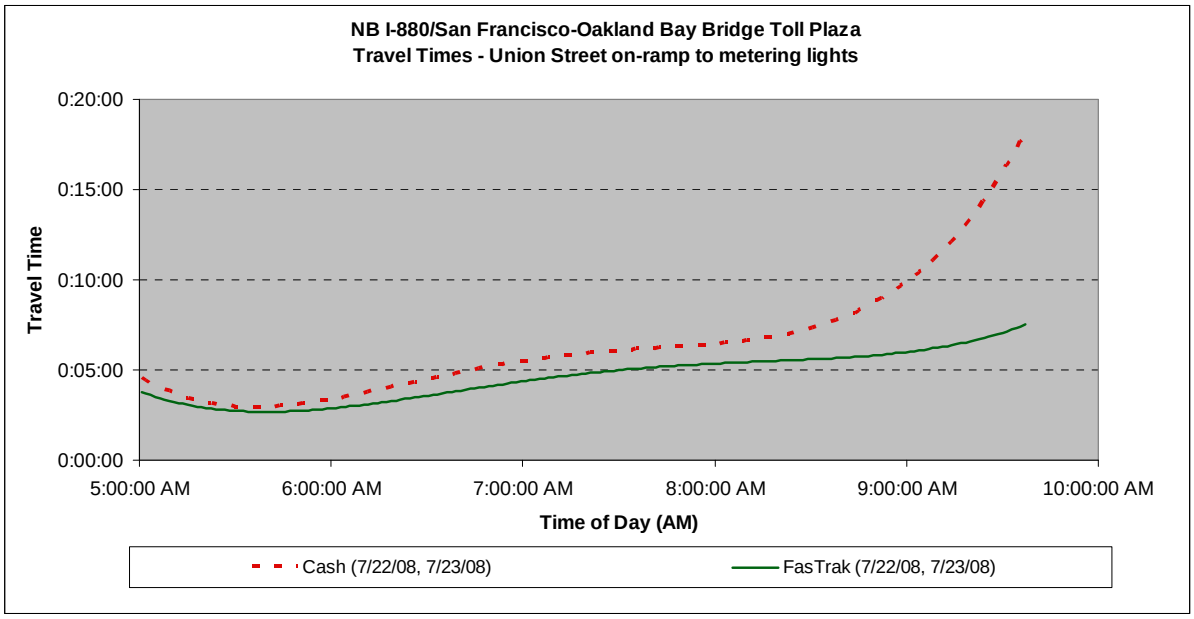


Figure 2-10: SFOBB WB I-880 Travel Time (AM)

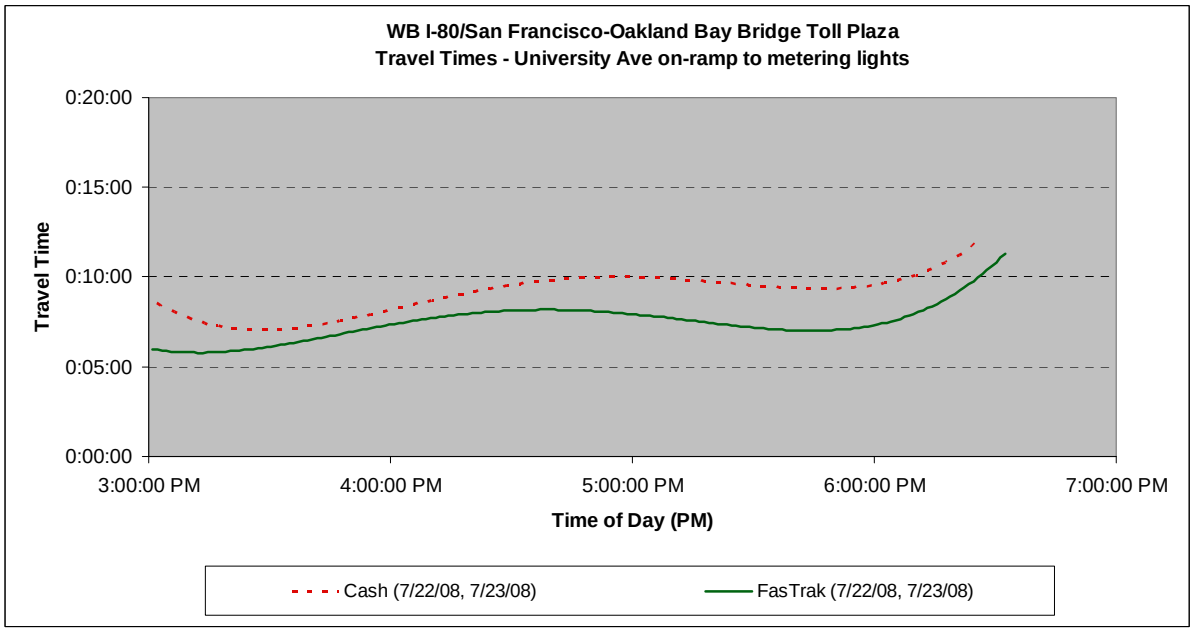


Figure 2-11: SFOBB WB I-80 Travel Time (PM)

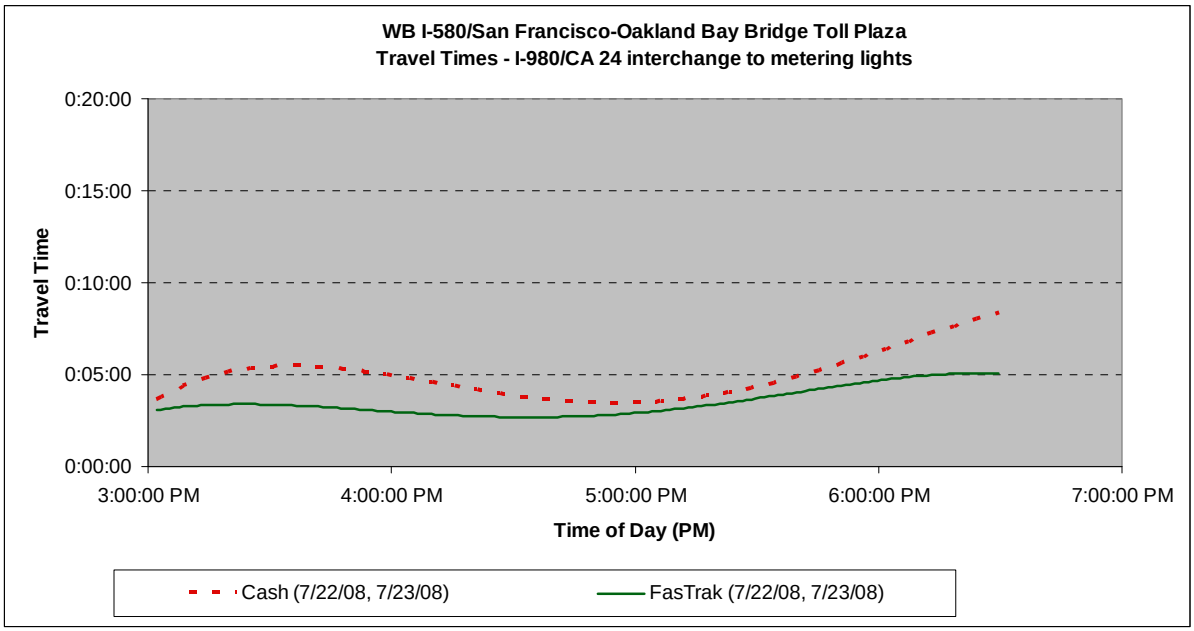


Figure 2-12: SFOBB WB I-580 Travel Time (PM)

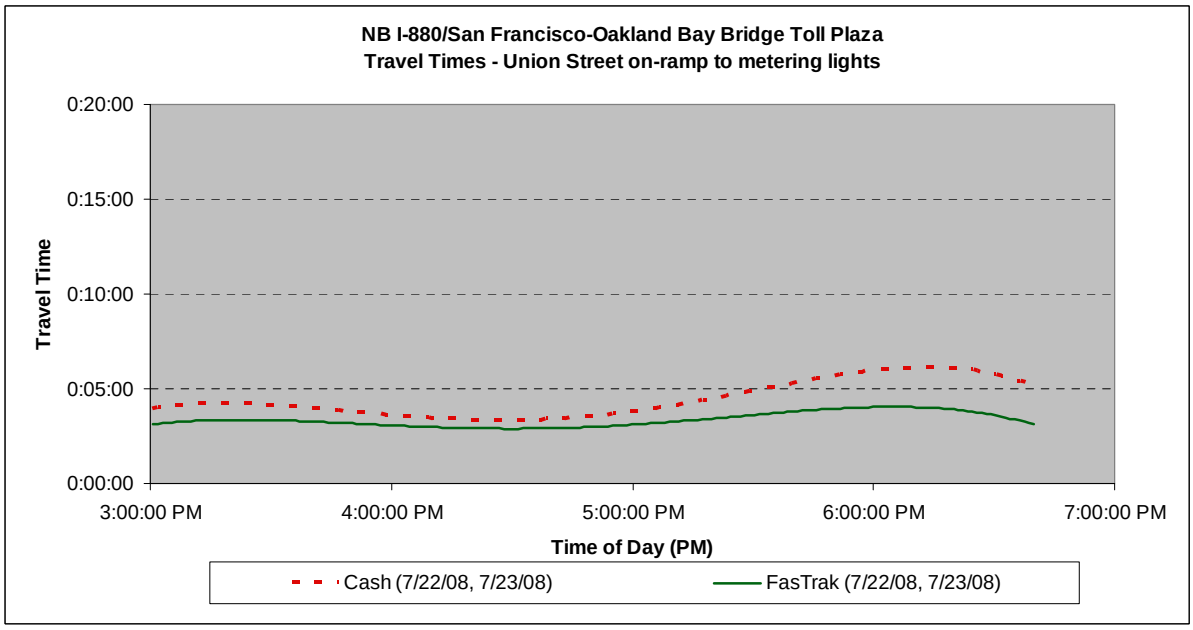


Figure 2-13: SFOBB WB I-880 Travel Time (PM)

3.0 Facility Reviews

In order to evaluate the physical aspects of the seven facilities as they relate to potential video tolling deployment, site visits were conducted and the resulting documentation analyzed. Toll plaza layout drawings showing mainline approach and departure lanes, a schematic plan and elevation view, and a detailed toll lane layout are included in Appendices C through I for each of the seven toll plazas. These drawings will be instrumental in making preliminary recommendations regarding signing and lane configuration under Task 8.

To best address the unique characteristics of each facility, individual facility assessments are provided in the following subsections. Relevant lane layouts and equipment diagrams are included in the appendix for reference. Summary data from the individual assessments is included in Table 4, at the end of this section.

3.1 Antioch Bridge Facility Review

3.1.1 Plaza Overview

With only three lanes of service, the Antioch Bridge facility is the smallest of the seven toll plazas. Located just northeast of Antioch, the bridge is signed as part of State Highway 160, running north and south. It connects Contra Costa County on the south bank of the San Joaquin River with Sacramento County on the north. Tolls are collected in the northbound direction only, on the southern approach to the bridge.

As shown in Figure 3-1, the plaza is comprised of a single canopy structure accommodating three lanes of toll processing. The approach apron accommodates a two-lane feed from Highway 4 as well as an entrance ramp from Wilbur Avenue. The departure apron condenses to a single lane as it begins to traverse the Antioch Bridge.

Figure 3-1: Antioch Plaza

The plaza includes three toll lanes: one FasTrak only and two mixed-use lanes, including carpools. An administration building is located on the east side of the facility. Refer to Appendix C for diagrams of the typical lane types and equipment used in each lane.

3.1.2 Data Analysis

Analysis of traffic and FasTrak data related to Antioch results in the following observations:

- The Antioch Bridge has a high rate of Cash usage, relative to the other bridges. 55.6% of weekday peak hour customers pay cash. As a result, FasTrak usage rates are the lowest of the seven bridges, at 35.1%. This is likely due to its rural surroundings and distance from metropolitan areas. Current trends indicate that ETC penetration will grow at a rate of 3.9% per year, slightly above the average of the other plazas.

- A toll plaza capacity analysis indicates that the Antioch Bridge has an abundance of reserve capacity in the ETC booth and approach lane during the PM peak hour, which also equates to little existing congestion.

3.1.3 Physical Analysis

Analysis of the physical characteristics of the Antioch toll plaza results in the following observations:

- The general approach to the Antioch toll plaza is fairly straightforward, with good sight distance and clear lane divisions. An entry ramp from Wilbur Avenue comes in just before the plaza, merging into the right-most mixed-use lane. If this entry includes a large percentage of potential video tolling drivers who might be attempting to cross over to the dedicated lane on the left, weave issues should be analyzed in the plaza approach area. The inclusion of video tolling in all lanes, as is currently being considered, will reduce the potential impact.

- On the departure side of the Antioch toll plaza, a similar situation to the approach exists, as an exit ramp to Bridgehead Road splits off to the right immediately after the plaza. Weave issues should be analyzed if FasTrak and/or video toll weaving results from increased traffic onto that exit.

- Equipment mounting in general should not be a problem, as the older-style canopy shown in Figure 3-2 below will allow for easy configuration. Vertical clearance should also not be an issue, based on the trapeze structures already in use.

Figure 3-2: Antioch Equipment Mounting

- The only potential equipment mounting issue will involve the front plate VES cameras. As reflected in the plaza layouts in Appendix C, the rear edge of the canopy is relatively close to the paypoint and the existing light curtains. To achieve an acceptable camera angle and make use of the light curtain triggers, cantilevered camera mounts like those used on several other bridges may be required.

- Signing determined to be necessary for the video tolling implementation would be required on the gantries and the plaza approach.

3.1.4 Conclusion

Based on the factors noted above, the Antioch Bridge toll plaza would easily support video tolling as a demonstration site and/or a permanent implementation. Considering the congestion relief objective of the demonstration, however, the potential benefits of video tolling in this area may not be easily demonstrated here, due to the low levels of existing congestion on this facility. Other objectives, including operational cost reductions, could be evaluated based on a demonstration deployment at this site. These factors will be included in the recommendation of a facility for the demonstration project in Task 8.0.

3.2 Benicia-Martinez Bridge Facility Review

3.2.1 Plaza Overview

Just recently completed, the Benicia-Martinez facility is the only plaza constructed with FasTrak Express (Open Road Tolling, or ORT) lanes as well as a dedicated express lane for HOV patrons. Located north of Martinez, the bridge carries I-680, running north and south. It connects Contra Costa County on the south bank of the Carquinez Strait with Solano

County on the north. Tolls are collected in the northbound directly only, on the south approach to the bridge.

As shown in Figure 3-3, the plaza is comprised of a single canopy structure accommodating nine mixed-use lanes, two FasTrak Express lanes and one dedicated HOV lane during the peak periods. The approach apron expands from a five lane mainline to the plaza and the departure condenses back to five main lanes as it begins to traverse the Benicia-Martinez Bridge.

Figure 3-3: Benicia-Martinez Toll Plaza

The plaza includes 12 toll lanes: Two ORT, one HOV, and nine mixed-use lanes. An administration building is located on the east side of the facility. Appendix D has been provided to represent the typical lane types and equipment usage for each lane.

3.2.2 Data Analysis

Analysis of traffic and FasTrak data related to Benicia-Martinez results in the following observations:

- Benicia-Martinez plaza has a mid-range rate of Cash usage, relative to the other bridges. 38.7% of weekday peak hour customers pay cash and 48.6% use FasTrak. Current trends indicate that ETC penetration will grow at a rate of only 1.0% per year.

- The violation rate is high through the Benicia-Martinez plaza at 12.6% on weekdays. This is due to lane equipment issues identified with the implementation of the ORT lanes. BATA is working with the transponder reader manufacturer to resolve the problem.

- A toll plaza capacity analysis indicates that the Benicia-Martinez plaza has adequate reserve capacity in the ETC booths during the PM peak hour. Both toll booth and approach lane capacities are currently at 30.5%.

3.2.3 Physical Analysis

Analysis of the physical characteristics of the Benicia-Martinez plaza results in the following observations:

- The approach to Benicia-Martinez has some degree of curvature, but it does not appear to restrict sight distance to a great degree. Lanes are clearly delineated, with significant space striped off between the cash plaza, Express lanes, and single dedicated HOV lane. No immediate entry or exit ramps interfere with the plaza approach or departure.

- Although the Benicia-Martinez plaza structure is new and aesthetically streamlined, equipment mounting is currently accomplished by suspending equipment below the paneled surface, as shown in Figure 3-4 below. The new equipment should be mountable in the same manner, although any revisions to the existing mounting structure would require cosmetic consideration. Vertical clearance should not be an issue, based on the mounting structures already in use.

Figure 3-4: Benicia-Martinez Equipment Mounting

- Front license plate cameras may require cantilevered mountings in the mixed-used lanes, similar to those currently in use on the Express lanes, shown in Figure 3-5 below. As reflected in Appendix D, the rear edge of the canopy is relatively close to the pay-point and the existing light curtains. To achieve an acceptable camera angle and make use of the light curtain triggers, cantilevered camera mounts may be required.

Figure 3-5: Cantilevered Front Camera Mountings

- Signing determined to be necessary for the video tolling implementation would be required on the gantries and the plaza approach. CMS messages should be modified for video tolling as well.

3.2.4 Conclusion

Based on the factors noted above, the Benicia-Martinez plaza would support video tolling as a demonstration site and/or a permanent implementation. The factors noted above will be included in the recommendation of a facility for the demonstration project in Task 8.0.

3.3 Carquinez Bridge Facility Review

3.3.1 Plaza Review

The Carquinez toll plaza is located on the northern side of the Carquinez Bridge structure, which connects I-80 across the Carquinez Strait to Vallejo. It traverses from Contra Costa County on the south bank of the Carquinez Strait to Solano County on the north. Tolls are collected in the northbound directly only, on the south departure from the bridge.

As shown in Figure 3-6, the plaza is comprised of a single canopy structure accommodating 12 lanes. The approach apron accommodates a four lane mainline feed from the bridge and tapers back to a four lane mainline at departure.

Figure 3-6: Carquinez Toll Plaza

The plaza includes three lane types: eight mixed-use, three FasTrak, and one dedicated HOV lane during the peak periods. An administration building is located on the west side of the facility. Refer to Appendix E for diagrams of the typical lane types and equipment used in each lane.

3.3.2 Data Analysis

Analysis of traffic and FasTrak data related to Carquinez results in the following observations:

- The Carquinez Bridge has the highest rate of Cash usage other than Antioch. 47.9% of weekday peak hour customers pay cash, and 42.5% use FasTrak. FasTrak penetration on the Carquinez Bridge is lower than all other bridges except Antioch. Current trends indicate that it will grow at an average rate of 3.2% per year.

- A toll plaza capacity analysis indicates that the Carquinez toll plaza has good reserve capacity in the ETC booths during the PM peak hour at 52.6%. ETC approach lane capacity is more constrained, but still adequate at 37.1%.

3.3.3 Physical Analysis

Analysis of the physical characteristics of the Carquinez plaza results in the following observations:

- The approach to Carquinez is straightforward and clearly delineated. One lane is kept closed as a buffer between the higher-speed dedicated lanes and the mixed-use lanes during non-peak periods. There is an immediate off-ramp to Sonoma Blvd / SR 29 Exit downstream of the plaza, which has been a problem for FasTrak lane vehicles needing to take this exit immediately after passing through the toll plaza. With video tolling, this condition may be aggravated by the reduced metering effect of cash collection, and will need to be monitored.

- The Carquinez Bridge toll plaza structure is industrial-strength, with an abundance of open structure for flexible and solid equipment mounting, as shown in Figure 3-7. Vertical clearance should not be an issue, based on the mounting structures already in use.

Figure 3-7: Carquinez Equipment Mounting

- To achieve an acceptable camera angle and make use of the light curtain triggers, cantilevered camera mounts may be required.

- Signing determined to be necessary for the video tolling implementation would be required on the gantries and the plaza approach. CMS messages should be modified for video tolling as well.

3.3.4 Conclusion

Based on the factors noted above, the Carquinez Bridge toll plaza would support video tolling as a demonstration site and/or a permanent implementation. Analysis indicates some level of congestion on the approach to the toll plaza, reflecting the potential to evaluate congestion management objectives. These factors will be included in the recommendation of a facility for the demonstration project in Task 8.0.

3.4 Dumbarton Bridge Facility Review

3.4.1 Plaza Review

The Dumbarton Bridge is the southernmost facility administered by BATA, carrying State Highway 84 over the San Francisco Bay between Alameda and San Mateo counties. The plaza is located on the east end, some distance from the actual bridge structure. Westbound traffic is tolled before entering the bridge.

With seven lanes of service, the Dumbarton plaza is one of the smaller plazas. As shown in Figure 3-8, the plaza is comprised of a single canopy structure accommodating two FasTrak Only lanes and four mixed-use lanes during the peak periods. There is also one dedicated carpool lane located to the far left hand side of the plaza. The approach apron accommodates a three lane mainline feed from Highway 84 and the departure apron tapers back to a three lane mainline downstream of the plaza.

The administration building is located on the north side of the facility. Appendix F has been provided to represent the typical lane types and equipment usage for each lane.

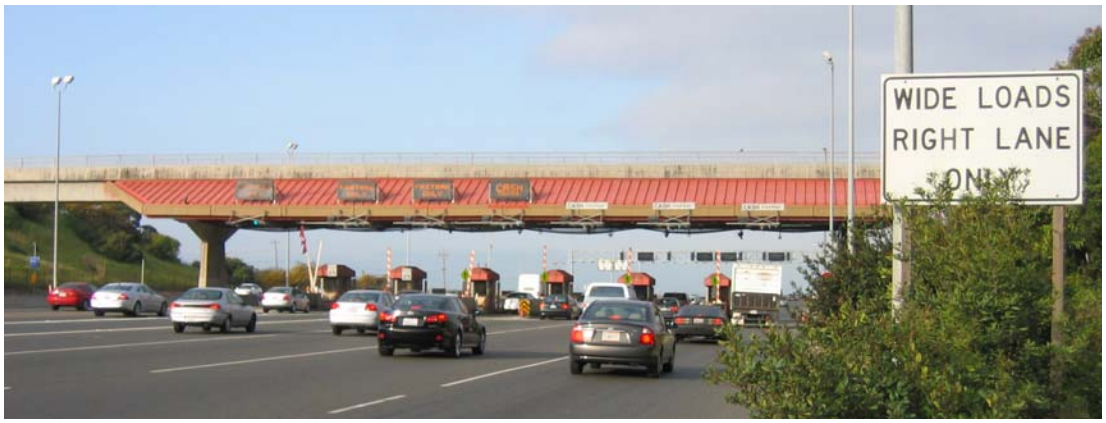


Figure 3-8: Dumbarton Toll Plaza

3.4.2 Data Analysis

Analysis of traffic and FasTrak data related to the Dumbarton Bridge results in the following observations:

- Weekday peak period FasTrak usage at the Dumbarton Bridge is the highest of all except the SFOBB AM period at 55.4%. Cash usage rates are correspondingly lower than most of the other bridges at 35.4%.

- During the morning commute, a toll plaza capacity analysis indicates that the Dumbarton toll plaza has a low reserve capacity at 15.6%.

3.4.3 Physical Analysis

Analysis of the physical characteristics of the Dumbarton plaza results in the following observations:

- The approach is clear, with good sight distance.

- Speed limits in the cash plaza lanes are currently posted at 5 mph, with dedicated FasTrak lanes operating at 25 mph.

Figure 3-9: Dumbarton Equipment Mounting

- The Dumbarton toll plaza is built under a pedestrian overpass structure. Equipment mounted on the structure is suspended from the concrete and metal infrastructure, as shown in Figure 3-9 above. As a result, equipment modifications should be fairly flexible. Vertical clearance does not appear to be an issue.

- To achieve an acceptable camera angle and make use of the light curtain triggers, cantilevered camera mounts may be required.

- Signing determined to be necessary for the video tolling implementation would be required on the gantries and the various plaza approaches. CMS messages should be modified for video tolling as well.

3.4.4 Conclusion

Based on the factors noted above, the Dumbarton Bridge toll plaza would support video tolling as a demonstration site and/or a permanent implementation. Low reserve capacity in the plaza should be kept at the forefront to avoid inadvertently creating congestion with video tolling growth. These factors will be included in the recommendation of a facility for the demonstration project in Task 8.0.

3.5 Richmond-San Rafael Bridge Facility Review

3.5.1 Plaza Review

Located north of San Francisco, the Richmond-San Rafael Bridge carries I-580 running east and west between Richmond and San Rafael. It traverses from Contra Costa County on the

east bank of the San Francisco Bay to Marin County on the west. The plaza is located on the eastern side of the bridge in the westbound direction.

As shown in Figure 3-10, the plaza is comprised of a single canopy structure accommodating seven toll lanes. The approach apron accommodates a three lane mainline from I-580 westbound. Just prior to the approach there is also an exit ramp to Western Drive. The departure apron tapers back to a two lane mainline as it begins to traverse the bridge structure. Although not expected to be a significant limitation, there is a noticeable curvature upon approach to the plaza as the apron begins to expand.

Figure 3-10: Richmond-San Rafael Toll Plaza

The plaza is comprised of two dedicated FasTrak and five mixed-use lanes, including carpools, during the peak periods. As indicated in Figure 3-10, the far right lane is also designated as a truck lane for trucks and wide load vehicles. The administration building is located on the south side of the facility between the westbound and eastbound traffic on I-580. Appendix G has also been provided to represent the typical lane types and equipment usage for each lane.

3.5.2 Data Analysis

Analysis of traffic and FasTrak data related to Richmond-San Rafael results in the following observations:

- Richmond-San Rafael plaza FasTrak usage during the weekday peak period is at 49.7%. Weekday cash usage rates are at 39.8%. Current trends indicate that ETC penetration will grow at an average rate of 3.3% per year.

- A toll plaza capacity analysis indicates that the Richmond-San Rafael toll plaza has adequate reserve capacity in the ETC booths during the AM peak hour, at 35.9%. However, the ETC approach lane capacity is somewhat constrained, with a low 10.2% reserve capacity during the peak hour.

3.5.3 Physical Analysis

Analysis of the physical characteristics of the Richmond-San Rafael plaza results in the following observations:

- The approach is straightforward and clearly delineated, but does have a more significant degree of curvature than the other bridges. The exit ramp to Western Drive splits off to the right of traffic just before the plaza, but should not have any impact on plaza traffic patterns.

- Currently, FasTrak vehicles merging onto the mainline from the Richmond Parkway on-ramp just upstream of the toll plaza experience some difficulty accessing the dedicated FasTrak approach lane on the left side due to queuing in the cash lanes. Video tolling could improve this condition if vehicles shift from the cash lanes to the ETC/video tolling lanes.

Figure 3-11: Richmond-San Rafael Equipment Mounting

- The Richmond-San Rafael plaza structure is sturdy enough for equipment mounting, but the narrowness of the gantry will cause issues. The current configuration includes cantilevered mounting structure for the rear plate cameras and illumination, as shown in Figure 3-11. Vertical clearance may also be an issue if equipment must be suspended below the canopy.

- To achieve an acceptable camera angle and make use of the light curtain triggers, cantilevered camera mounts may be required. Structural capability will need to be assessed, due to the already-mounted front cantilevers and top-mounted signing.

- Signing determined to be necessary for the video tolling implementation would be required on the gantries and the plaza approach. CMS messages should be modified for video tolling as well.

3.5.4 Conclusion

Based on the factors noted above, the Richmond-San Rafael toll plaza could probably support video tolling as a demonstration site and/or a permanent implementation with no significant issues. An ETC approach lane capacity analysis indicates some level of congestion in the approach lane, reflecting the potential to evaluate congestion management objectives. The undersized gantry structure and canopy could result in constraints. These factors will be included in the recommendation of a facility for the demonstration project in Task 8.0.

3.6 San Francisco-Oakland Bay Bridge Facility Review

3.6.1 Plaza Review

The largest and most prominent facility administered by BATA, the San Francisco-Oakland Bay Bridge (SFOBB) connects the cities of San Francisco and Oakland. It carries I-80 from Alameda County on the east bank of the San Francisco Bay to San Francisco County on the west. Located on the eastern side in Oakland, the plaza tolls westbound traffic entering the bridge.

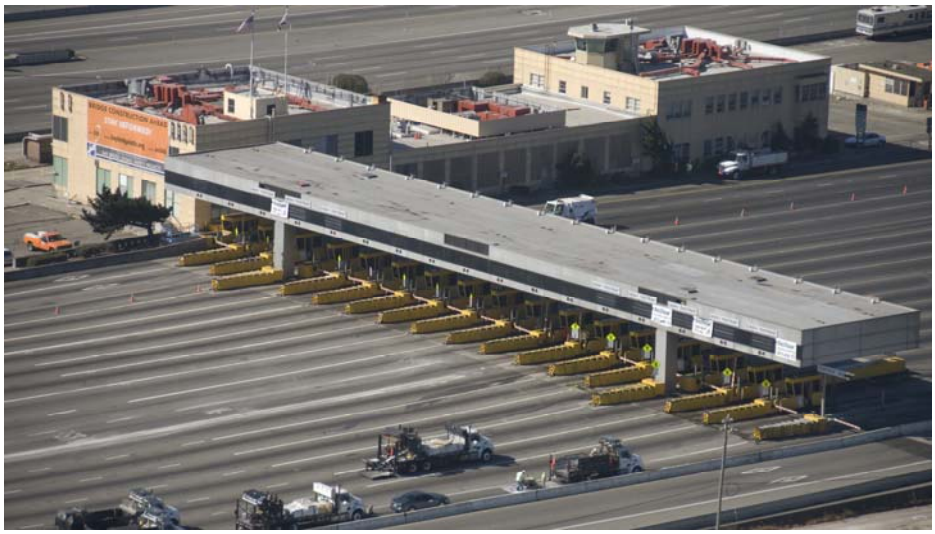


Figure 3-12: SFOBB Main Toll Plaza

Figure 3-13: SFOBB Mini-Plaza

As shown in Figure 3-12, the main plaza is comprised of a single canopy structure accommodating 17 toll lanes. Unique to this facility and San Mateo-Hayward, the SFOBB toll plaza also utilizes 'outrigger' or 'mini-plaza' lanes, where additional capacity is accommodated in several additional toll lanes either upstream or downstream of the main plaza. In this case, the mini-plaza, shown in Figure 3-13, accommodates three additional FasTrak only lanes, just downstream and to the right of the main plaza. Also, two separate dedicated HOV bypass lanes run parallel on the right side of the mini-plaza. These configurations are illustrated in Appendix H.

During peak periods, the SFOBB includes four dedicated HOV lanes (two on the left and two on the right), eight dedicated FasTrak lanes (lanes 7 through 11 in the center of the main toll plaza and 3 in the mini-toll plaza), and 10 mixed-use lanes. The administration building is located on the south side of the facility between the eastbound and westbound traffic. Refer to Appendix H for diagrams of the typical lane types and equipment used in each lane.

The approach to SFOBB is extremely complex, as illustrated in Figure 3-14 below. The approach apron accommodates mainline feeds from I-80, I-580 and I-880. I-880 enters from the south, with HOV lanes splitting off on both sides to enter the dedicated HOV lanes on either side of the plaza. The other three lanes from I-880 enter plaza lanes 16 and 17, plus the entry lane to the mini-plaza. I-80 and I-580 are already combined prior to this point, and form the main body of lanes entering the plaza, fanning from 6 lanes to 13, including full-time dedicated FasTrak-only lanes 7, 8, and 9. An HOV flyover ramp from westbound I-80 touches down near the right side of the toll plaza, merging with the dedicated HOV lane from I-880. West Grand Avenue also splits off from the right side of I-80 and loops across the I-80/I-580 lanes to the south.

Figure 3-14: SFOBB Approach

Departure from the SFOBB plaza is more straightforward, but still complex. Metering lights just downstream of the plaza, shown in Figure 3-15 below, control capacity across the bridge and into downtown San Francisco, but back traffic up into the plaza and beyond. Metering lights are generally only turned on during the morning commute period, when they negate any positive impacts from FasTrak participation. The same could be assumed of video tolling benefits.

Figure 3-15: SFOBB Departure Metering Lights

The departure apron tapers from the full 22 lanes to 16 lanes at the metering lights, then down to five lanes entering the bridge.

3.6.2 Data Analysis

Analysis of traffic and FasTrak data related to SFOBB results in the following observations:

- SFOBB plaza FasTrak usage is the highest of all the bridges at 55.6% during the weekday AM peak periods. Cash usage rates are correspondingly lower than most of the other bridges, with 35.4% weekday. Current trends indicate that ETC usage at this bridge is expected to grow at an average rate of 7.4% per year – the highest projected annual growth of all seven bridges.

- During the afternoon peak period when the metering lights are turned off, a toll plaza capacity analysis indicates that the ETC booths serving I-80/I-580 have a reserve capacity at 55.3%, and through the ETC booths serving I-880, a reserve capacity of 36.7%. ETC approach lane capacity is somewhat constrained, with 21.7% reserve capacity from I-80 / I-580.

- During the morning peak period when the metering lights are turned on, the toll plaza and the approaches to the toll plaza are operating at capacity. Vehicle back-ups occur upstream from the metering lights, through the toll plaza and beyond.

3.6.3 Physical Analysis

Analysis of the physical characteristics of the SFOBB toll plaza results in the following observations:

- As noted, the approach is complex and confusing due to the interchange geometrics just upstream of the plaza.

Figure 3-16: SFOBB Equipment Mounting

- Equipment mounted on the SFOBB toll plaza structure is recessed into openings in the paneled canopy undersurface, either for aesthetic or vertical clearance reasons. While this makes for a clean look, it will also require additional work when new equipment is added to the plaza. Vertical clearance may also be an issue if equipment must be suspended below the canopy.

- To achieve an acceptable camera angle and make use of the light curtain triggers, cantilevered camera mounts may be required.

- Signing determined to be necessary for the video tolling implementation would be required on the gantries and the various plaza approaches. CMS messages should be modified for video tolling as well.

3.6.4 Conclusion

Needless to say, SFOBB is too complex and congested a facility to function well as a video tolling demonstration site. However, it could support video tolling as a long-term implementation, with planning and consideration of the various complicating factors. Video tolling could not be expected to have a significant impact on congestion during the AM peak period, due to the metering. These factors will be included in the recommendation of a facility for the demonstration project in Task 8.0.

3.7 San Mateo-Hayward Bridge Facility Review

3.7.1 Plaza Review

Running east and west, the San Mateo-Hayward bridge carries State Highway 92 over the San Francisco Bay between San Mateo on the west side and Hayward on the east. It travels from Alameda County on the east bank of the San Francisco Bay to San Mateo County on the west. The plaza is located on the eastern side and tolls westbound traffic entering the bridge.

Figure 3-17: San Mateo-Hayward Main Toll Plaza

The plaza includes a total of 10 lanes, as shown in Figures 3-17 and 3-18. Like SFOBB, the plaza includes an upstream 'outrigger' or 'mini-plaza' for three of the 10 lanes, shown in Figure 3-18. The San Mateo-Hayward Mini-Plaza is upstream and to the right of the main toll plaza.

Figure 3-18: San Mateo-Hayward Mini-Plaza

The main plaza includes three lane types: FasTrak Only, mixed-use lanes, and carpool lanes during the peak periods. An administration building is located on the east side of the facility between the westbound and eastbound traffic. Appendix I has also been provided to represent the typical lane types and equipment usage for each lane.

The approach to San Mateo-Hayward is fairly simple but looks complex because of the mini-plaza, as illustrated in Figure 3-19 below. The approach apron accommodates a three lane mainline feed from SH 92. As the approach expands, a slip ramp to the right allows patrons to take advantage of the three mini-plaza lanes, which are equipped as mixed use lanes. The departure apron tapers back to a three lane mainline as it enters the bridge. These configurations are illustrated in Appendix I.

Figure 3-19: San Mateo-Hayward Approach

3.7.2 Data Analysis

Analysis of traffic and FasTrak data related to San Mateo-Hayward Bridge results in the following observations:

- Weekday peak period FasTrak usage at the San Mateo-Hayward Bridge closely follows Dumbarton and SFOBB at 53.7%. Cash usage rates are correspondingly lower than most of the other bridges, with 33.7% during the weekday peak. However, current trends indicate that it has a very low growth rate of 0.8%.

- During the morning commute, toll plaza capacity analysis indicates that the San Mateo-Hayward Bridge toll plaza has low reserve capacity in the ETC booths at 16.5%. The reserve capacity in the ETC approach lane is better, at 41.6%.

3.7.3 Physical Analysis

Analysis of the physical characteristics of the San Mateo-Hayward Bridge toll plaza results in the following observations:

- The approach is clear, with good sight distance, only slightly complicated by the presence of the mini-plaza.

Figure 3-20: San Mateo-Hayward Equipment Mounting

- Equipment mounted on the toll plaza structure is attached to the visible pipe infrastructure. As a result, equipment modifications should be very flexible. Vertical clearance does not appear to be an issue.

- To achieve an acceptable camera angle and make use of the light curtain triggers, cantilevered camera mounts may be required.

- Signing determined to be necessary for the video tolling implementation would be required on the gantries and the various plaza approaches. CMS messages should be modified for video tolling as well.

3.7.4 Conclusion

Based on the factors noted above, the San Mateo-Hayward Bridge toll plaza would support video tolling as a demonstration site and/or a permanent implementation. A toll plaza capacity analysis indicates the ETC booths are approach capacity during the morning peak hour, reflecting the potential to evaluate congestion management objectives. The low reserve capacity should be kept at the forefront to avoid inadvertently aggravating congestion with video tolling growth. These factors will be included in the recommendation of a facility for the demonstration project in Task 8.0.

Table 4: Facility Key Findings Summary

Bridge Facility	Key Considerations				
	Signing	Geometry		Video Tolling Equipment Installation	Avg Available Peak Period Capacity %
		Approach	Departure		
Antioch	Signing on approach and plaza gantry needed. CMS messages need to include video tolling.	Slight potential for weave issues if vehicles entering from Wilbur Ave attempt to cross to higher-speed dedicated lane.	Slight potential that vehicles wishing to exit Bridgehead Rd. ramp after the plaza may not be able to weave to the far right.	Front VES cameras may require mounting adjustments.	Booth Capacity: 80% Approach Capacity: 86%
Benicia-Martinez	Signing on approach and plaza gantry needed. CMS messages need to include video tolling.	No limitations expected	No limitations expected	Front VES cameras may require mounting adjustments. Structure aesthetics will make mounting more complex.	Booth Capacity: 31% Approach Capacity: 31%
Carquinez	Signing on approach and plaza gantry needed. CMS messages need to include video tolling.	No limitations expected	Sonoma Blvd / SR 29 exit downstream has existing weave issues. Will require monitoring, potential adjustments.	Front VES cameras may require mounting adjustments.	Booth Capacity: 53% Approach Capacity: 27%
Dumbarton	Signing on approach and plaza gantry needed. CMS messages need to include video tolling.	No limitations expected	No limitations expected	Front VES cameras may require mounting adjustments.	Booth Capacity: 16% Approach Capacity: 2%
Richmond - San Rafael	Signing needed on immediate approach and further upstream, due to sight distance limitations. Lane designation signage needs to include video tolling.	During peak periods weaving movements may increase due to the approach curvature.	No limitations expected	Front and rear VES cameras may require mounting adjustments. Vertical clearance may be an issue.	Booth Capacity: 36% Approach Capacity: 10%
San Francisco Oakland Bay	Due to the larger footprint, advanced signing on approaches are needed but may have minimal effect. Plaza signing and CMS messages need to include video tolling.	Complex, with extreme weaving situations. Mini-plaza provides additional throughput, but increases confusion potential.	Metering downstream of the plaza will significantly reduce any benefit realized by video tolling with respect to throughput during the AM Peak.	Modification of canopy ceiling panels required to install front cameras and lights to maintain current vertical clearance. Front VES cameras may require mounting adjustments.	Booth Capacity: 30 to 70% depending on approach and time. Morning peak period has no reserve capacity, due to metering.
San Mateo - Hayward	Signing on approach and plaza gantry needed. CMS messages need to include video tolling.	Mini-plaza provides additional throughput, but causes slight increase in complexity.	No limitations expected	Front VES cameras may require mounting adjustments.	Booth Capacity: 17% Approach Capacity: 42%

Appendix A - Toll Plaza Capacity Analysis

Antioch Bridge							Source of Info
Peak Period	3 pm - 7 pm						Peak Period FT Booths.xls (BATA)
Peak Lane Config	2 Cash, 1 ETC						http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
ETC Lane Number(s)	Lane 3					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
Peak Hour	3:00-4:00 PM	4:00-5:00 PM	5:00-6:00 PM	6:00-7:00 PM			
Peak Hour Volume per ETC booth (ETC+Viol)	217	286	232	169		Tu, 7/15/08	mode_pay_ant_0715_hour.xls (BATA)
Average Throughput	**217**	**286**	**232**	**169**		Average	
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,400	1,400		veh/hr	
Number of ETC Booths	1	1	1	1			Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	15.5%	20.4%	16.6%	12.1%			
Peak Hour ETC Reserve Capacity	**84.5%**	**79.6%**	**83.4%**	**87.9%**			
Approach Lane Config	1 Cash/HOV, 1 ETC	1 Cash/HOV, 1 ETC	1 Cash/HOV, 1 ETC	1 Cash/HOV, 1 ETC			http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
Std Lane Capacity (vph)	2,000	2,000	2,000	2,000		veh/hr	
Number of ETC Approach Lanes	1	1	1	1			http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
Total ETC Approach Capacity	2,000	2,000	2,000	2,000		veh/hr	
Peak Hour ETC Approach Capacity in Use	10.9%	14.3%	11.6%	8.5%			
Peak Hour ETC Approach Reserve Capacity	**89.2%**	**85.7%**	**88.4%**	**91.6%**			

Benicia-Martinez Bridge							Source of Info
Peak Period	3 pm - 7 pm						Peak Period FT Booths.xls (BATA)
Peak Lane Config	9 Cash, 2 ETC, 1 HOV						http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
ETC Lane Number(s)	Lanes 12 & 13					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
Peak Hour	3:00-4:00 PM	4:00-5:00 PM	5:00-6:00 PM	6:00-7:00 PM			
Peak Hour Volume per ETC booth (ETC+Viol)	2,286	2,693	2,916	1,763		Tu, 7/15/08	mode_pay_ben_0715_hour.xls (BATA)
Peak Hour Volume per ETC booth (ETC+Viol)	1,678	2,296	2,644	2,751		W, 7/16/08	mode_pay_ben_0716_hour.xls (BATA)
Average Throughput	**1,982**	**2,495**	**2,780**	**2,257**		Average	
Max Capacity Per ETC Booth (vph)	2,000	2,000	2,000	2,000		veh/hr	
Number of ETC Booths	2	2	2	2			Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	49.6%	62.4%	69.5%	56.4%			
Peak Hour ETC Reserve Capacity	**50.5%**	**37.6%**	**30.5%**	**43.6%**			
Approach Lane Config	Cash, 1 ETC/HOV, 1 ETC	Cash, 1 ETC/HOV, 1 ETC	Cash, 1 ETC/HOV, 1 ETC	Cash, 1 ETC/HOV, 1 ETC			http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
Std Lane Capacity (vph)	2,000	2,000	2,000	2,000		veh/hr	
Number of ETC Approach Lanes	2	2	2	2			http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
Total ETC Approach Capacity	4,000	4,000	4,000	4,000		veh/hr	
Peak Hour ETC Approach Capacity in Use	49.6%	62.4%	69.5%	56.4%			
Peak Hour ETC Approach Reserve Capacity	**50.5%**	**37.6%**	**30.5%**	**43.6%**			

Appendix A - Toll Plaza Capacity Analysis

Carquinez Bridge							Source of Info
Peak Period	3 pm - 7 pm						Peak Period FT Booths.xls (BATA)
Peak Lane Config	8 Cash, 3 ETC, 1 HOV						http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
ETC Lane Number(s)	Lanes 2, 3, & 4					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
Peak Hour	3:00-4:00 PM	4:00-5:00 PM	5:00-6:00 PM	6:00-7:00 PM			
Peak Hour Volume per ETC booth (ETC+Viol)	1,873	1,994	1,977	1676		Tu, 7/15/08	mode_pay_car_0715_hour.xls (BATA)
Peak Hour Volume per ETC booth (ETC+Viol)	1,795	1,972	2,008	1,602		W, 7/16/08	mode_pay_car_0716_hour.xls (BATA)
Average Throughput	**1,834**	**1,983**	**1,993**	**1,639**		Average	
Peak Hour carpool volume	781	903	923	877		Average of 7/15, 7/16	
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,400	1,400		veh/hr	
Number of ETC Booths	3	3	3	3			Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	43.7%	47.2%	47.4%	39.0%			
Peak Hour ETC Reserve Capacity	**56.3%**	**52.8%**	**52.6%**	**61.0%**			
Approach Lane Config	Cash, 1 ETC/HOV, 1 ETC	Cash, 1 ETC/HOV, 1 ETC	Cash, 1 ETC/HOV, 1 ETC	Cash, 1 ETC/HOV, 1 ETC			http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
Std Lane Capacity (vph)	2,000	2,000	2,000	2,000		veh/hr	
Number of ETC Approach Lanes	2	2	2	2			http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
Total ETC Approach Capacity	4,000	4,000	4,000	4,000		veh/hr	
Peak Hour ETC Approach Capacity in Use	65.4%	72.2%	72.9%	62.9%			
Peak Hour ETC Approach Reserve Capacity	**34.6%**	**27.9%**	**27.1%**	**37.1%**			

Dumbarton Bridge							Source of Info
Peak Period	5 am - 10 am						Peak Period FT Booths.xls (BATA)
Peak Lane Config	4 Cash, 2 ETC, 1 HOV						http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
ETC Lane Number(s)	Lanes 5 & 6					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
Peak Hour	5:00-6:00 AM	6:00-7:00 AM	7:00-8:00 AM	8:00-9:00 AM	9:00-10:00 AM		
Peak Hour Volume per ETC booth (ETC+Viol)	616	1,553	2,248	2,369	1,745	Tu, 7/15/08	mode_pay_dum_0715_hour.xls (BATA)
Peak Hour Volume per ETC booth (ETC+Viol)	605	1,467	2,274	2,357	1,740	W, 7/16/08	mode_pay_dum_0716_hour.xls (BATA)
Average Throughput	**611**	**1,510**	**2,261**	**2,363**	**1,743**	Average	
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,400	1,400	1,400	veh/hr	
Number of ETC Booths	2	2	2	2	2		Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	21.8%	53.9%	80.8%	84.4%	62.2%		
Peak Hour ETC Reserve Capacity	**78.2%**	**46.1%**	**19.3%**	**15.6%**	**37.8%**		
Approach Lane Config	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
Std Lane Capacity (vph)	2,400	2,400	2,400	2,400	2,400	veh/hr	
Number of ETC Approach Lanes	1	1	1	1	1		http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
Total ETC Approach Capacity	2,400	2,400	2,400	2,400	2,400	veh/hr	
Peak Hour ETC Approach Capacity in Use	25.4%	62.9%	94.2%	98.5%	72.6%		
Peak Hour ETC Approach Reserve Capacity	**74.6%**	**37.1%**	**5.8%**	**1.5%**	**27.4%**		

Appendix A - Toll Plaza Capacity Analysis

Richmond-San Rafael Bridge							Source of Info
Peak Period	5 am - 10 am						Peak Period FT Booths.xls (BATA)
Peak Lane Config	5 Cash/HOV, 2 ETC						http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
ETC Lane Number(s)	Lanes 1 & 2					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
Peak Hour	5:00-6:00 AM	6:00-7:00 AM	7:00-8:00 AM	8:00-9:00 AM	9:00-10:00 AM		
Peak Hour Volume per ETC booth (ETC+Viol)	576	1,280	1,740	1,763	1,429	Tu, 7/15/08	mode_pay_rich_0715_hour.xls (BATA)
Peak Hour Volume per ETC booth (ETC+Viol)	604	1,339	1,732	1,828	1374	W, 7/16/08	mode_pay_rich_0716_hour.xls (BATA)
Average Throughput	**590**	**1,310**	**1,736**	**1,796**	**1,402**	Average	
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,400	1,400	1,400	veh/hr	
Number of ETC Booths	2	2	2	2	2		Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	21.1%	46.8%	62.0%	64.1%	50.1%		
Peak Hour ETC Reserve Capacity	**78.9%**	**53.2%**	**38.0%**	**35.9%**	**49.9%**		
Approach Lane Config	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC		http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
Std Lane Capacity (vph)	2,000	2,000	2,000	2,000	2,000	veh/hr	
Number of ETC Approach Lanes	1	1	1	1	1		http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
Total ETC Approach Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Peak Hour ETC Approach Capacity in Use	29.5%	65.5%	86.8%	89.8%	70.1%		
Peak Hour ETC Approach Reserve Capacity	**70.5%**	**34.5%**	**13.2%**	**10.2%**	**29.9%**		

San Mateo-Hayward Bridge							Source of Info
Peak Period	5 am - 10 am						Peak Period FT Booths.xls (BATA)
Peak Lane Config	5 Cash, 2 ETC, 2 HOV, 1 Closed						http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
ETC Lane Number(s)						<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
Peak Hour	5:00-6:00 AM	6:00-7:00 AM	7:00-8:00 AM	8:00-9:00 AM	9:00-10:00 AM		
Peak Hour Volume per ETC booth (ETC+Viol)	909	1,797	2,314	2,349	1,850	Tu, 7/15/08	mode_pay_smo_0715_hour.xls (BATA)
Peak Hour Volume per ETC booth (ETC+Viol)	932	1,762	2,328	2,327	1,756	W, 7/16/08	mode_pay_smo_0716_hour.xls (BATA)
Average Throughput	**921**	**1,780**	**2,321**	**2,338**	**1,803**	Average	
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,400	1,400	1,400	veh/hr	
Number of ETC Booths	2	2	2	2	2		Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	32.9%	63.6%	82.9%	83.5%	64.4%		
Peak Hour ETC Reserve Capacity	**67.1%**	**36.4%**	**17.1%**	**16.5%**	**35.6%**		
Approach Lane Config	2 Cash, 1 HOV, 2 ETC	2 Cash, 1 HOV, 2 ETC	2 Cash, 1 HOV, 2 ETC	2 Cash, 1 HOV, 2 ETC	2 Cash, 1 HOV, 2 ETC		http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
Std Lane Capacity (vph)	2,000	2,000	2,000	2,000	2,000	veh/hr	
Number of ETC Approach Lanes	2	2	2	2	2		http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
Total ETC Approach Capacity	4,000	4,000	4,000	4,000	4,000	veh/hr	
Peak Hour ETC Approach Capacity in Use	23.0%	44.5%	58.0%	58.5%	45.1%		
Peak Hour ETC Approach Reserve Capacity	**77.0%**	**55.5%**	**42.0%**	**41.6%**	**54.9%**		

Appendix A - Toll Plaza Capacity Analysis

San Francisco-Oakland Bay Bridge				2350	1175		Source of Info
Morning Peak Period (from I-80/I-580)	5 am - 10 am						Peak Period FT Booths.xls (BATA)
Peak Lane Config	8 Cash, 5 ETC, 2 HOV						http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 7, 8, 9, 10 & 11					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Hour	**5:00-6:00 AM**	**6:00-7:00 AM**	**7:00-8:00 AM**	**8:00-9:00 AM**	**9:00-10:00 AM**		
Peak Hour Volume per ETC booth (ETC+Viol)	2,756	3,155	2,819	2,853	3,014	Tu, 7/22/08	mode_pay_sfo_0722am_hour.xls (BATA). Note: Metering lights NOT turned on.
Peak Hour Volume per ETC booth (ETC+Viol)	2,711	3,028	2,734	2,592	2,666	W, 7/23/08	mode_pay_sfo_0723am_hour.xls (BATA). Note: Metering lights turned on at 7:30am
Average Throughput	**2,734**	**3,092**	**2,777**	**2,723**	**2,840**	Average	
	Traffic volumes and capacity calculations are misleading due to the metering lights. Actual peak is 7:00-8:00 am.						
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,175	950	950	veh/hr	
Number of ETC Booths	5	5	5	5	5		Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	39.1%	44.2%	47.3%	57.3%	59.8%		
Peak Hour ETC Reserve Capacity	**61.0%**	**55.8%**	**52.7%**	**42.7%**	**40.2%**		
Approach Lane Config	4 Cash, 2 ETC, 2 HOV	4 Cash, 2 ETC, 2 HOV	4 Cash, 2 ETC, 2 HOV	4 Cash, 2 ETC, 2 HOV	4 Cash, 2 ETC, 2 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity (vph)	2,000	2,000	1,680	1,360	1,360	veh/hr	
Number of ETC Approach Lanes	2	2	2	2	2		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Total ETC Approach Capacity	4,000	4,000	3,360	2,720	2,720	veh/hr	
Peak Hour ETC Approach Capacity in Use	68.3%	77.3%	82.6%	100.1%	104.4%		
Peak Hour ETC Approach Reserve Capacity	**31.7%**	**22.7%**	**17.4%**	**-0.1%**	**-4.4%**		

San Francisco-Oakland Bay Bridge							Source of Info
Morning Peak Period (from I-880)	5 am - 10 am						Peak Period FT Booths.xls (BATA)
Peak Lane Config	2 Cash, 3 ETC & 2 HOV						http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 18, 19 & 20					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Hour	**5:00-6:00 AM**	**6:00-7:00 AM**	**7:00-8:00 AM**	**8:00-9:00 AM**	**9:00-10:00 AM**		
Peak Hour Volume per ETC booth (ETC+Viol)	603	952	985	1,019	1,009	Tu, 7/22/08	mode_pay_sfo_0722am_hour.xls (BATA). Note: Metering lights NOT turned on.
Peak Hour Volume per ETC booth (ETC+Viol)	604	964	955	1,018	1,028	W, 7/23/08	mode_pay_sfo_0723am_hour.xls (BATA). Note: Metering lights turned on at 7:30am
Average Throughput	**604**	**958**	**970**	**1,019**	**1,019**	Average	
	Traffic volumes and capacity calculations are misleading due to the metering lights. Actual peak is 7:00-8:00 am.						
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,175	950	950	veh/hr	
Number of ETC Booths	3	3	3	3	3		Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	14.4%	22.8%	27.5%	35.7%	35.7%		
Peak Hour ETC Reserve Capacity	**85.6%**	**77.2%**	**72.5%**	**64.3%**	**64.3%**		
Approach Lane Config	2 Cash, 1 ETC, 2 HOV	2 Cash, 1 ETC, 2 HOV	2 Cash, 1 ETC, 2 HOV	2 Cash, 1 ETC, 2 HOV	2 Cash, 1 ETC, 2 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity (vph)	2,000	2,000	1,680	1,360	1,360	veh/hr	
Number of ETC Approach Lanes	1	1	1	1	1		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Total ETC Approach Capacity	2,000	2,000	1,680	1,360	1,360	veh/hr	
Peak Hour ETC Approach Capacity in Use	30.2%	47.9%	57.7%	74.9%	74.9%		
Peak Hour ETC Approach Reserve Capacity	**69.8%**	**52.1%**	**42.3%**	**25.1%**	**25.1%**		

Appendix A - Toll Plaza Capacity Analysis

San Francisco-Oakland Bay Bridge							Source of Info
Afternoon Peak Period (from I-80/I-580)	3 pm - 7 pm						Peak Period FT Booths.xls (BATA)
Peak Lane Config	8 Cash, 5 ETC, 2 HOV						http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 7, 8, 9, 10 & 11					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Hour	**3:00-4:00 PM**	**4:00-5:00 PM**	**5:00-6:00 PM**	**6:00-7:00 PM**			
Peak Hour Volume per ETC booth (ETC+Viol)	2,250	2,630	3,101	2,713		Tu, 7/22/08	mode_pay_sfo_0722pm_hour.xls (BATA)
Peak Hour Volume per ETC booth (ETC+Viol)	2,223	2,734	3,162	2,674		W, 7/23/08	mode_pay_sfo_0723pm_hour.xls (BATA)
Average Throughput	**2,237**	**2,682**	**3,132**	**2,694**		Average	
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,400	1,400		veh/hr	
Number of ETC Booths	5	5	5	5			Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	32.0%	38.3%	44.7%	38.5%			
Peak Hour ETC Reserve Capacity	**68.1%**	**61.7%**	**55.3%**	**61.5%**			
Approach Lane Config	4 Cash, 2 ETC, 2 HOV	4 Cash, 2 ETC, 2 HOV	4 Cash, 2 ETC, 2 HOV	4 Cash, 2 ETC, 2 HOV			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity (vph)	2,000	2,000	2,000	2,000		veh/hr	
Number of ETC Approach Lanes	2	2	2	2			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Total ETC Approach Capacity	4,000	4,000	4,000	4,000		veh/hr	
Peak Hour ETC Approach Capacity in Use	55.9%	67.1%	78.3%	67.3%			
Peak Hour ETC Approach Reserve Capacity	**44.1%**	**33.0%**	**21.7%**	**32.7%**			

San Francisco-Oakland Bay Bridge							Source of Info
Afternoon Peak Period (from I-880)	3 pm - 7 pm						Peak Period FT Booths.xls (BATA)
Peak Lane Config	2 Cash, 3 ETC & 2 HOV						http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 18, 19 & 20					<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Hour	**3:00-4:00 PM**	**4:00-5:00 PM**	**5:00-6:00 PM**	**6:00-7:00 PM**			
Peak Hour Volume per ETC booth (ETC+Viol)	867	1,031	1,243	976		Tu, 7/22/08	mode_pay_sfo_0722pm_hour.xls (BATA)
Peak Hour Volume per ETC booth (ETC+Viol)	858	1,090	1,291	1,001		W, 7/23/08	mode_pay_sfo_0723pm_hour.xls (BATA)
Average Throughput	**863**	**1,061**	**1,267**	**989**		Average	
Max Capacity Per ETC Booth (vph)	1,400	1,400	1,400	1,400		veh/hr	
Number of ETC Booths	3	3	3	3			Peak Period FT Booths.xls (BATA)
Peak Hour ETC Booth Capacity in Use	20.5%	25.3%	30.2%	23.5%			
Peak Hour ETC Reserve Capacity	**79.5%**	**74.8%**	**69.8%**	**76.5%**			
Approach Lane Config	2 Cash, 1 ETC, 2 HOV	2 Cash, 1 ETC, 2 HOV	2 Cash, 1 ETC, 2 HOV	2 Cash, 1 ETC, 2 HOV			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity (vph)	2,000	2,000	2,000	2,000		veh/hr	
Number of ETC Approach Lanes	1	1	1	1			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Total ETC Approach Capacity	2,000	2,000	2,000	2,000		veh/hr	
Peak Hour ETC Approach Capacity in Use	43.1%	53.0%	63.4%	49.4%			
Peak Hour ETC Approach Reserve Capacity	**56.9%**	**47.0%**	**36.7%**	**50.6%**			

Appendix B – FasTrak Trendlines

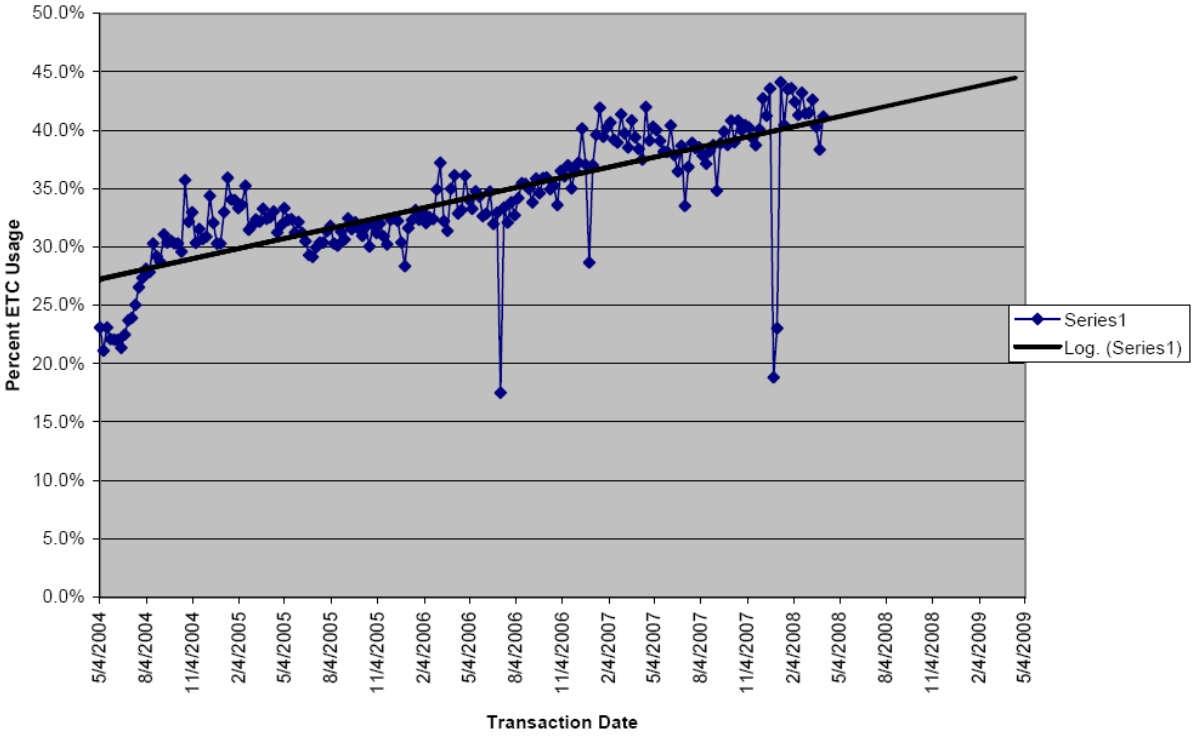


Figure B-1: Antioch PM Peak Period ETC Usage 2004-2008

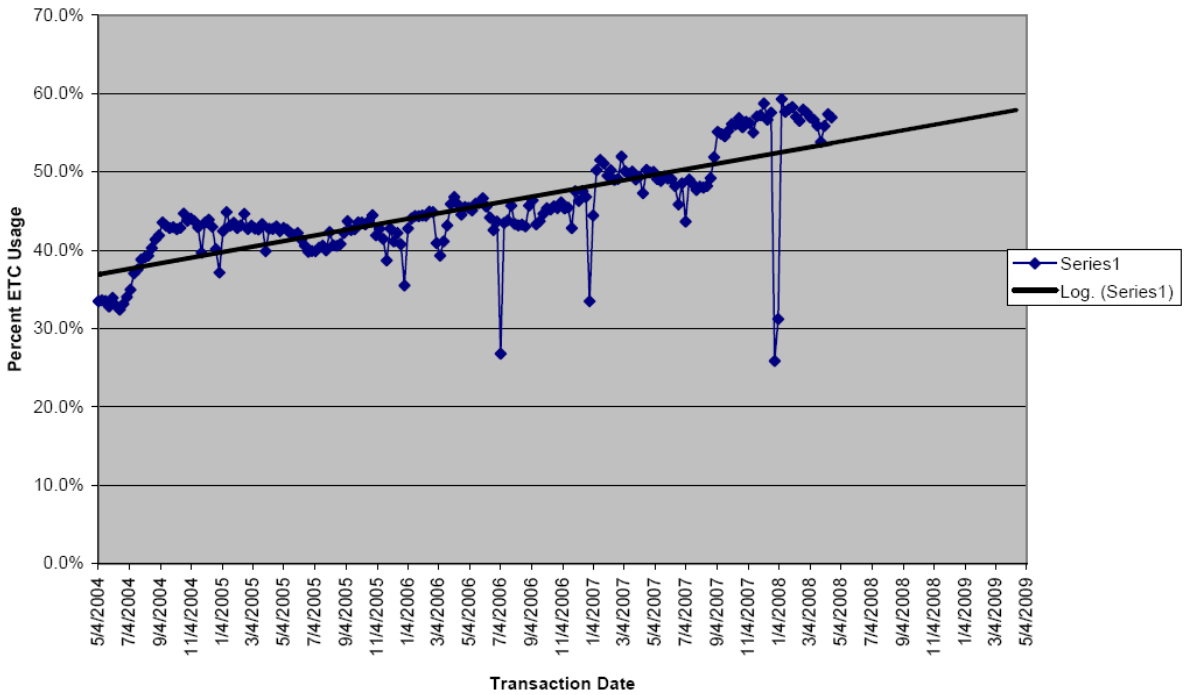


Figure B-2: Benicia-Martinez PM Peak ETC Usage Trendline

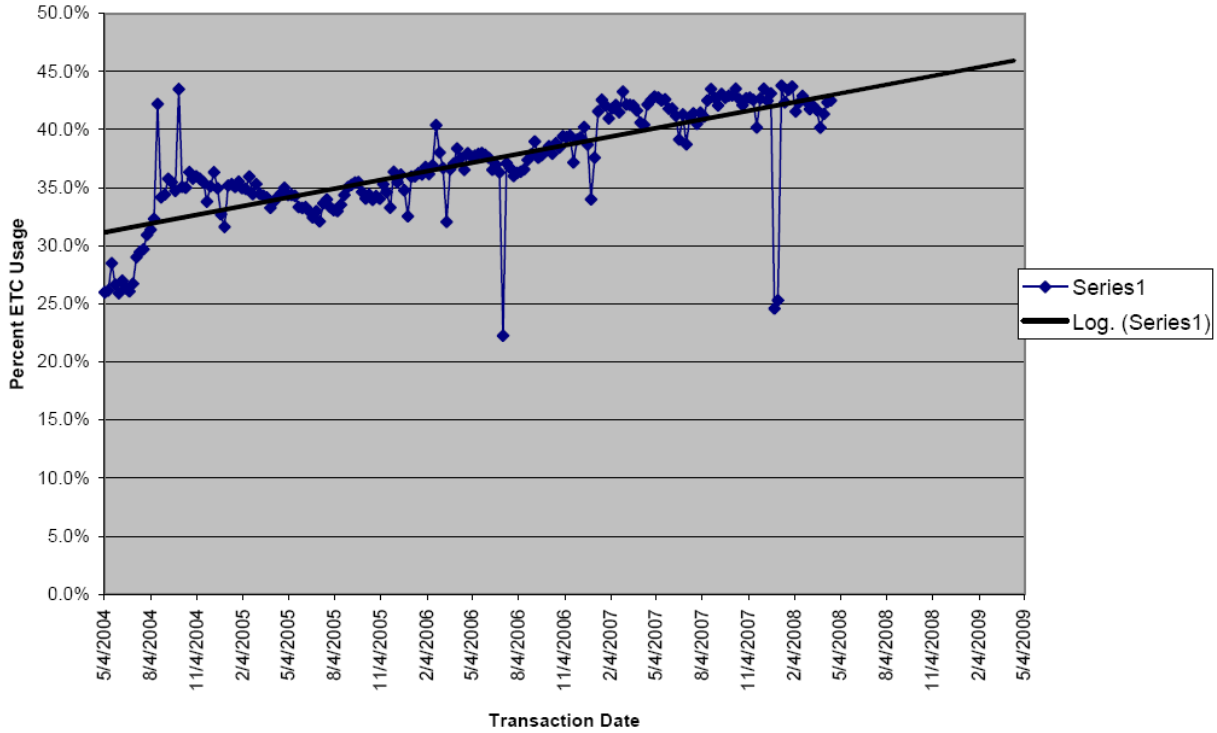


Figure B-3: Carquinez PM Peak ETC Usage Trendline

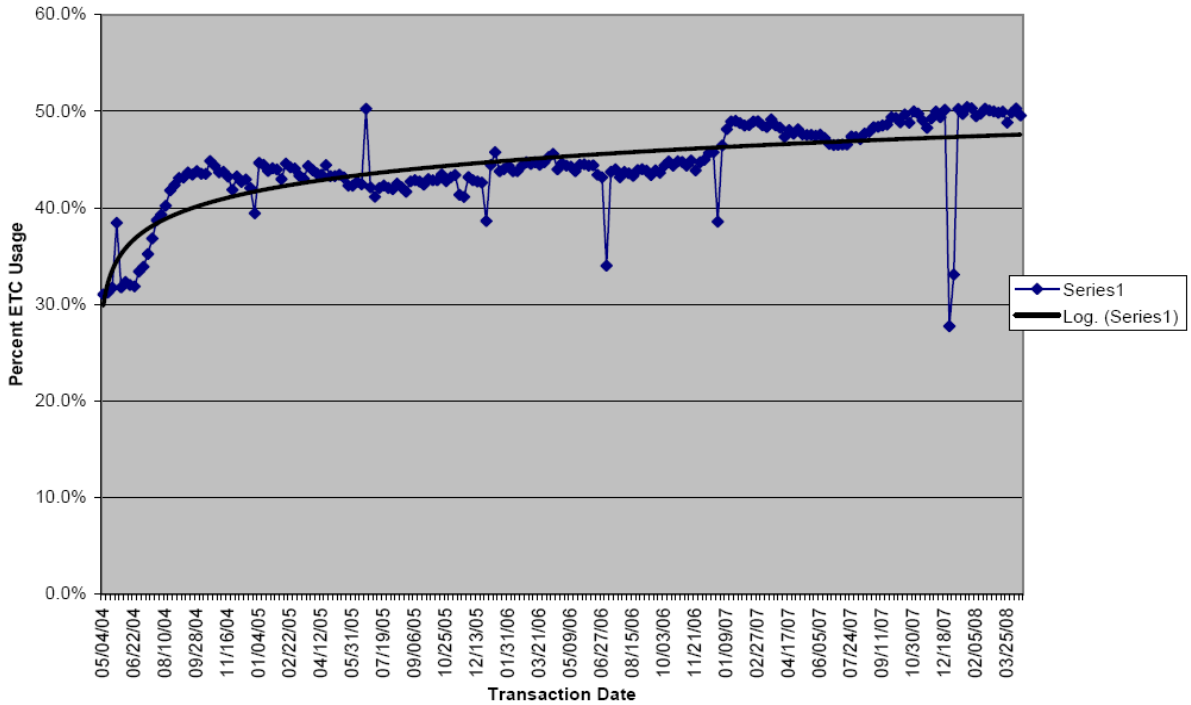


Figure B-4: Dumbarton AM Peak ETC Usage Trendline

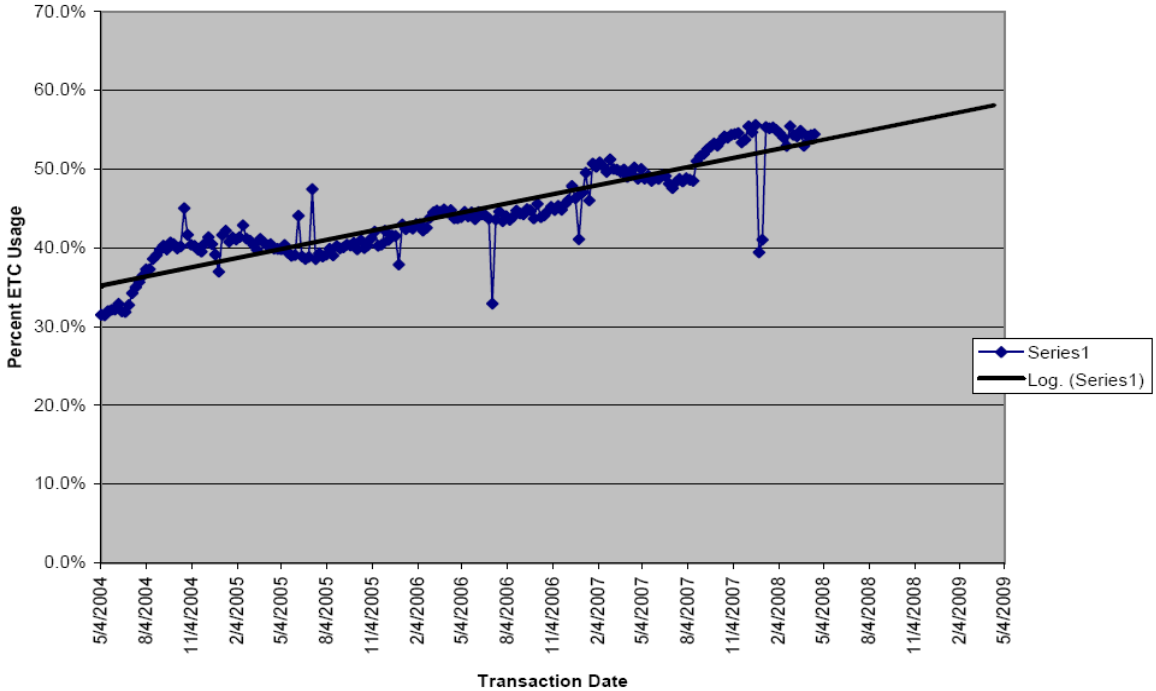


Figure B-5: Richmond-San Rafael PM Peak ETC Usage Trendline

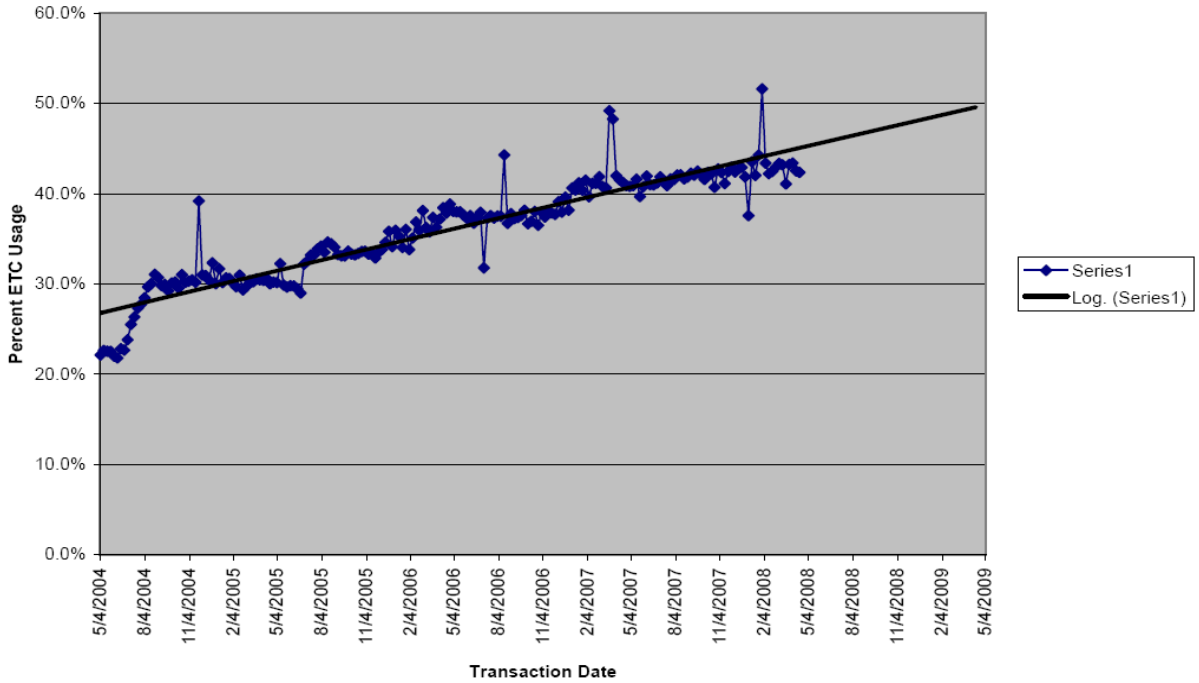


Figure B-6: San Francisco/Oakland Bay Bridge AM Peak ETC Usage Trendline

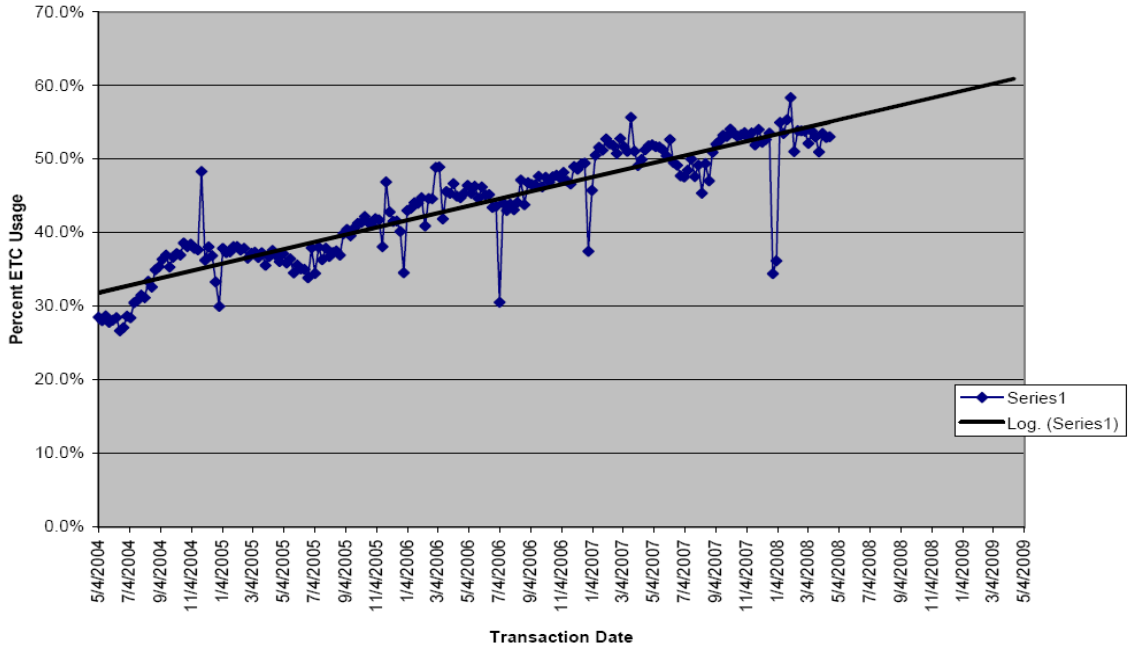


Figure B-7: San Francisco/Oakland Bay Bridge PM Peak Usage Trendline

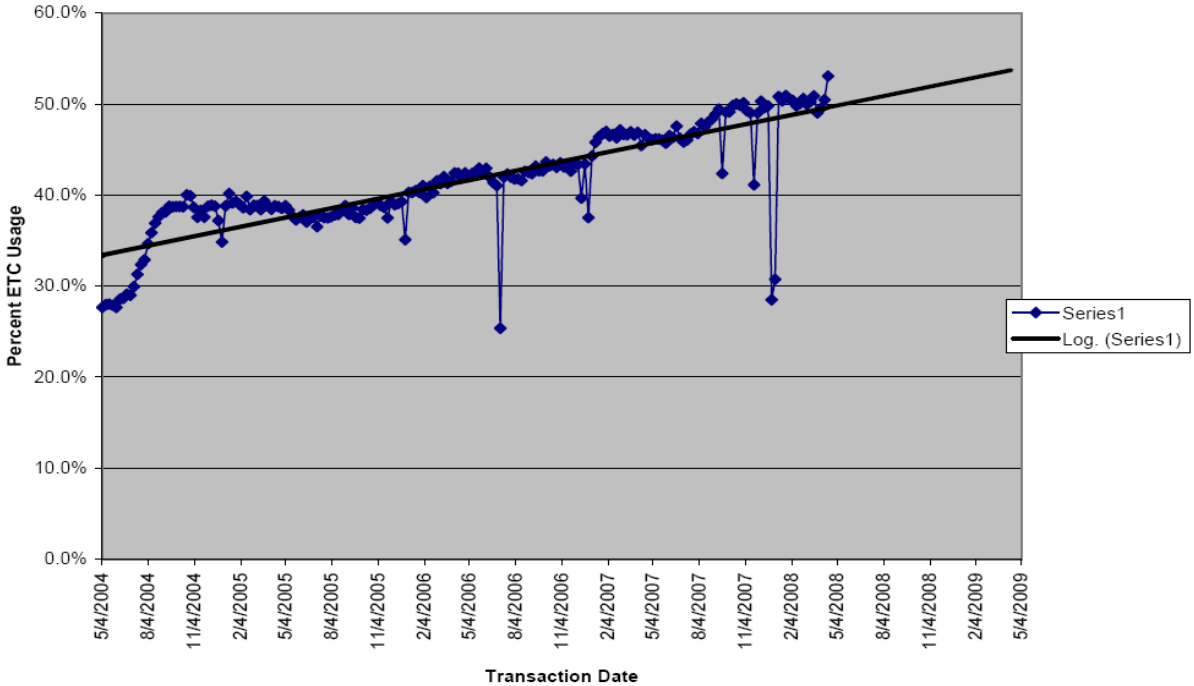


Figure B-8: San Mateo – Hayward AM Peak ETC Usage Trendline

Appendix C – Antioch Bridge Facility Review

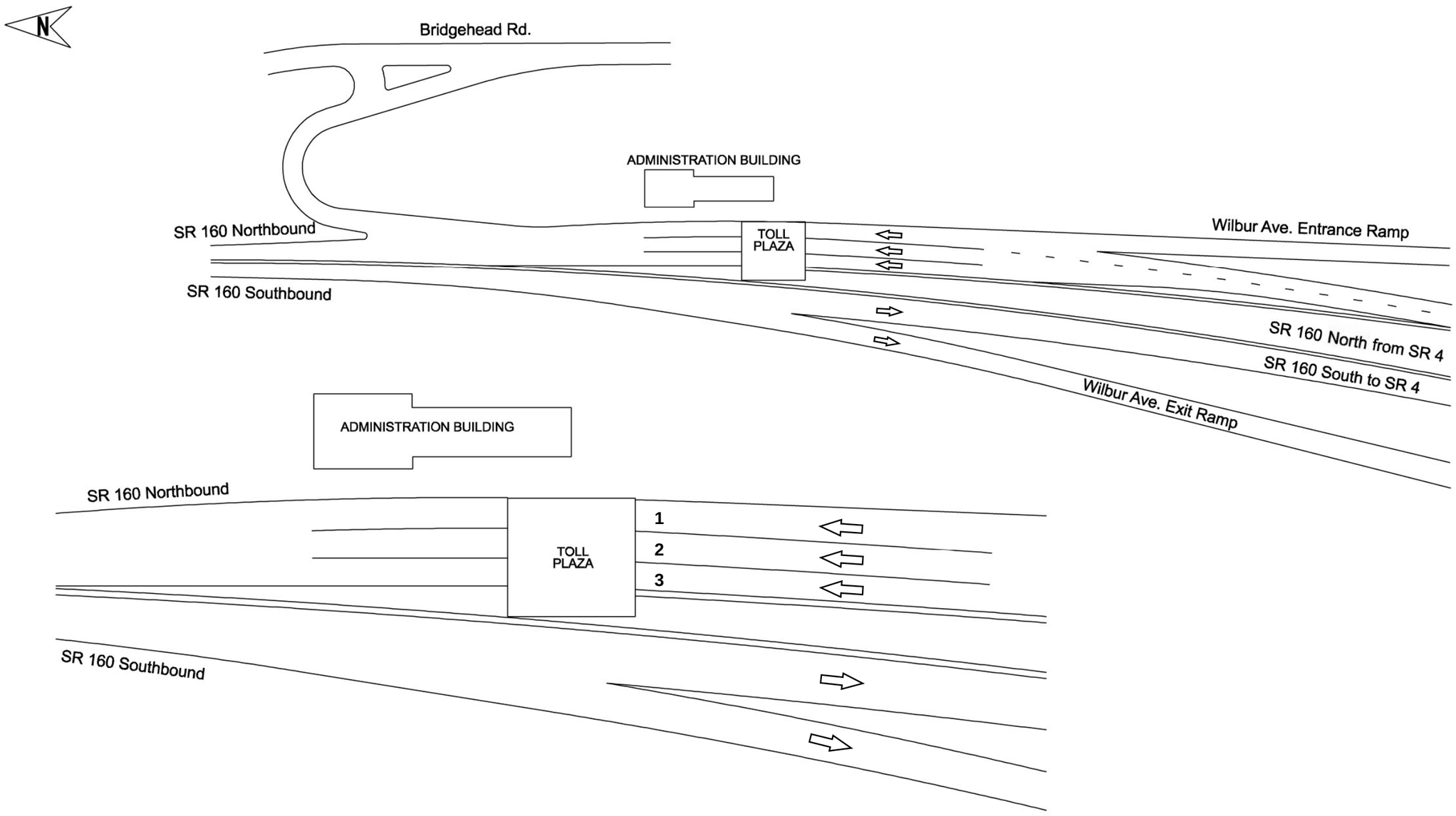


Figure 1 - Antioch Bridge Plaza Configuration

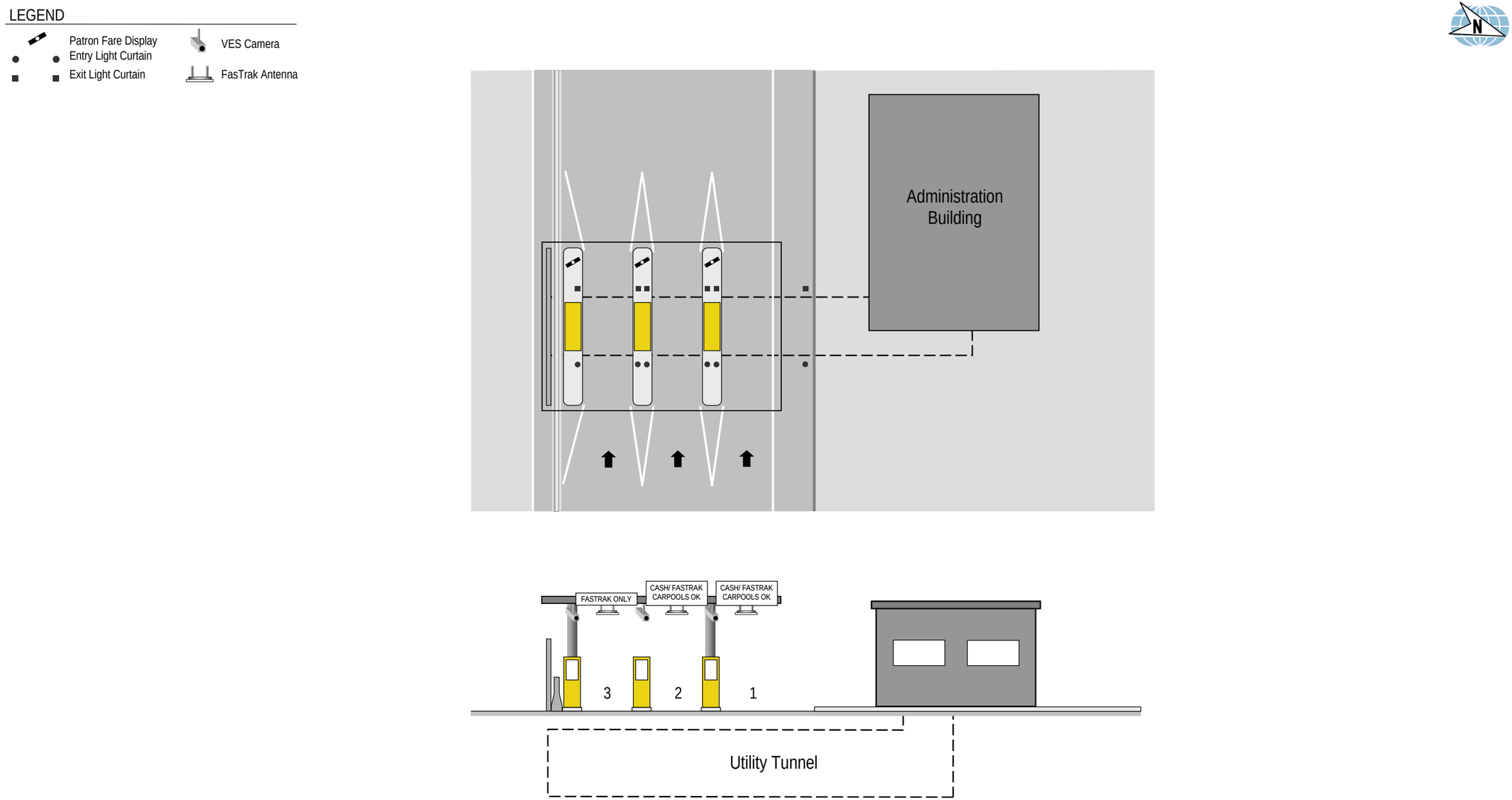


Figure 2 - Antioch Schematic Plan & Elevation View

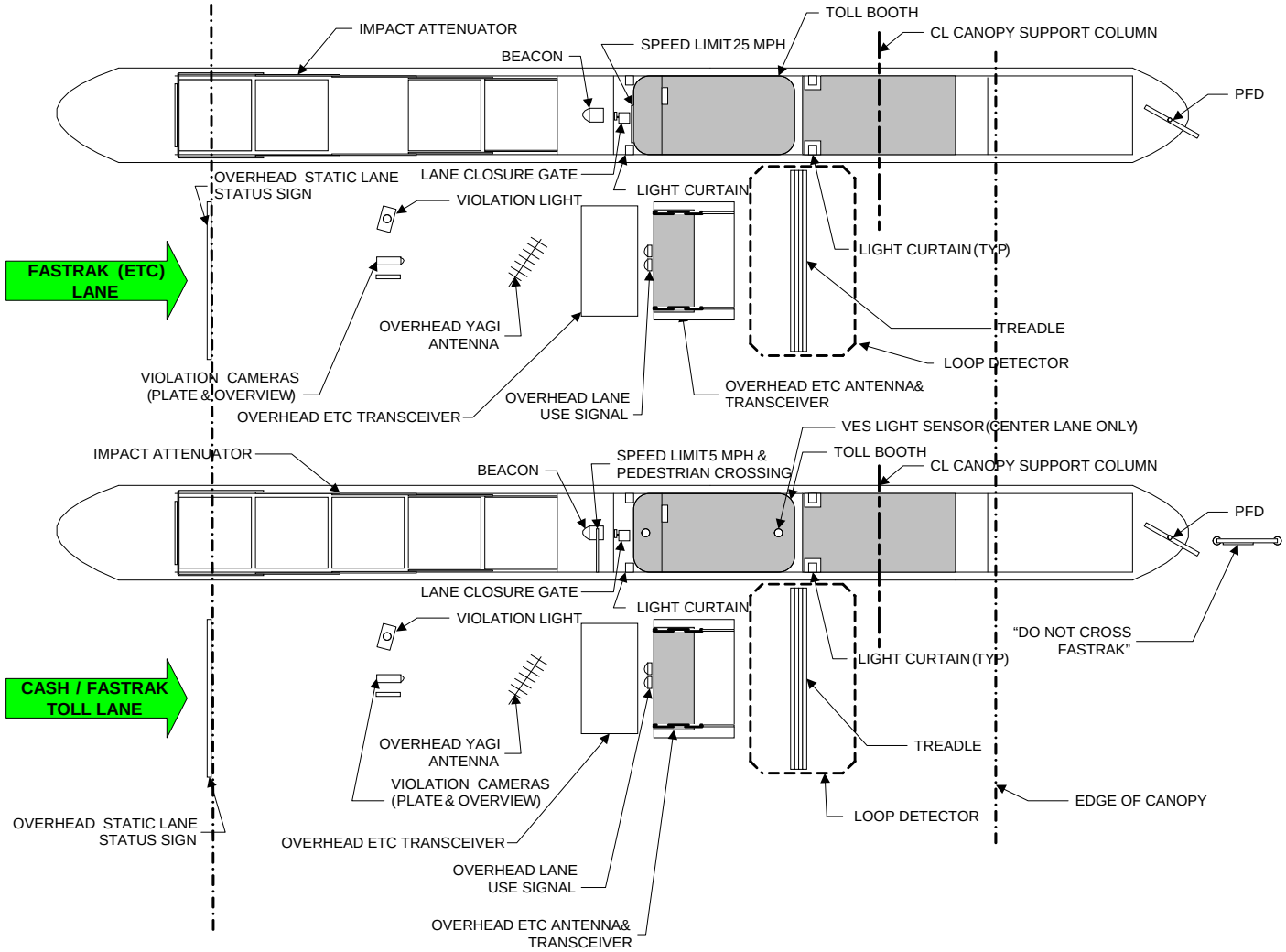


Figure 3 - Antioch Toll Plaza Lane Equipment Configuration

Appendix D – Benicia-Martinez Bridge Facility Review

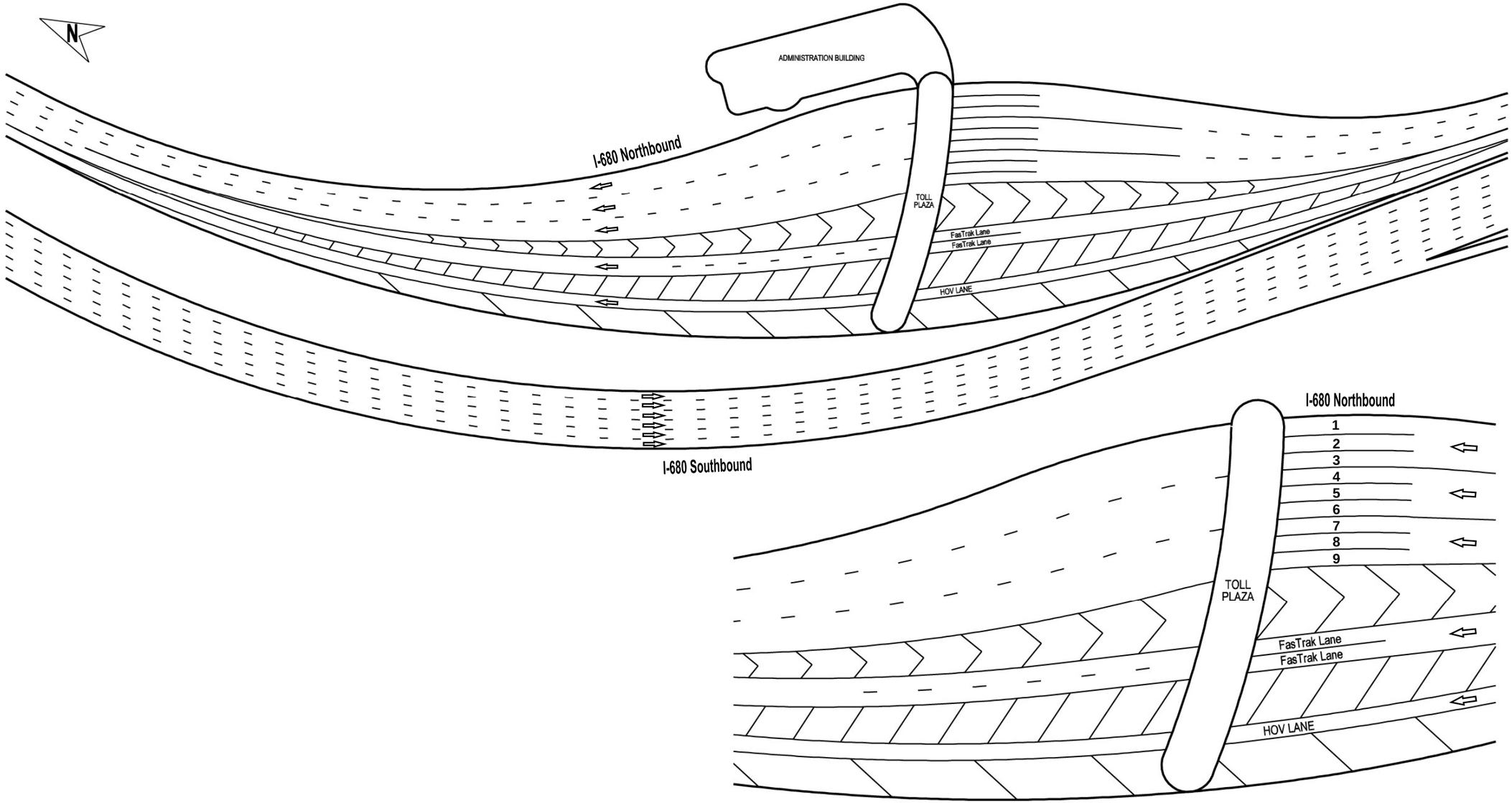


Figure 1 - Benicia-Martinez Bridge Plaza Configuration

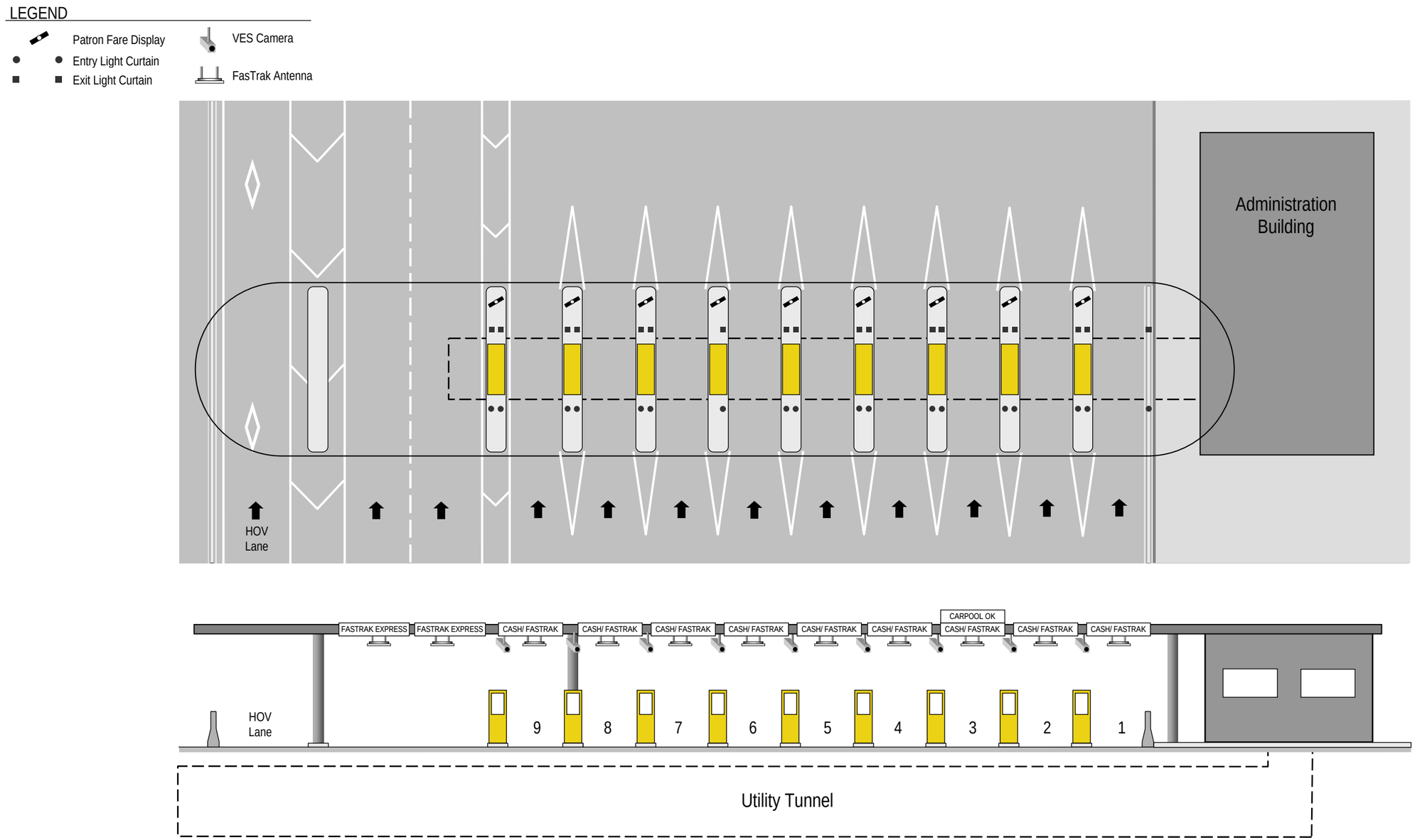


Figure 2 - Benicia-Martinez Schematic Plan & Elevation View

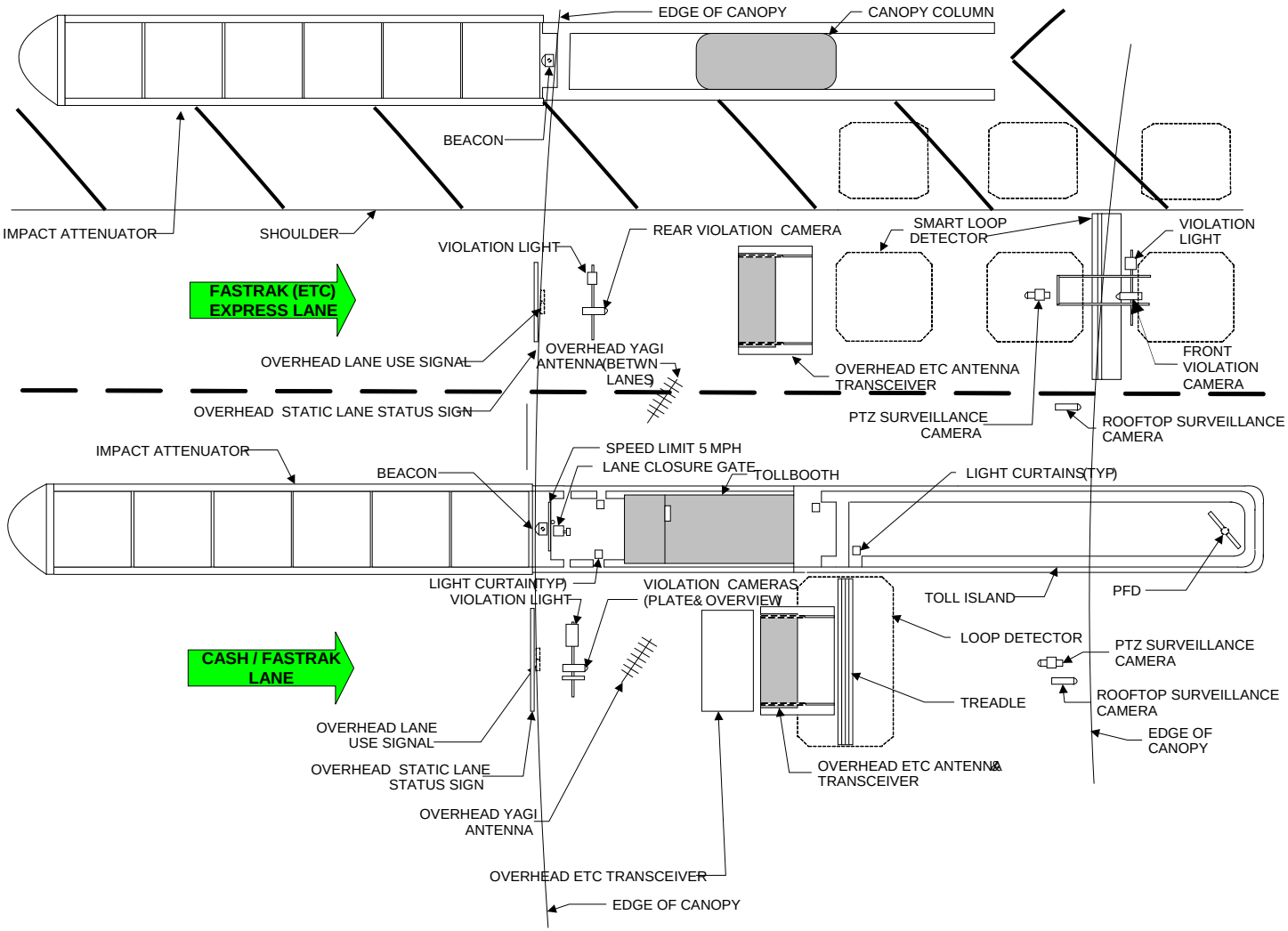


Figure 3 - Benicia-Martinez Toll Plaza Lane Equipment Configuration

Appendix E – Carquinez Bridge Facility Review

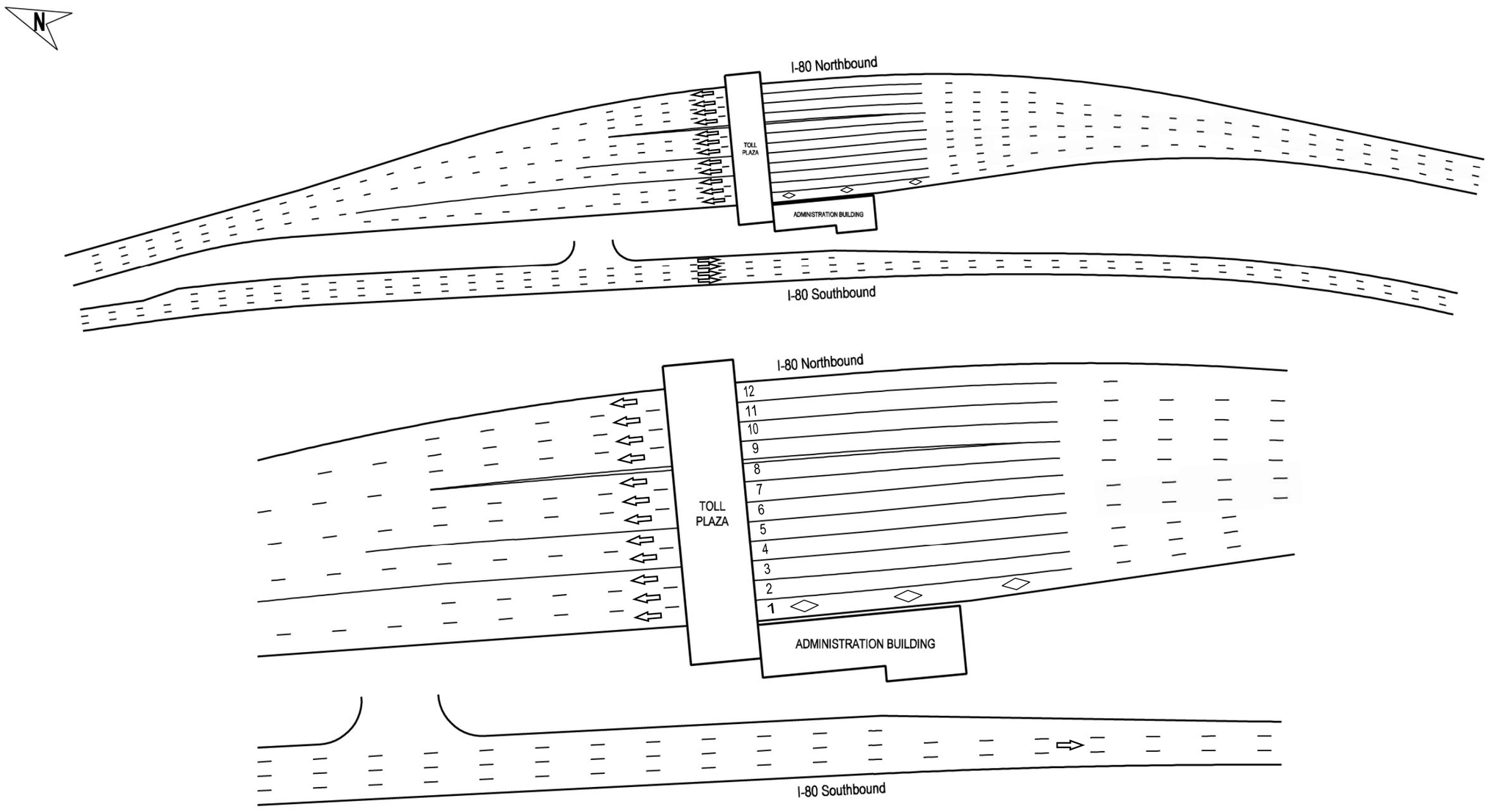


Figure 1 - Carquinez Bridge Plaza Configuration

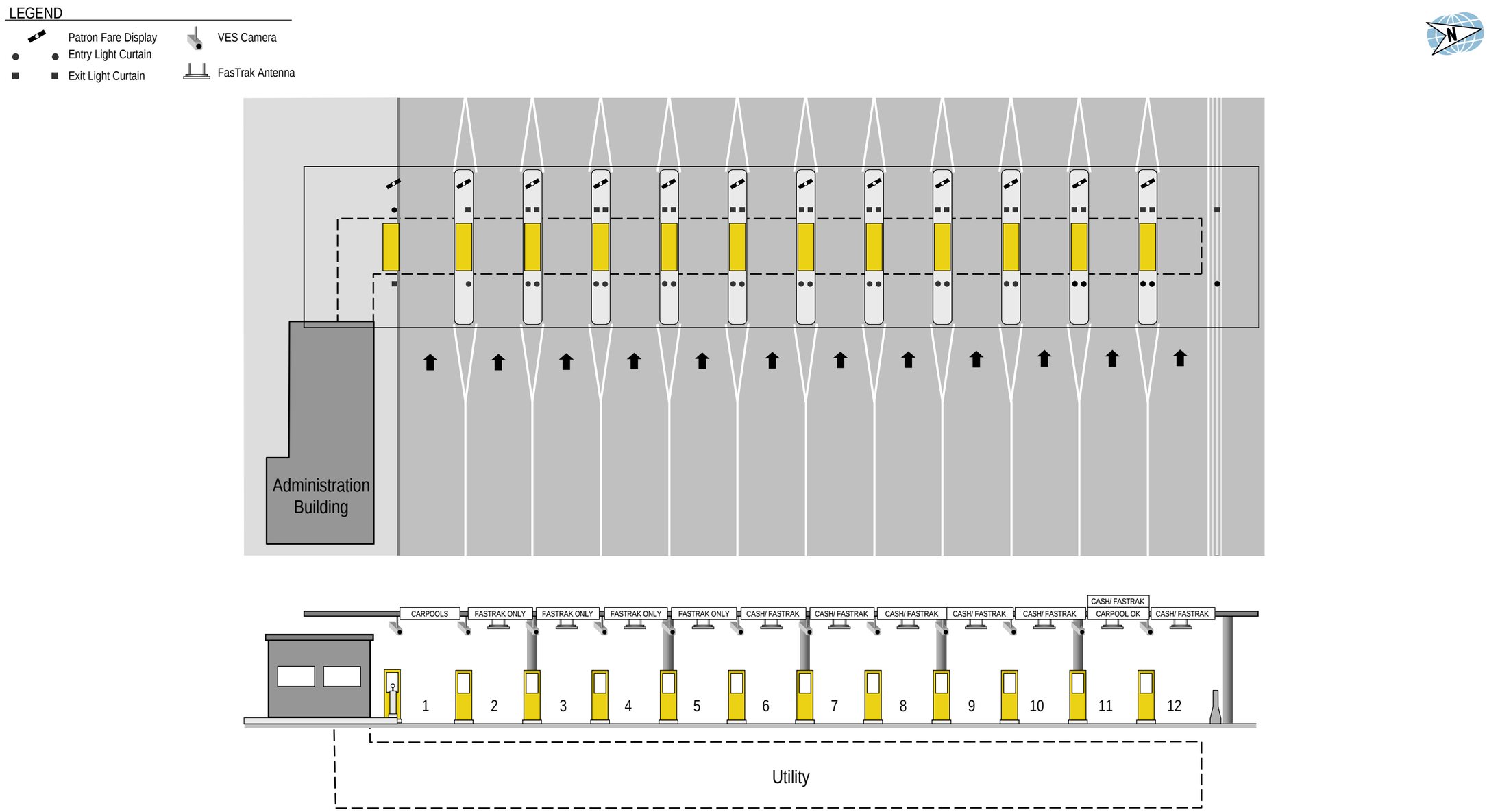


Figure 2 - Carquinez Schematic Plan & Elevation View

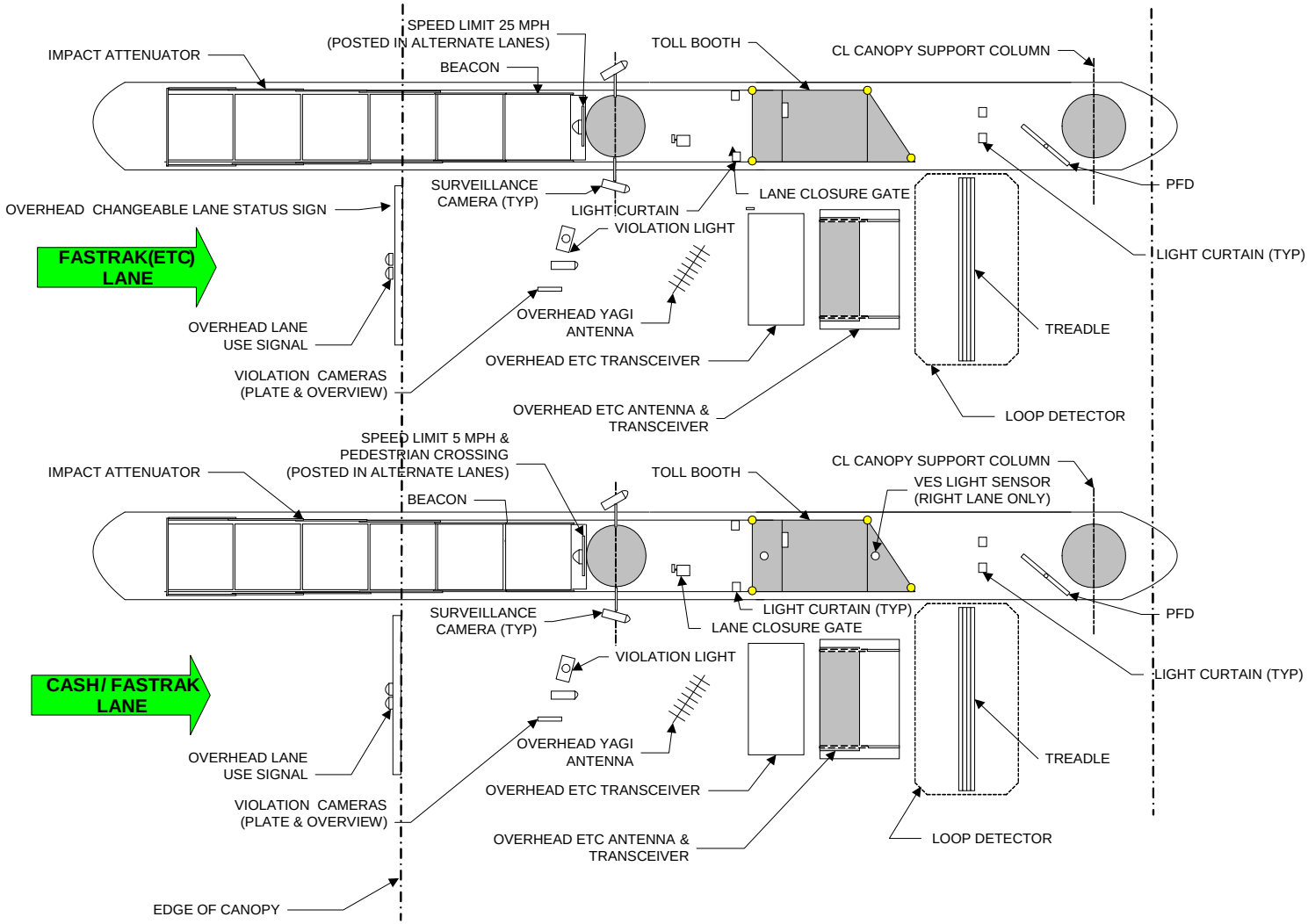


Figure 3 - Carquinez Toll Plaza Lane Equipment Configuration

Appendix F – Dumbarton Bridge Facility Review

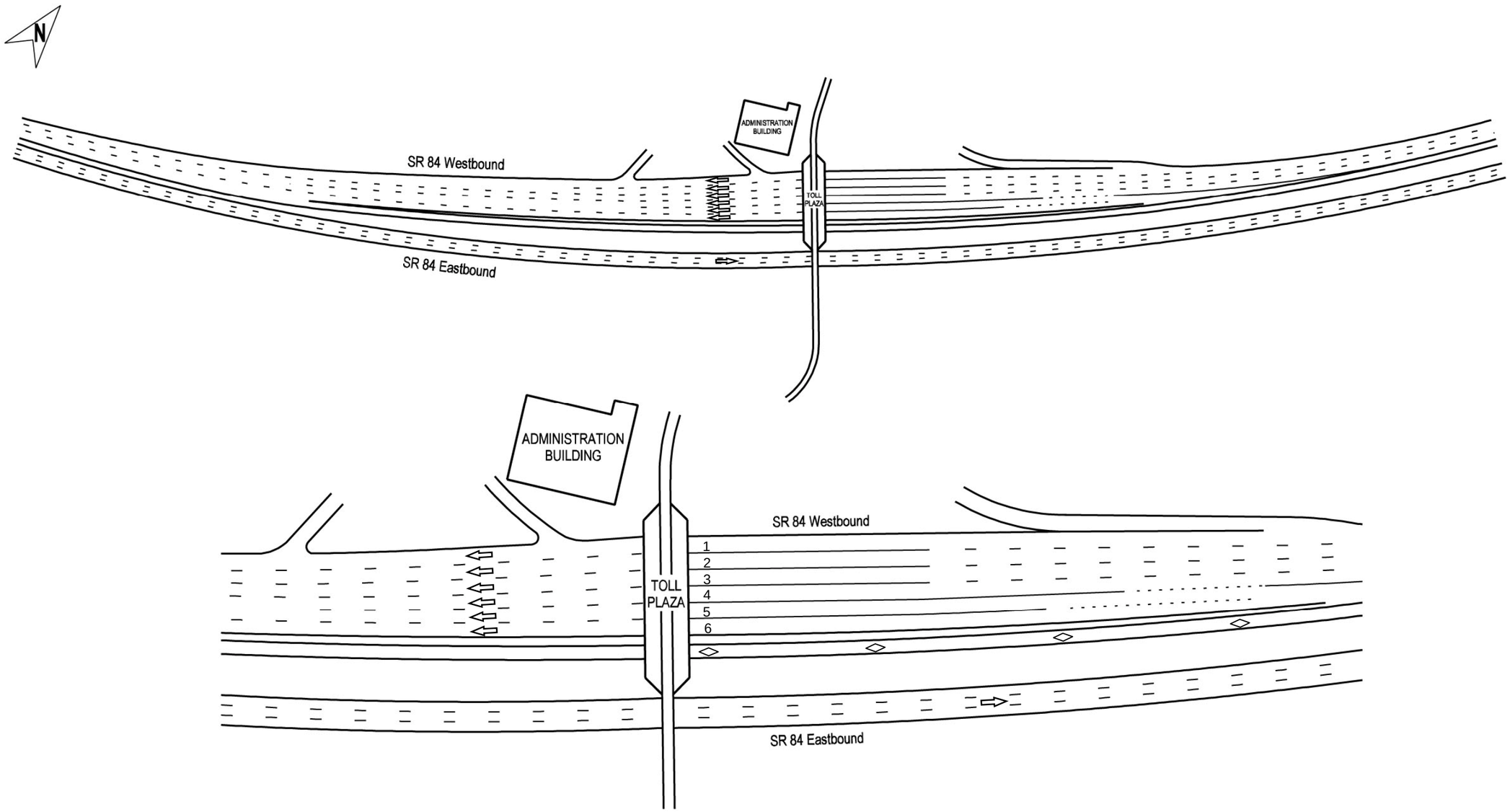


Figure 1 – Dumbarton Plaza Configuration

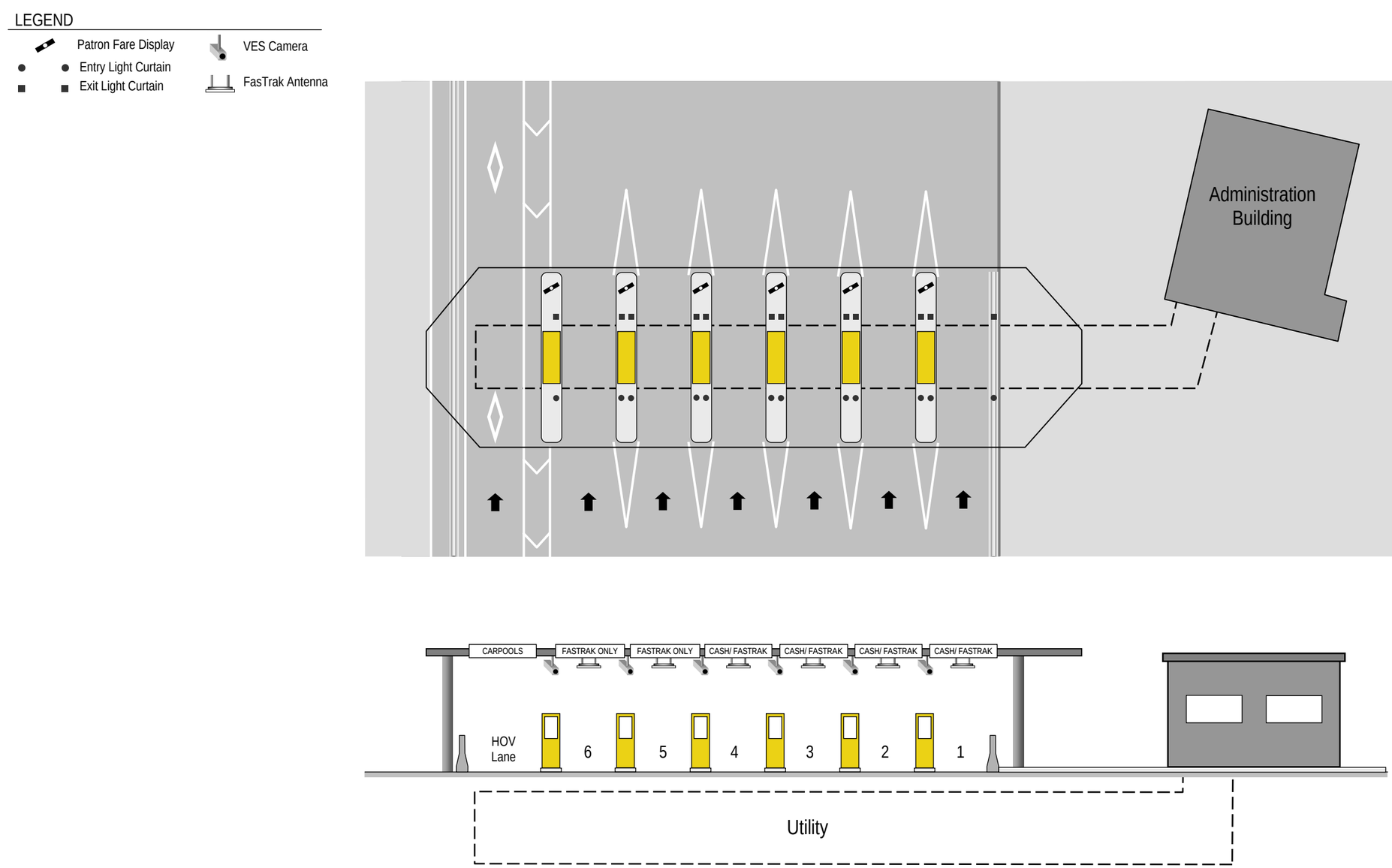


Figure 2 – Dumbarton Schematic Plan & Elevation View

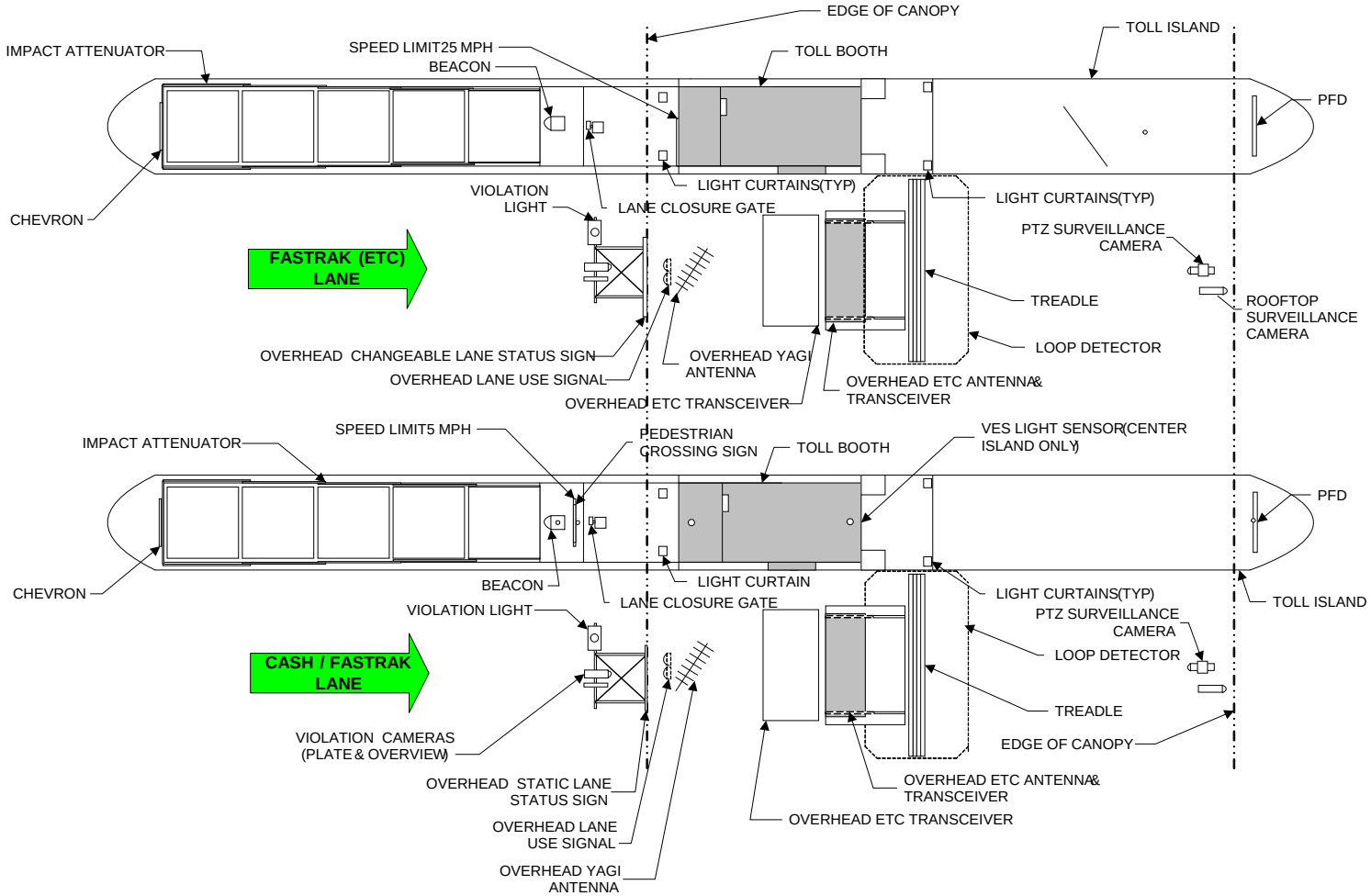


Figure 3 – Dumbarton Toll Plaza Lane Equipment Configuration

Appendix G – Richmond-San Rafael Bridge Facility Review

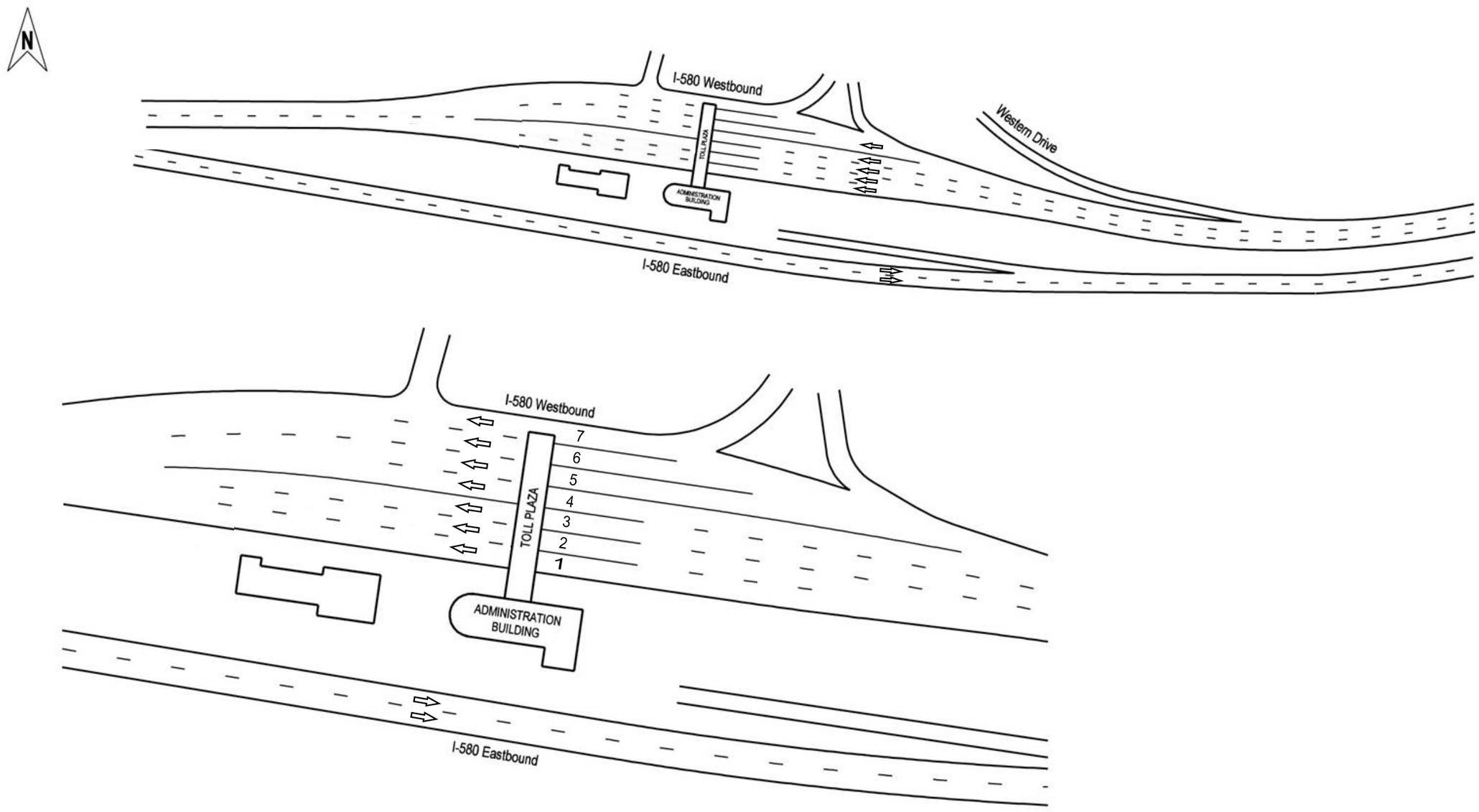


Figure 1 – Richmond-San Rafael Bridge Plaza Configuration

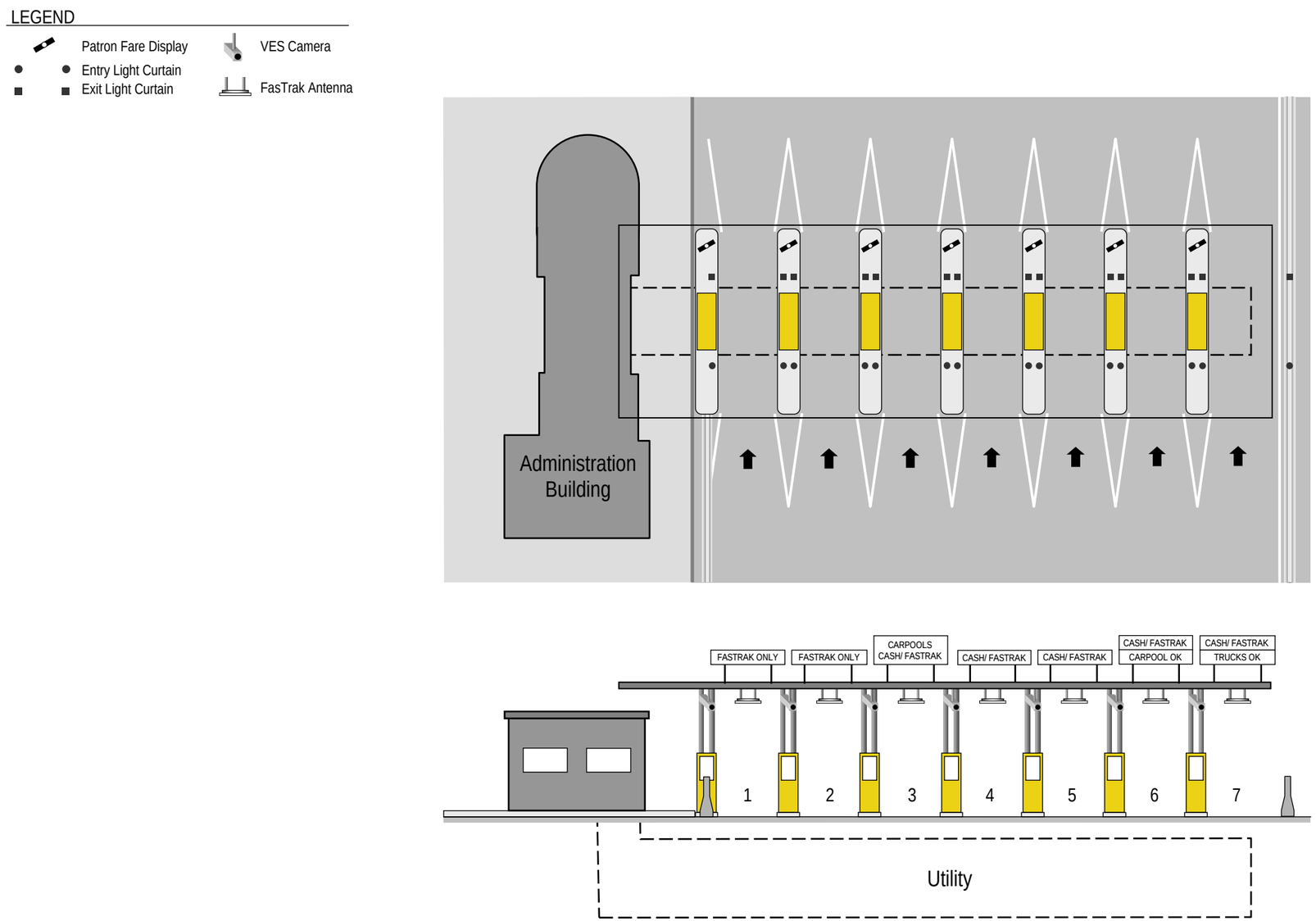


Figure 2 – Richmond-San Rafael Schematic Plan & Elevation View

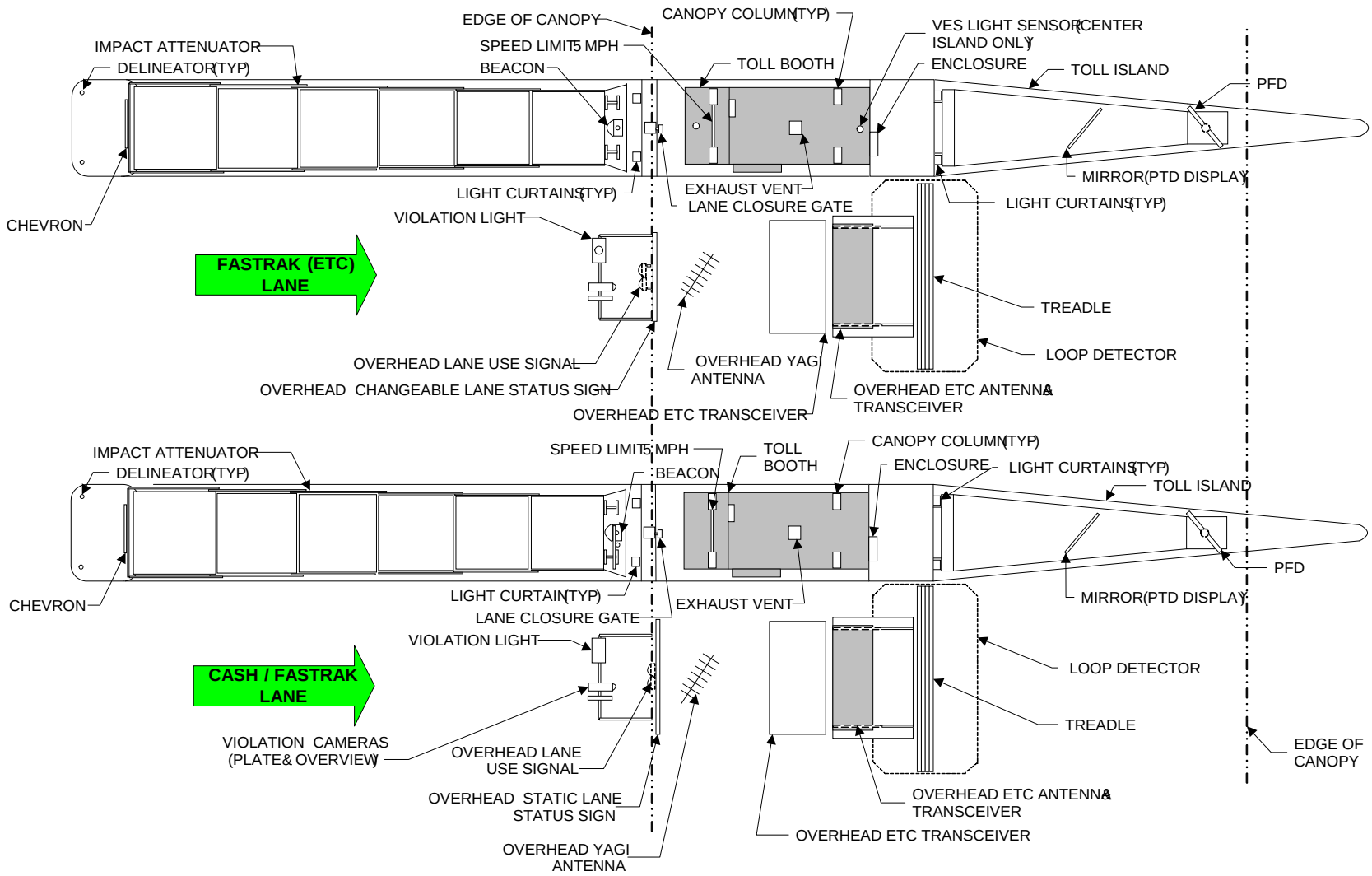

EDGE OF CANOPY
CANOPY COLUMN (TYP)
VES LIGHT SENSOR (CENTER ISLAND ONLY)
IMPACT ATTENUATOR
SPEED LIMIT 5 MPH
DELINEATOR (TYP)
BEACON
TOLL BOOTH
ENCLOSURE
TOLL ISLAND
PFD
MIRROR (PTD DISPLAY)
LIGHT CURTAINS (TYP)
EXHAUST VENT
LANE CLOSURE GATE
LIGHT CURTAINS (TYP)
CHEVRON
VIOLATION LIGHT
FASTRAK (ETC) LANE
TREADLE
LOOP DETECTOR
OVERHEAD LANE USE SIGNAL
OVERHEAD YAGI ANTENNA
OVERHEAD CHANGEABLE LANE STATUS SIGN
OVERHEAD ETC ANTENNA & TRANSCEIVER
OVERHEAD ETC TRANSCEIVER
IMPACT ATTENUATOR
SPEED LIMIT 5 MPH
TOLL BOOTH
CANOPY COLUMN (TYP)
DELINEATOR (TYP)
BEACON
ENCLOSURE
LIGHT CURTAINS (TYP)
TOLL ISLAND
PFD
CHEVRON
LIGHT CURTAIN (TYP)
EXHAUST VENT
MIRROR (PTD DISPLAY)
LANE CLOSURE GATE
VIOLATION LIGHT
LOOP DETECTOR
CASH / FASTRAK LANE
TREADLE
VIOLATION CAMERAS (PLATE & OVERVIEW)
OVERHEAD LANE USE SIGNAL
EDGE OF CANOPY
OVERHEAD STATIC LANE STATUS SIGN
OVERHEAD ETC ANTENNA & TRANSCEIVER
OVERHEAD ETC TRANSCEIVER
OVERHEAD YAGI ANTENNA

Figure 3 – Richmond-San Rafael Toll Plaza Lane Equipment Configuration

Appendix H – San Francisco-Oakland Bay Bridge (SFOBB) Facility Review

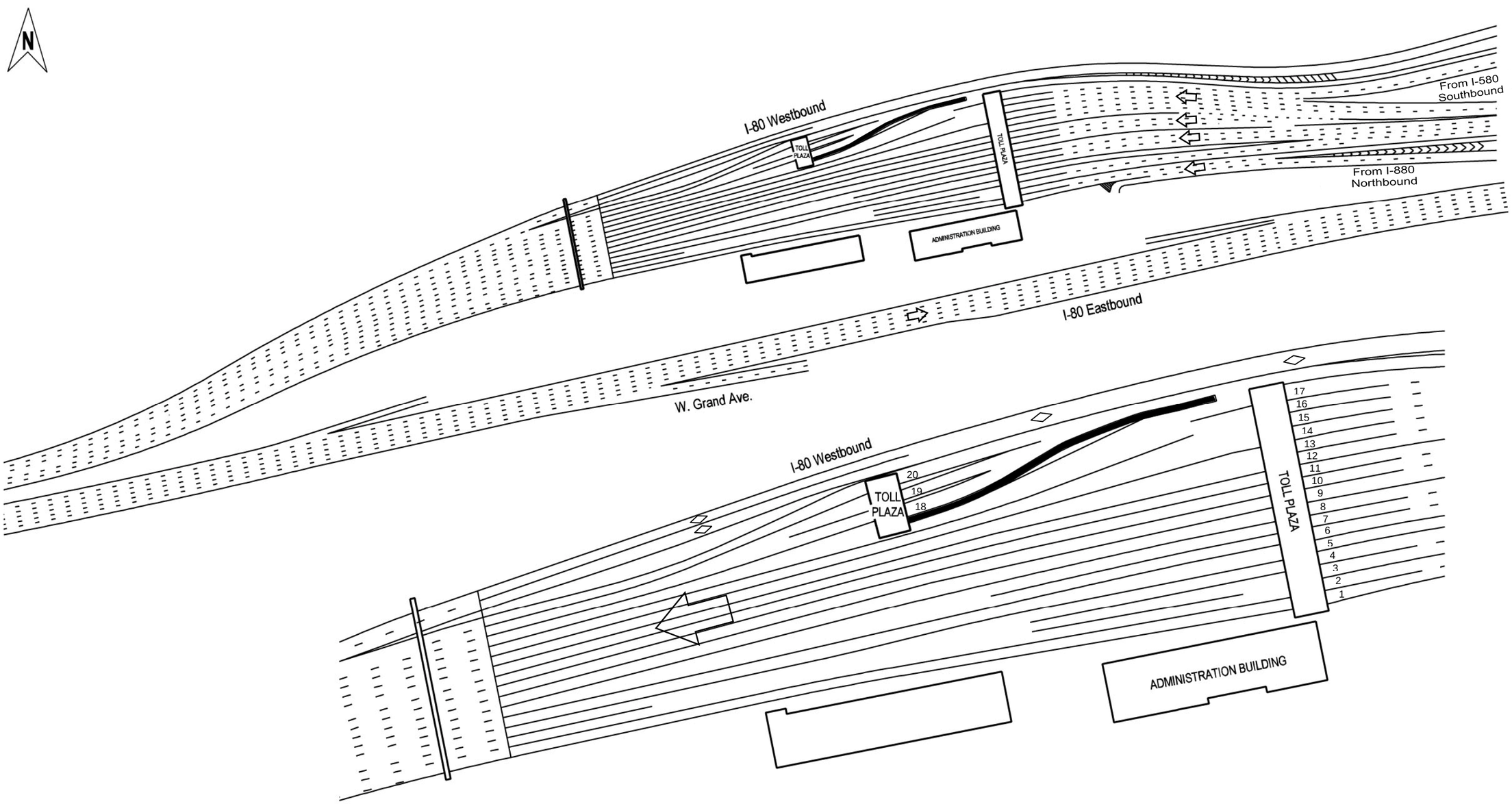


Figure 1 – SFOBB Plaza Configuration

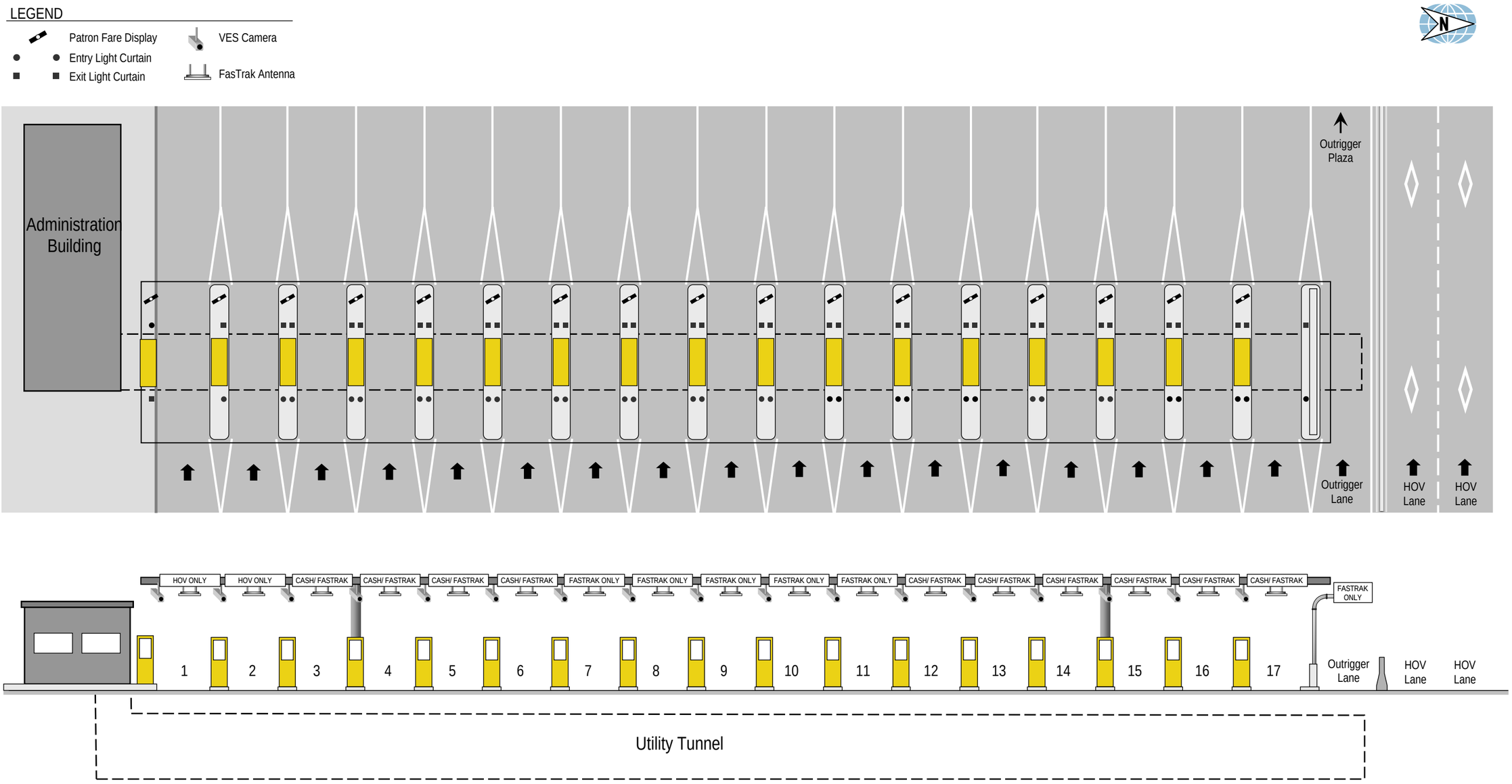


Figure 2 – SFOBB Schematic Plan & Elevation View

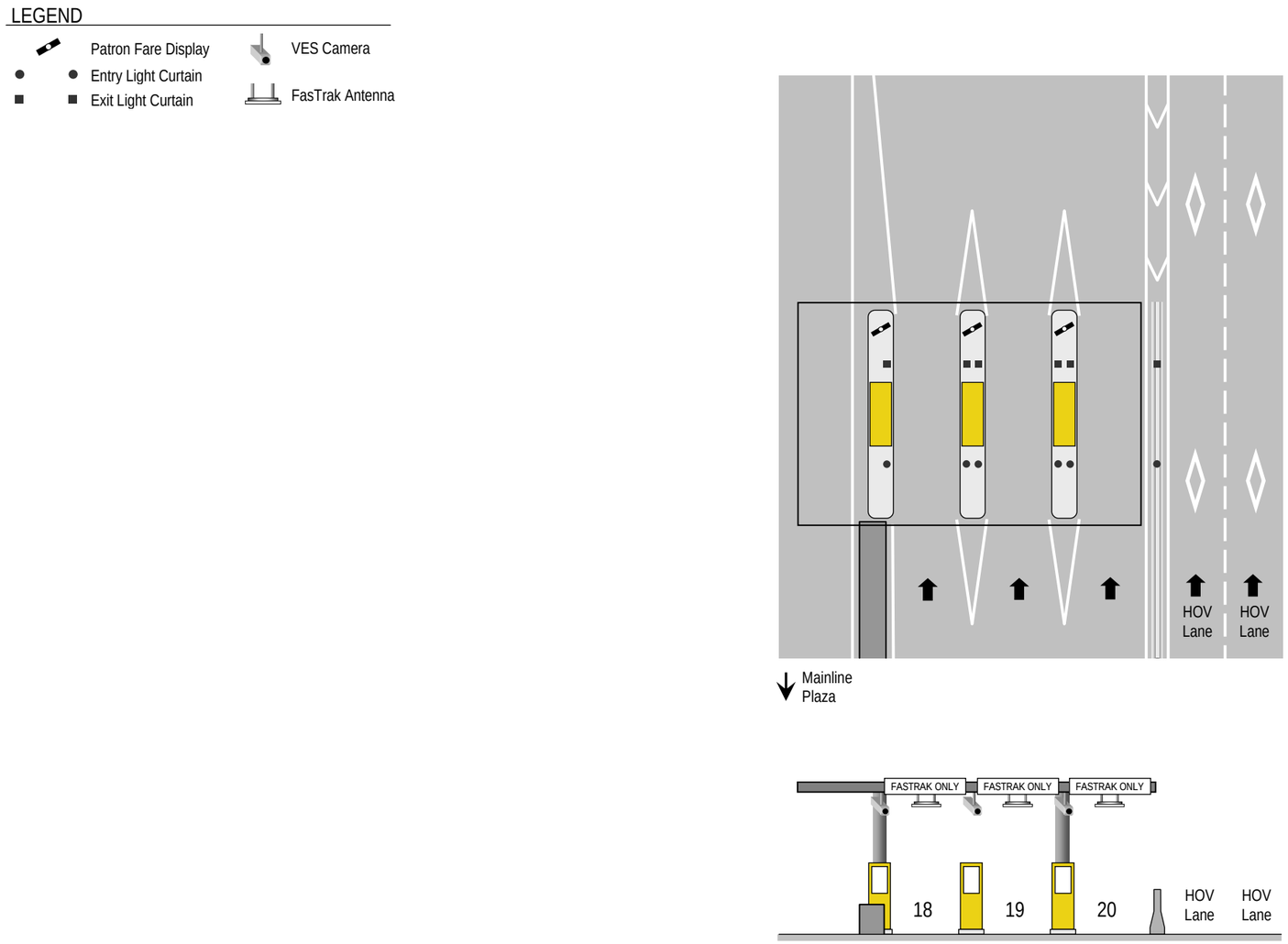


Figure 3 - SFOBB Mini-Plaza Schematic Plan & Elevation View

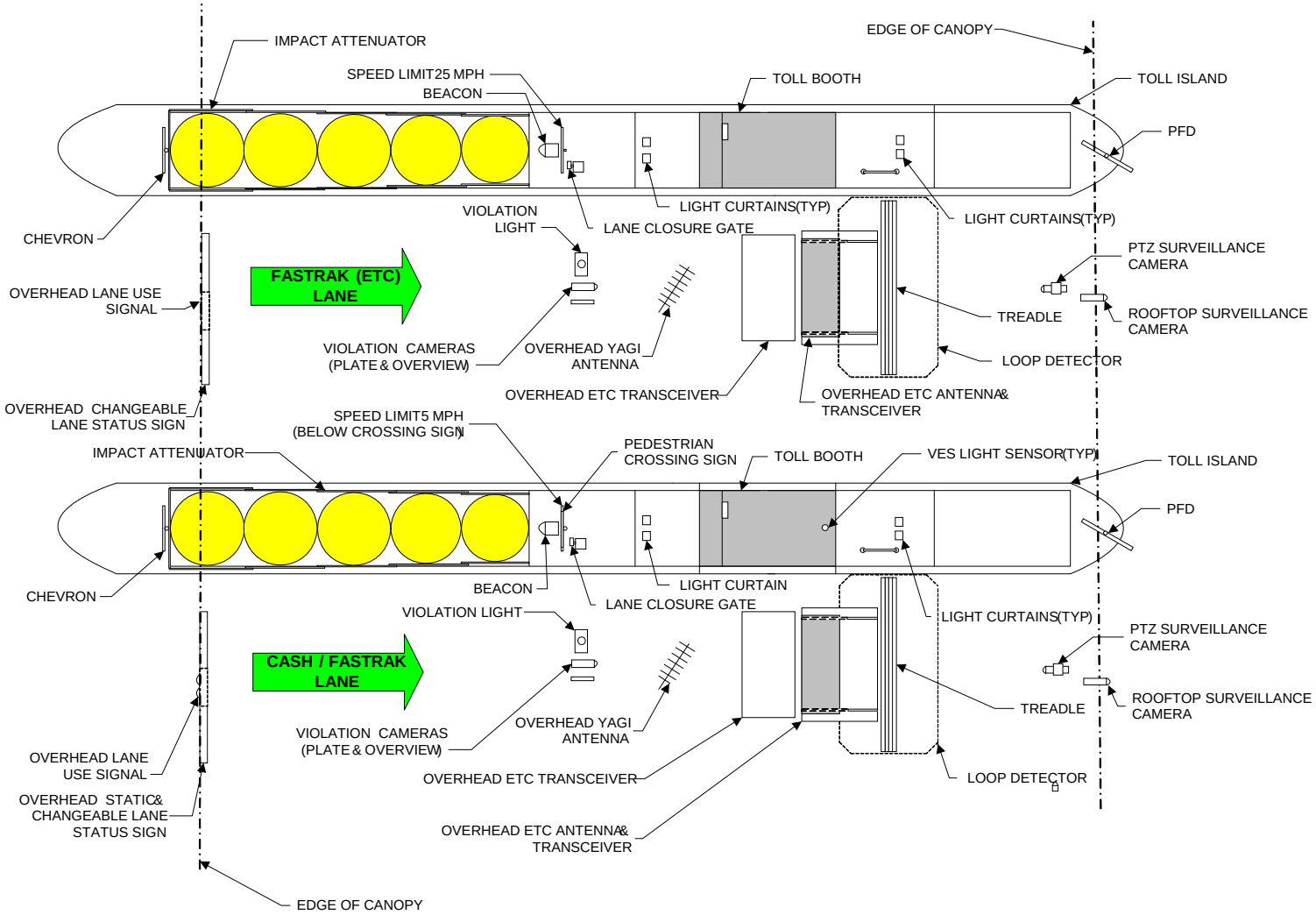
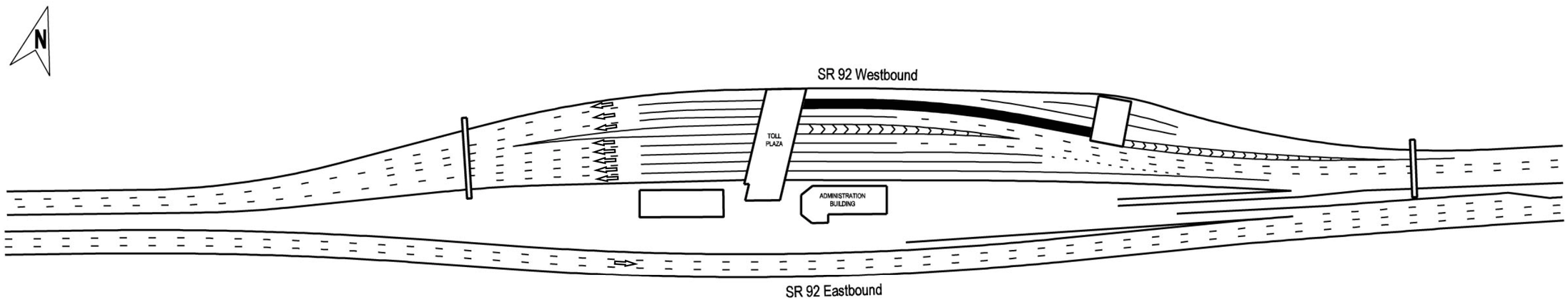


Figure 4 – SFOBB Toll Plaza Lane Equipment Configuration

Appendix I – San Mateo-Hayward Bridge Facility Review



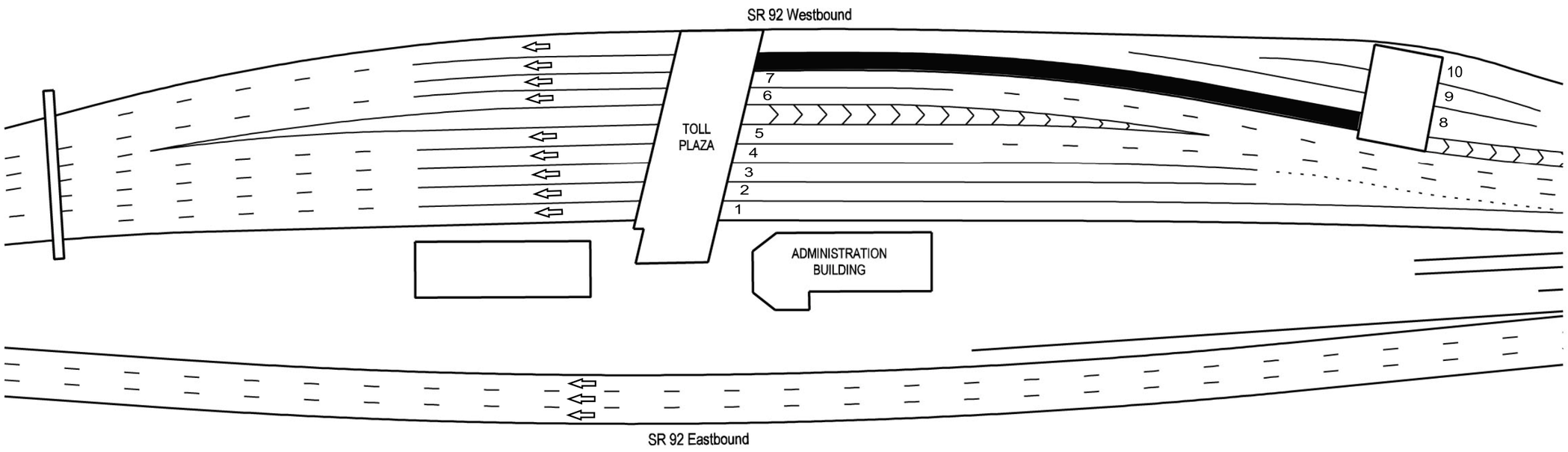


Figure 1 – San Mateo-Hayward Plaza Configuration

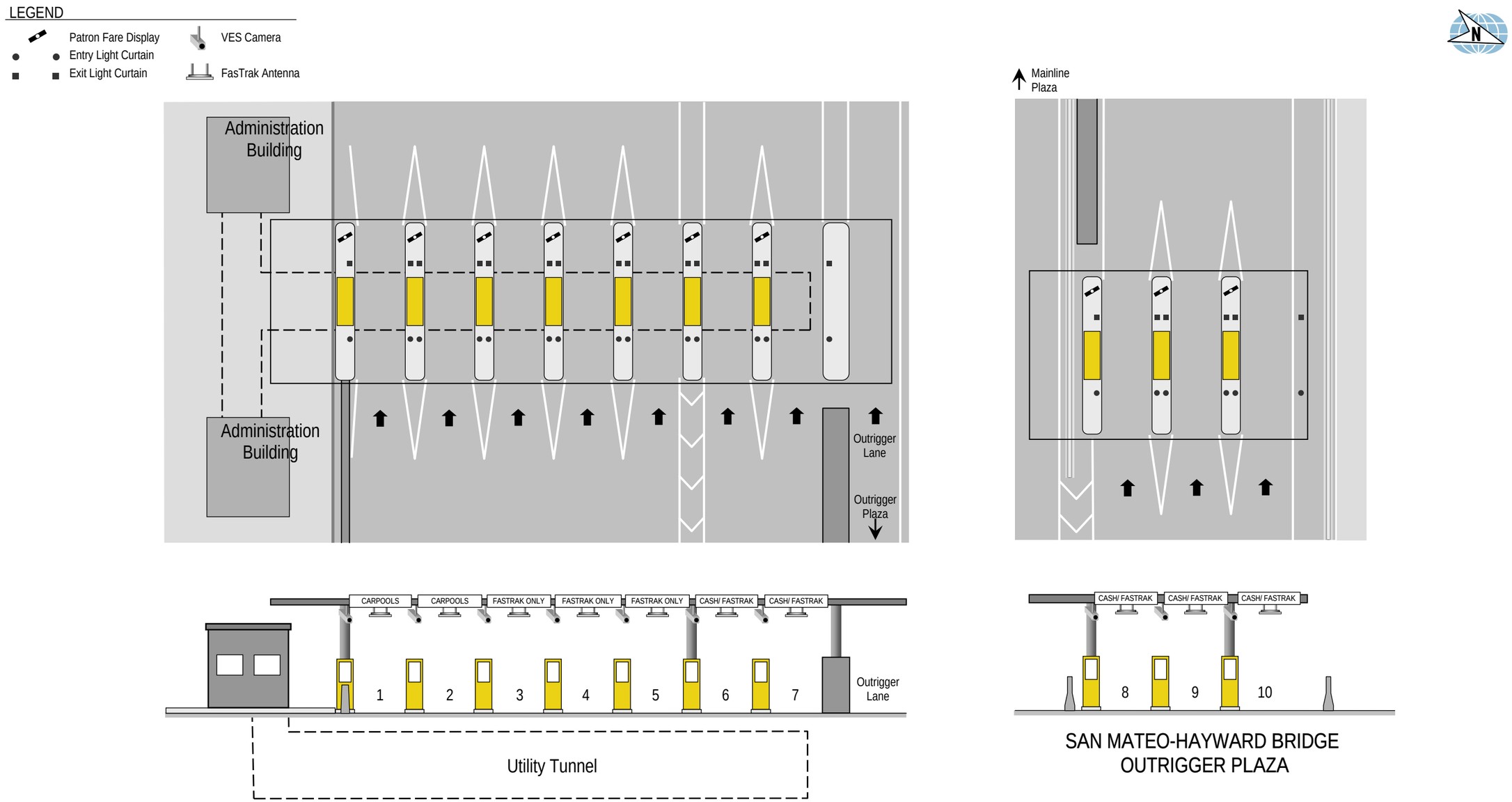


Figure 2 – San Mateo-Hayward Schematic Plan & Elevation View

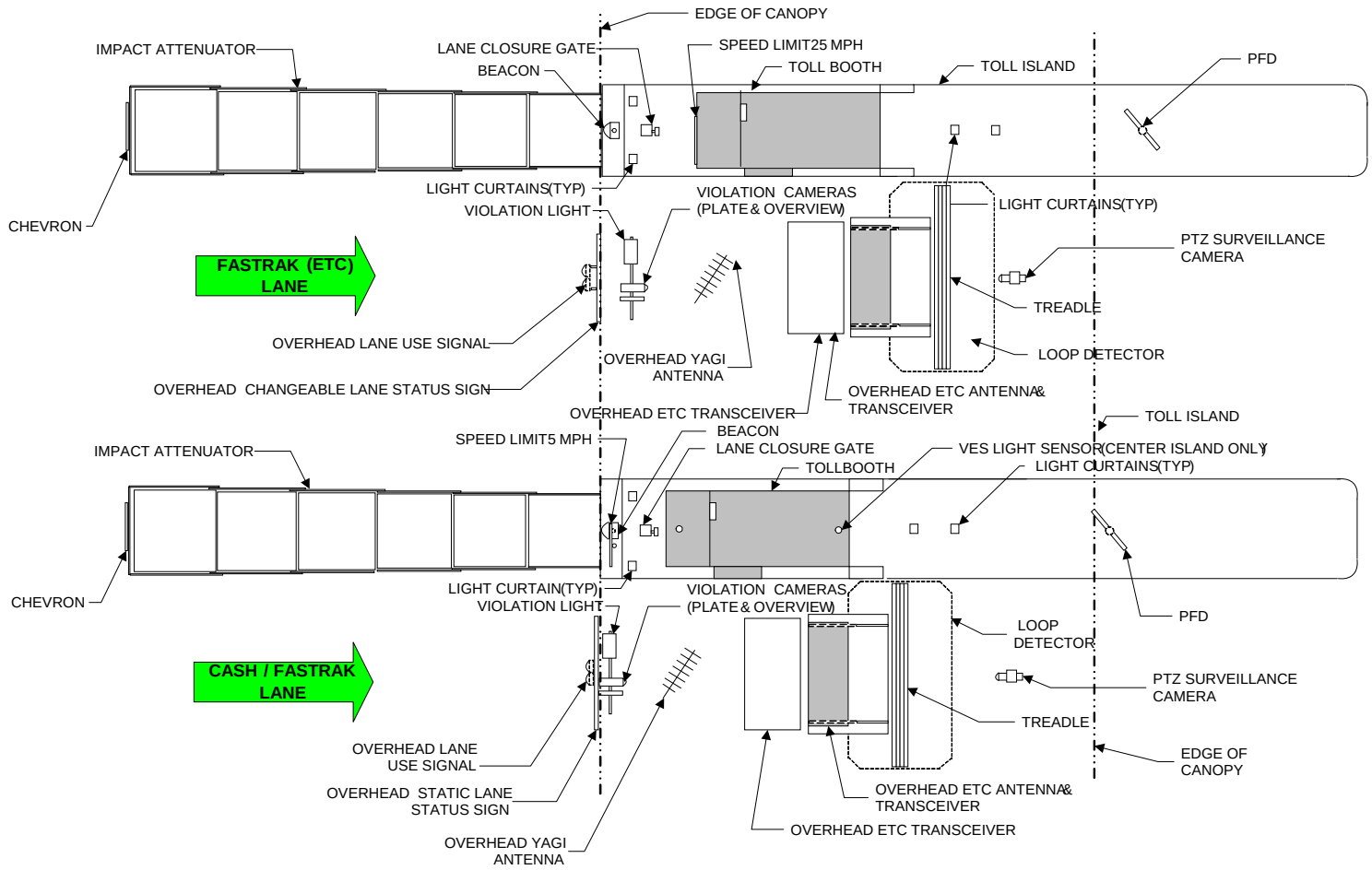


Figure 3 – San Mateo-Hayward Toll Plaza Lane Equipment Configuration

ATTACHMENT E:

Task 5.0 Technology Review

Technical Memorandum – Final Report

BATA Video Tolling Demonstration Project

Task 5.0: Technology Review

July 9, 2008

Prepared for:

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DOCUMENT CONTROL PANEL		
File Name:	*Technical Memorandum – Technology Review*	
File Location:		
Deliverable Number:	5.2	
Version Number:	0.0	
	Name	**Date**
Created By:	Bonds	5/19/2008
Reviewed By:	Dillard	5/20/2008
	L. Lee, BATA	5/30/2008
	Dillard	6/2/2008
	BATA, ACS	6/12/2008
	BATA, ACS	7/7/2008
Modified By:	Bonds	5/23/2008
	Bonds	6/3/2008
	Dillard	6/9/2008
	Dillard	6/18/2008
	Bonds	7/9/2008
Completed By:	Dillard	7/23/08

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1.0 Introduction

1.1 Purpose

This memorandum summarizes a review of the technology currently supporting BATA's toll collection operation, including the current toll system, the new violation enforcement system (VES), and the back office system. Details were gathered from several sources, including BATA Interface Control Documents, the TRMI VES proposal, toll plaza site visits and meetings with BATA and ACS personnel. Appendix A provides a list of the reference material used in this technical review.

This document is intended to provide an overview of the existing systems capabilities and identify potential issues that might impact the implementation of video tolling. As one of the deliverables of the BATA Video Tolling Demonstration Project, this memorandum will serve as the foundation for the forthcoming business rules and operational concepts documents for the Video Tolling Demonstration Project.

1.2 Context within Project and Toll Industry

Video tolling is a relatively new concept in the United States, but has been in use outside the U.S. for some time. In particular, Europe has standardized license plates, making video tolling a more reliable alternative. It is currently being considered or deployed by several toll agencies to displace traditional cash toll collection and augment electronic toll collection (ETC), and in some cases is the primary toll collection technology employed on a toll facility, as described in the Task 1.0 Video Tolling Concepts Review document.

In early deployments of video cameras in conjunction with toll enforcement technology, circa 1995, all images were manually processed. This practice was expensive, time-consuming, and error-prone, leading agencies to rely on it only as necessary to address violations. As software and digital imaging have become more sophisticated, optical character recognition (OCR) technology has reduced reliance on human interpretation of the images. Today's automatic license plate recognition (LPR) technologies are 85% to 90% accurate, and still improving.

Even with these improvements, it is not possible to completely eliminate unreadable images. Some percentage of images will continue to require human review. Of that number, a small percentage will not be legible

or the plates will be missing, and they will remain uncollectable. Nonetheless, improving OCR technologies will help to reduce those percentages to the lowest numbers possible.

One intent of BATA's Video Tolling Demonstration Project is to examine the feasibility of employing video tolling in conjunction with their existing systems and new VES, to augment their existing cash and ETC methods. This technical memorandum describes the technologies in use, and provides some analysis of the potential system-related issues and modifications that might be required in order to add video tolling. It is important to note that any system modifications identified are preliminary, until further decisions have been made regarding the specific methods and rules to be employed in the video tolling process.

Section 2.0 of this document provides an overview of BATA's existing systems, as they may relate to video tolling. Section 3.0 presents technical analysis of the existing systems and interfaces, and Section 4.0 presents the conclusions drawn from that analysis.

2.0 BATA's Toll-Related Systems

BATA's toll operation is currently supported by a variety of systems, as illustrated in the general systems overview in **Figure 1**, below. The following systems will be discussed within this document, due to the potential impacts of video tolling on them:

- ATCAS (Advanced Toll Collection and Accounting System) – BATA's lane / plaza / host toll collection system, used on all seven supported bridges. ATCAS is owned by BATA and managed in-house, with lane / plaza maintenance provided by ACS.
- VES (Violation Enforcement System) – The lane / plaza enforcement system currently being replaced under contract with TRMI. The existing ORT shown in Figure 1 is not within the scope of the VES upgrade.
- BATA's Interface Server – The point of collection for data to be transmitted to the RCSC / Vector system, currently located at the Oakland Data Center. (Oakland Data Center equipment is being relocated to BATA's offices at 101 Eighth St., Oakland. The relocation is expected to be complete in July 2008.)
- BATA's DMV Server – The interface used to route license plate information to DMV for identification of the registered owner, which is then used to mail violation notices. Also currently housed at the Oakland Data Center.
- Vector – The back office system supporting the FasTrak® Regional Customer Service Center (RCSC) in downtown San Francisco. Vector is provided under license to BATA, and is maintained and operated by ACS.

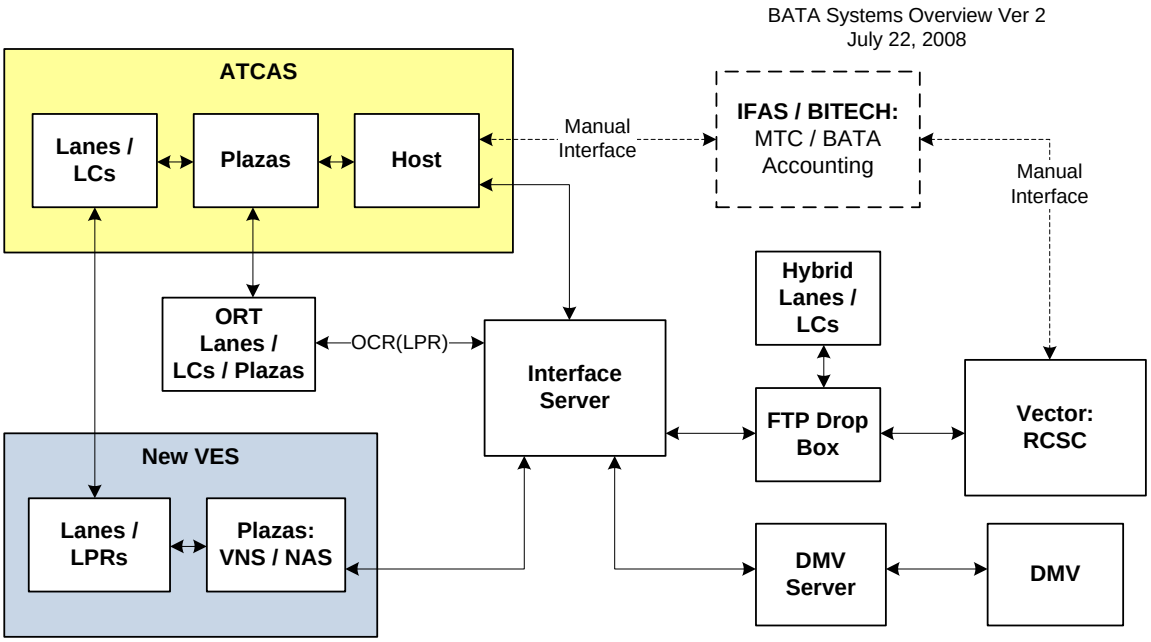


Figure 1: BATA Systems Overview

2.1 ATCAS (Advanced Toll Collection and Accounting System)

BATA's ATCAS system includes the main components used for toll collection, such as:

- Lane equipment, including controllers, processors, lane hardware, and peripherals (one set per lane).
- Plaza equipment, including servers and associated workstations (one set per plaza).
- The Host Server (one), currently housed at the Oakland Data Center.

In addition, there are multiple other systems surrounding and interfacing to ATCAS. These systems have been added or connected to the original ATCAS for a variety of specific purposes. Some may now be considered part of ATCAS, while others continue to be separately identified. These systems include:

- The Interface Server, which consolidates transaction and violation data for transmission to the RCSC Vector system via an FTP Drop Box. The ATCAS Host Server provides ETC transaction data to the Interface Server.
- VES, which provides violation transaction and image data to the Interface Server. VES lane components also interface directly with the Lane Controllers of each lane for camera triggers and transaction status messaging.
- A separate Open Road Tolling (ORT) lane / plaza system currently used on the Benicia-Martinez Bridge ORT lanes. The ORT system supplies ETC transaction data to the ATCAS plaza server (at Benicia-Martinez Bridge only), and violation data and images are sent directly to the Interface Server.
- A separate Hybrid Transactions system, which handles BATA-specific accommodations for hybrid vehicle use of the toll facilities. The Hybrid system communicates transaction data directly to the FTP Drop Box for pick-up by the RCSC.
- The DMV server, which transmits violation license plate information to the DMV and receives registered owner name and address information back.
- The CMMS, a commercial off the shelf maintenance management system that tracks equipment failures from occurrence through repair, tracks technicians' activity, controls inventory, and provides a suite of reports for management. The CMMS is outside of the BATA ATCAS system.
- The MTC / BATA accounting system, known as IFAS / BITECH. ATCAS cash toll collection data and Vector ETC and violation data are manually entered into the accounting system.

The general interactions of these components are illustrated **Figure 1**, above. Based on the general system functionalities, the ORT system and Hybrid Transactions system will be included in discussions and analysis of ATCAS. VES interaction with the CMMS is illustrated in **Figures 2 and 3**, following.

2.2 VES (Violation Enforcement System)

BATA is currently in the process of procuring a new violation enforcement system, which will be provided by TRMI Systems Integration. The new VES is required to parallel the general layout and utilize the same interfaces as the old VES, but will make use of new and improved video technologies. The first instance of the new VES is expected to be installed on the Antioch Bridge in mid-2008, with the remainder to follow after a 3 month test period, so the violation enforcement portion of this review will be based on the new VES specification. It should be noted that details of the VES integration may change as design, development, and testing are completed by TRMI.

2.2.1 System Overview

For general context purposes, **Figure 2** illustrates the distribution of the new VES components within the plaza and lane equipment. Lane equipment is shown within the red dashed lines and plaza equipment within the green dashed lines. The orange dashed lines enclose the equipment currently at the Oakland Data Center. Systems outside the red and green lines, plus the existing lane controller illustrated separately within the red lines, are external to the VES.

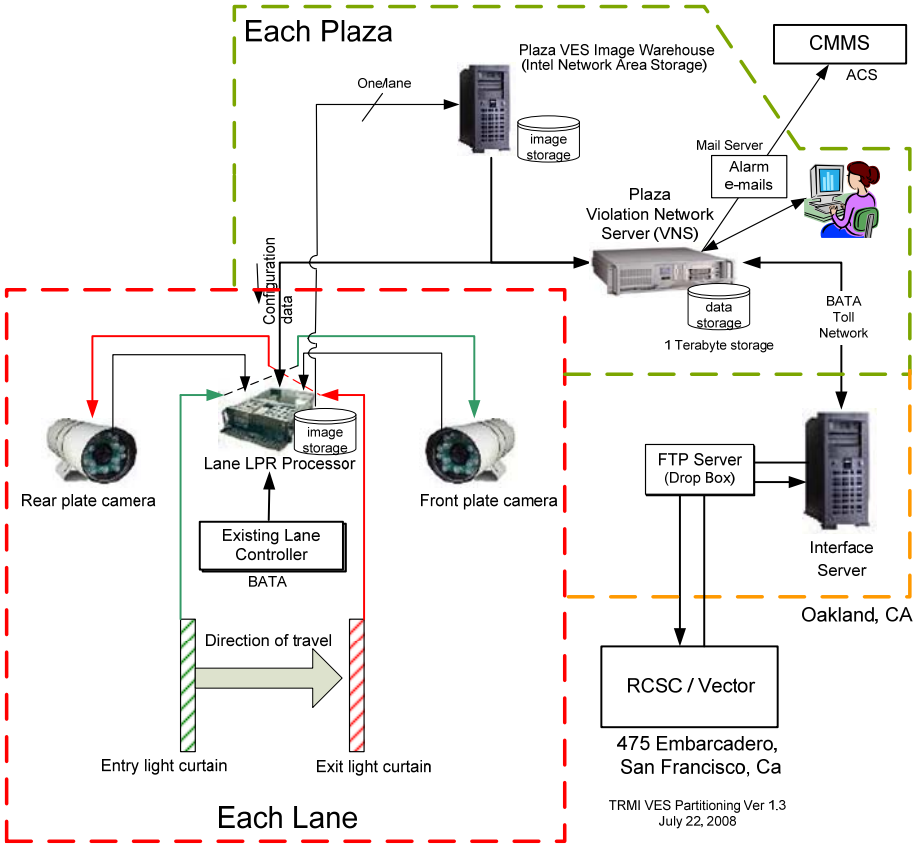


Figure 2: TRMI VES Component Distribution

Figure 3, below, provides a more detailed diagram of the new VES data flow. A general overview of the VES operation, based on the new VES specification and proposal, is provided in the following paragraphs.

A new VES camera system will be installed in each lane with one camera photographing the back of the vehicle and another the front. Each camera will take images in high-resolution color (1600 x 1200 CCD pixels), resulting in an initial image size of approximately 2 megabytes (MB).The proposed camera will have built-in light strobes for additional illumination.

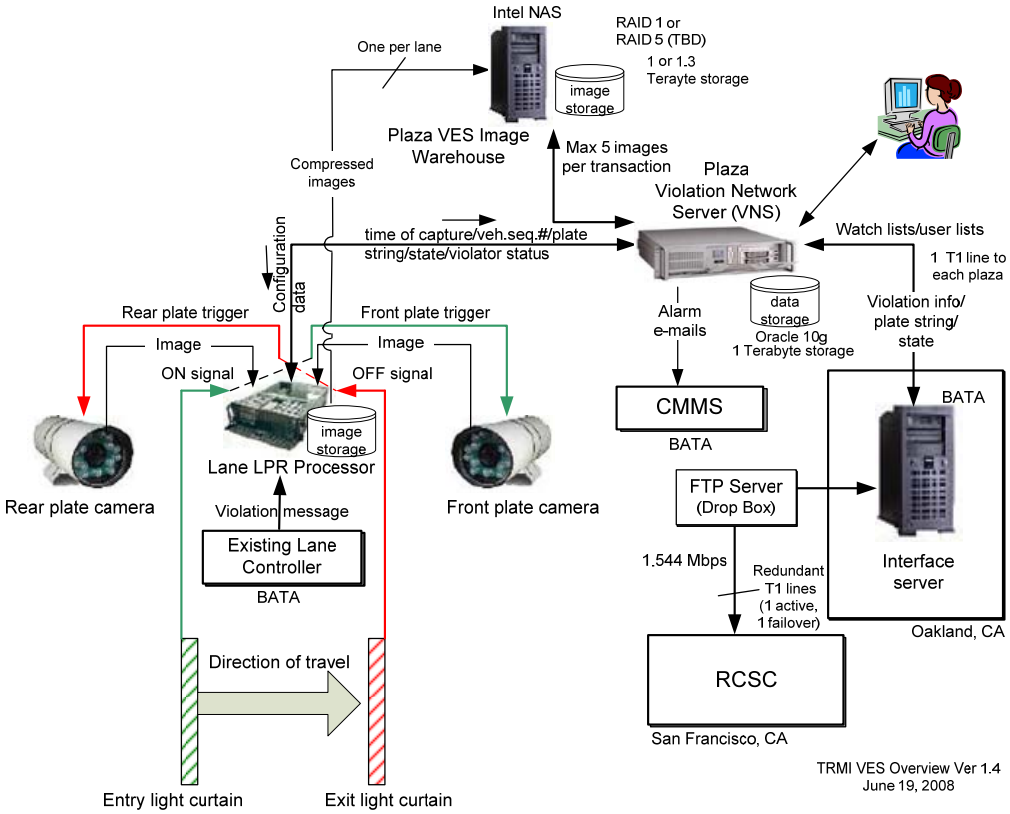


Figure 3: TRMI VES Overview

Prior to transmission, the initial 2 MB images will be compressed to approximately 300 KB, per the current proposal. Image quality and OCR performance can be affected by pixel loss during compression. TRMI will continue to address the compressed file size during design and development, with the eventual goal of smaller compressed file transmission and storage requirements with little or no degradation in image quality.

Camera triggers will be derived from the light curtain signals. The entry light curtain, colored green in Figure 2, will trigger the front camera and the exit light curtain will

trigger the rear camera. A maximum of 4 images per vehicle will be captured - 2 front and 2 rear.

Image sets for up to 5 vehicles will be stored locally at each LPR processor, waiting for a message from the lane controller to indicate that any of the 5 was a violator. If no violation message is received by the time the 6th vehicle is imaged, the oldest set of images is rotated out of the buffer. These images will be saved along with a transaction record, but will not be transmitted to the VNS for further processing.

If a violation message for any of the 5 vehicles is received, violation transaction data in the signal will include the unique vehicle / transaction code. This unique code will be matched to the corresponding images in local storage at the Lane LPR Processor, where they will then be processed and packaged for transmission to the Plaza VES Image Warehouse, the Interface Server, and eventually the RCSC for violation processing.

2.2.2 VES Image Processing

Under the new VES, if the vehicle does not pay cash or return a valid ETC transponder code, the lane License Plate Recognition (LPR) processor will prepare a composite image for the OCR. When the LPR receives the violation message, it will retrieve the corresponding set of vehicle images from local storage and locate the license plate within each image, if it was captured. Since each original image, front or rear, covers an area of approximately 5 feet high by 9 feet wide, a segment of the image will be cropped to the size of the license plate. This “patch” image will be provided for use by the OCR software, for more efficient operation. The cropped license plate image is a patch of the best images available in the 4 taken of the vehicle, and will be a 5th image added to the image set.

The TRMI system relies on the alpha-numeric pattern of the license plate to identify California plates. California uses a number-letter-number pattern in the form of NAAANNN for passenger vehicles and trucks use NANNNNN where “A” is a letter and “N” is a number from 0 to 9. This pattern is unique to California, although vanity plates, six-character California plates and motorcycle plates will not be recognized as California plates unless pre-registered. The California six-character plate was last issued in 1980, although the seven-character plate was introduced in 1969, so the percentage of remaining six-character plates in circulation should be fairly small.

Once the image is cropped, OCR will be applied to determine the license plate string and state. The OCR engine also assigns a “confidence rating”, which reflects the likelihood that the plate number read by the OCR is accurate. This information is attached to the violation data from the BATA lane controller and sent to the Plaza VNS. The 4 JPEG images and the patch image in bitmap (.bmp) format are sent to the Plaza VES Image Warehouse (also referred to as the Network Area Storage, or NAS), attached to the VNS.

It should be noted that the ORT lanes on the Benicia-Martinez toll facility are not a part of the new VES and will continue to use the existing ACS-provided VES equipment. This will not prevent video tolling for vehicles driving through the ORT lanes, but it will

require separate attention. Violation data and images from the ORT system are routed directly to the Interface Server, just as those from the new VES will be.

2.2.3 Plaza Violation Network Server (VNS)

The new Plaza VNS will provide storage of the transaction data for approximately 30 days in an Oracle database with a capacity of 1 terabyte (TB). It will also control transmission of violation data and images to the Interface Server.

The VNS will also contain a Watch List and a User List in comma separated value (CSV) text format. The user list is used to determine who has system access rights to the VNS. Access to the VES will be available at the plaza level through an ASP.NET (browser) interface to the VNS.

The watch list provides the ability to store a list of BATA designated license plate numbers and generate an alarm to the CMMS when these plates are identified by the LPR. Both lists will need to be updated as requested by BATA. Plates on the watch list might include violations that are repeatedly incorrectly identified by the LPR processor, frequent violators, or plates for which BATA requests notification for any other reason. This is a new function of the TRMI VES, not available in the existing VES.

2.2.4 Plaza VES Image Warehouse (NAS)

At each plaza, an Intel Network Area Storage (NAS) server will store the violation images processed by the lane LPR processors. Images will be stored on redundant dual 500 gigabyte (GB) hard drives using RAID 1 architecture, for a total image storage capacity of 1 TB. RAID 5 is under consideration, which would increase available storage capacity to 1.3 TB. Requirements addressed by the VES proposal indicate that this system will be sized to store a minimum of 30 days of processed violation images at a plaza level violation rate of 10%.

The NAS will receive the 4 JPEG images of the vehicle and the cropped bitmap license plate image from each lane LPR processor and store them locally. The VNS will pull images from the NAS in order to send them to the Interface Server for transmission to the RCSC. NAS local storage is not accessible from outside the plaza and will also be used as image backup in the event of failure of the Interface Server, the Oakland Data Center or the T1 lines connecting the Data Center with the Plaza(s).

2.3 Interface Server

The Interface Server is currently located at the Oakland Data Center at 111 Grand Avenue in Oakland, but is due to be relocated along with other Data Center components to the BATA offices on Eighth Street in Oakland.

The Interface Server was created by ACS to facilitate data exchange between the Bay Area bridge toll plazas (through the ATCAS host server) and the RCSC, located in downtown San Francisco. It is the only interface between the toll plazas and the RCSC, and is managed and maintained by ACS, along with the Vector RCSC system. The VNS at each plaza communicates with the Interface Server using sockets. A handshaking

protocol is used over the socket connection, by which the interface server regularly pulls the violation data from each plaza VNS.

ACS maintains an electronic drop box to exchange files between the Interface Server and the RCSC. Data files are copied by the Interface Server to the drop box, where Vector pulls them from the drop box to the RCSC incoming file system using file transfer protocol (FTP).

The Interface Server appends the file extensions to the data files, per the BATA Regional Interface Control Document. The file extension is then used by the Vector software to sort the files for processing. **Figure 4** is a general overview of the files exchanged between the Interface Server, the RCSC System, and the California Department of Motor Vehicles (DMV). Further detail regarding the transfer of .VDF files and associated violation images is addressed in Appendix B.

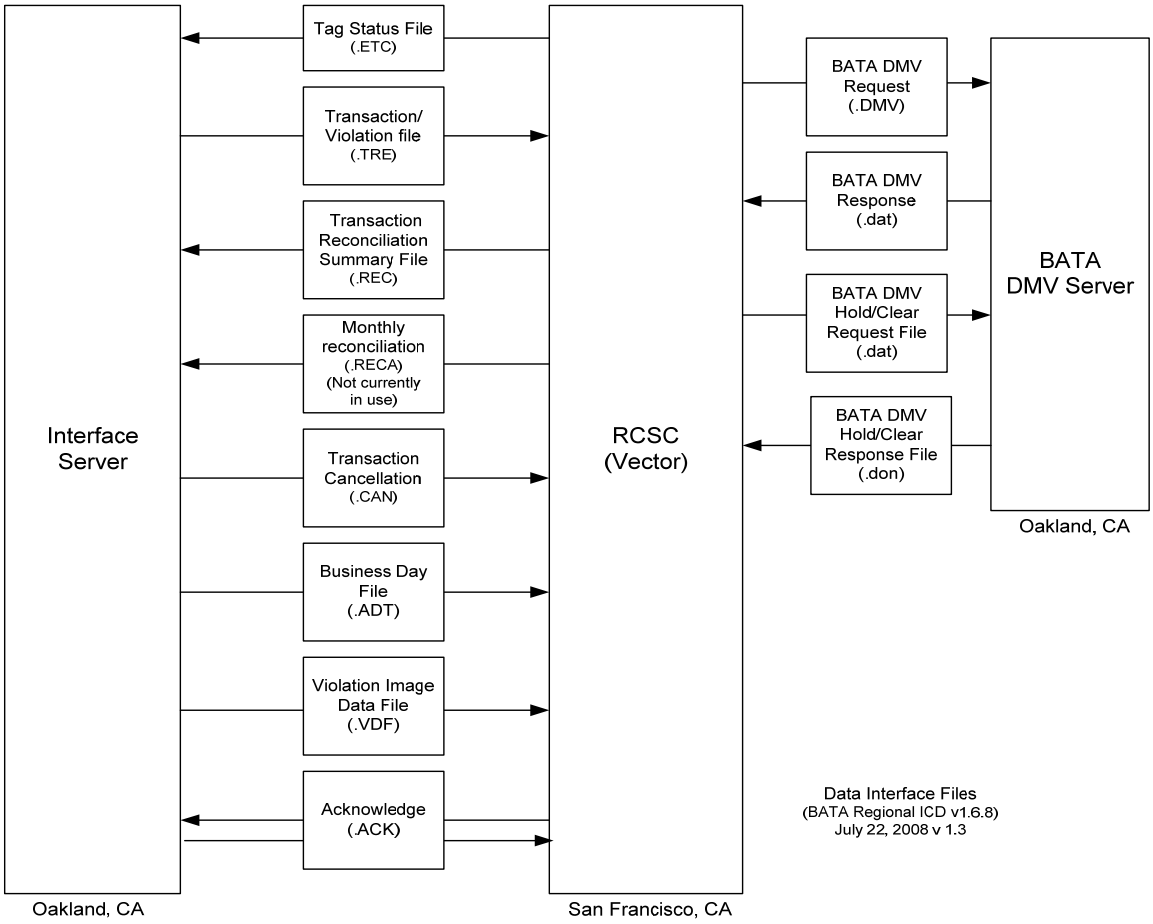


Figure 4: Data File Transmissions

2.4 DMV Server

BATA maintains an interface to the California DMV in order to request and receive registered owner name and address information for vehicles that violate. This information is currently used to create and send violation notices, but would also be used for video tolling.

BATA's interface to the California DMV is through a DMV server located in the Caltrans District 4 office. Vector sends all DMV information requests in twice-daily batches through the Interface Server, which routes them to the BATA DMV server. It in turn forwards requests to the California DMV server in Sacramento, and receives response data back along the same path. The files exchanged are illustrated in **Figure 4**, above, and DMV file transfer details are further addressed in Appendix C.

In order to ensure that video tolling does not impact this interface, DMV connectivity bandwidth should be analyzed and monitored. Although initial lookup volumes may not change significantly, depending on the video tolling methods employed, increases may occur over time as video tolling volumes increase. If potential impacts are discovered, it may be necessary to request additional DMV ports or explore alternate interface mechanisms.

2.5 Vector RCSC System

The software that manages Fastrak customer accounts and processes transactions against them is called Vector. As noted previously, it is licensed by BATA from ACS State and Local Services, and is installed, maintained, and operated by ACS at the Regional Customer Service Center (RCSC) at 475 The Embarcadero in downtown San Francisco, California.

Figure 5 below provides a Vector overview diagram, depicting the processing that occurs in the rectangle marked RSCS (Vector) in earlier figures, with emphasis on violation processing. This description of Vector and its related processes is based on the BATA Interface Control Document and meetings with the ACS staff. Specific names for processes may not match the names used by BATA or ACS, but the description of the data flow and processing logic is accurate based on the information received.

The Interface Server, via the FTP Drop Box, sends transaction and violation data files and images to Vector and receives data files for use in managing the toll collection processes at each plaza. Per the current Interface Control Document, Vector pulls the data files from the Drop Box every 4 hours.

Vector is connected to the Drop Box through a point-to-point T1 digital data communications line, which supports transfers rates at a theoretical maximum of 1.544 million bits per second (Mbps). A second T1 line is available for backup / failover communications in the event of primary T1 failure.

The transaction processing component of Vector sorts the incoming files according to their file extensions and allocates them to software processes that handle each file type. Violation files are identified by the file extension "VDF" and are checked by the system

to see if they include a license plate number identified with high confidence, based on the OCR confidence rating. Regardless of the confidence rating, all images are currently sent for manual review / validation.

Once the license plate information is present and validated, Vector requests the California DMV to identify the registered owner and their address. Vector requests information from the DMV by sending it first to the Interface Server.

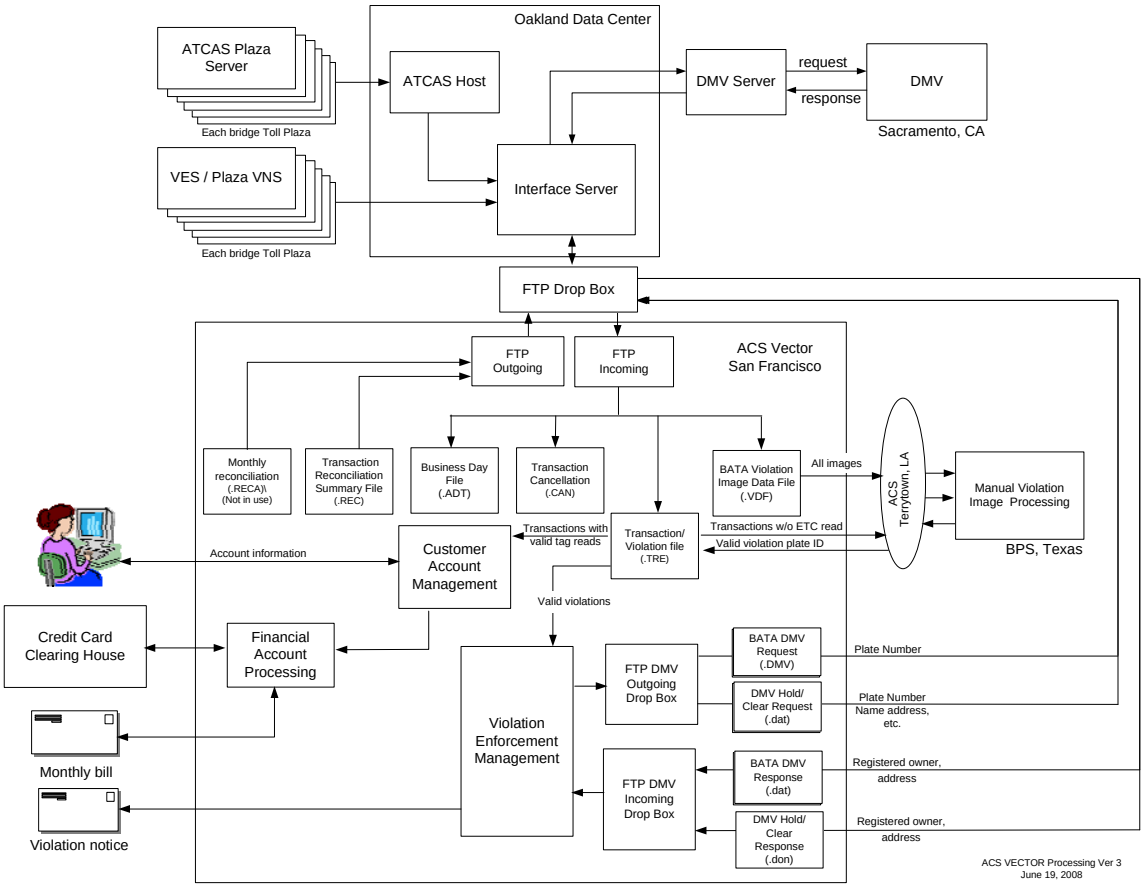


Figure 5: Vector Transaction / Violation Processing

3.0 Analysis

Based on the information collected regarding BATA's toll collection systems and their supporting interfaces, various areas of potential concern with relation to video tolling are analyzed and discussed in this section. Note that this analysis does not include cost information, which will be included in the Task 6.0 Financial Impact deliverable.

3.1 Image Storage and Transmission

According to the current specification for the new VES, the image capture file size may be significantly larger than those of the existing VES. The initial size noted for the front and rear images is 2 megabytes (MB), which in the absence of detailed design information is assumed for the purposes of this analysis to be a per-image size. TRMI's proposal further states that compression prior to transmission will reduce the image file size to 300 kilobytes (KB). These images will be delivered in .jpg format. The size of the patch image reflecting the cropped license plate is not stated, but would presumably be similar, due to the bitmap file format. If these assumptions are correct, the size of the image set for one vehicle / violation transaction could be in the neighborhood of 1.5 MB.

The existing VES delivers images that are each approximately 15 KB in size, including the bitmapped patch image. As a result, the complete image set for a current violation transaction is around 75 KB. This is a significant difference, at approximately 20 times the image set size. As such, will require a thorough analysis of both system storage and network bandwidth / communication capabilities.

Even if the above assumptions are incorrect and 300 KB is actually the full image set size, the new image set will be 4 times the size of the current image set. This is still a significant enough size difference to warrant storage and network capacity analysis.

Prior to undertaking that analysis, it should be confirmed that these file sizes for the new VES are correct and final. Since VES design is currently in process, this may not be possible for some time.

In addition, the current image volumes are based on the current volume of violations occurring in the lanes. Depending on the type of video tolling implemented, part or all of these violations would shift to video toll transactions. Part of the cash transactions could also be expected to shift to video toll transactions, as well, and growth could occur on any or all bridges, based on customer acceptance of the new payment methods. All of the above could result in higher image-based transaction volumes than are currently being processed. These shifts will be projected in future deliverables, based on the type(s) of video tolling BATA elects to deploy.

Once final file sizes are ascertained and volumes have been projected, total image volumes should be calculated and compared to the following, to ensure that sufficient capacity exists:

- Plaza VNS / NAS – Although this component is part of the new VES, BATA should confirm that images for both non-violation and violation transactions can be

stored at the plaza for the requisite amount of time. Current NAS specifications indicate a RAID 1 configuration allowing for 1 terabyte (TB) of storage. Current specification data includes a requirement for 30 days of violation images and data at an assumed 10% violation rate per plaza. However, the specification also indicates that non-violation images will be stored along with their transaction data as they are rolled out of the lane LPR's local storage buffer. Timeframes and assumed volumes for non-violation transaction data are not specified.

- BATA Interface Server and FTP Drop Box – The Plaza VNS currently transmits the image files to the Interface Server along with the violation transaction data, and Interface Server transmits the same files to the RCSC Vector system via the FTP Drop Box. Current reserve capacities on both the Interface Server and the Drop Box must be analyzed, to ensure that they can accommodate the increased transmissions and temporary storage of the files. Insufficient capacity could be remedied either by increasing storage and/or processing power, or since these are temporary pass thru locations for the violation image and transaction data, by modifying the timing of plaza transmissions. Actual solutions will depend on the average vs. peak volumes and the number and timing of peaks.
- BATA DMV Server – Similar concerns to the Interface Server and Drop Box will also exist for the DMV server. Any violation transaction that does not match an existing account will need to be routed for DMV information, with the same potential volume shifts as above. Although the image files themselves are not sent to DMV, the volume of requests should be analyzed against the existing storage, processing power, and communications capacity, and modifications made as needed.
- Vector – The same analysis will be required for the Vector system, to avoid impacting not only BATA's operation but also the Golden Gate and other interoperable Fastrak operations. This analysis should include capacities related to the BPS image review operation in Texas. Requirements for image receipt, processing, access, storage, and archival should be taken into account.
- Communications Capacity – The available bandwidth between each of the above locations will also be impacted by violation / video toll volumes and image file sizes. Transmissions between each plaza and the Interface Server will travel the single T1 line currently in place. Transmissions between the FTP Drop Box and the RCSC Vector system travel along redundant T1 lines, but the second line is reserved for failover use. DMV requests are routed through the Interface Server to the local BATA DMV server, then out across an external means of communication to the California DMV. All of these communications routes, as well as internal communications between system servers, must be analyzed for throughput, to ensure that a bottleneck is not created.

3.2 Image Review

Although it is entirely possible that images provided by the new VES are compatible with the BPS image review process in Texas, early verification and testing of these functions would prevent potential delays. The new VES will provide images in a standard 4:3 aspect ratio and will provide a cropped license plate image, but the resolution will be 1600 x 1200, possibly requiring adjustment to display correctly on the BPS image review screens.

3.3 Differential Toll Rate or Fee

Due to the additional costs of video toll processing, agencies typically require that customers pay either a higher toll rate or a separate processing fee, as noted in the Task 1.0 Video Tolling Concepts Review. BATA's costs and objectives will be similar, but are currently constrained by their operating statutes. The Task 2.0 Legal and Legislative Review will address the potential for policy and statute changes to accommodate these additional charges to the customer.

Once legal hurdles are cleared, it is likely that BATA would charge a differential toll rate and/or an administrative or invoicing fee for video tolling. If that is the case, the following would require analysis to ensure that the additional rate or fee could be supported:

- ATCAS – Because toll rates are maintained at the plaza and applied to all transactions as they occur, ATCAS would need to accommodate any differential toll rate that might be applied. This could involve modifications to toll rate tables, system processes that apply toll rates to transactions, and potentially the interface to the ATCAS Host, the Host data structure itself, and the connection to the Interface Server. Modifications to the legacy ATCAS Plaza and Host applications would require application baselining to ensure the consistency of release across plazas. Since BATA has plans to replace ATCAS and does not currently have the ability or desire to modify it, this is not a likely scenario.

  If the type of video tolling selected included all vehicles that did not pay cash or ETC, it is possible that the video toll rate could be substituted for any rate currently applied to violation transactions. It is also possible that a rate differential or fee could be applied in the RCSC / Vector, eliminating the need to address it in ATCAS.

- Vector – If differential toll rates were applied in ATCAS, it is possible that Vector would continue to apply the provided rates, including the new Video Toll rate, and not require additional system modifications, or require fewer modifications, than it might otherwise. However, if video toll rates or fees will be applied in the back office only, Vector will necessarily have to accommodate them. Since Vector will also have to support video toll-related operational changes to transaction / violation processing, as well as a new invoicing process, these changes would go hand-in-hand.

3.4 ATCAS System of Record

Within the MTC / BATA systems, ATCAS currently functions as the "system of record" for tolling. Based on a general understanding of the use of this term, this would imply that ATCAS is used for "official" reporting and auditability related to transaction data and financial /accounting information at the transaction level. Depending on which model(s) of video tolling BATA chooses to implement, as well as the specific way they are implemented, this may present an issue requiring modifications to ATCAS.

For example, if BATA chooses to deploy UNREG/POST video tolling, and the deployment leaves ATCAS as-is, interpreting violation transactions as video toll transactions in the back office, ATCAS would no longer contain correct information regarding the disposition of those transactions.

If non-ETC/non-cash transactions are processed by Vector as video tolls, this reconciled information would need to be sent back to ATCAS to update its files, in order for it to remain the system of record. This approach would require some modifications to ATCAS.

3.5 Vector

In addition to areas noted above, the ACS Vector system may require other modifications to support video tolling. Depending on the video tolling model(s) pursued, these may include revisions necessary to accommodate:

- Video Toll Account Registration: If supported, revisions to support the addition of vehicles without tags to Fastrak accounts, and/or set up separate pre-paid and/or post-paid accounts with vehicles only
- Transaction Processing: Revisions to the transaction processing flow to accommodate separate paths for ETC, video tolling and violations
- Post-Paid Accounts: Account structure modifications necessary to allow for the establishment and invoicing of post-paid accounts. A post-paid account option does exist within Vector, but would likely require some modification for this use.
- Video Toll Invoicing: A full process for invoice development, population, generation, printing and mailing (or interface to a mailhouse), and tracking process
- Invoice Payment Processing: Revisions necessary to receive, process, and separately track payments against video tolling invoices, by check, cash, and credit or debit
- Rental Car Processing: Revisions necessary to allow for handling of rental car transactions and exceptions, either through direct interfaces with rental car companies or third-party services.
- Account Management System: Modifications to the account management system to support the capability to convert video accounts to ETC accounts if the customer desires.

- Video to Violation Conversion: Revisions in violation processing module to convert video transactions to violations if the invoice payment is not received against corresponding video transaction.
- Customer Service Interfaces: Modifications to CSC-related screens and reports to provide video tolling support to customers via phone, walk-in, and email
- Customer Web Interfaces: Revisions to support video toll account management, pre- and/or post-registration, invoice payment, and customer service
- IVR: Modifications to voice script and interfaces to support new account types and payments for post-paid invoices.
- Report Modifications: Revisions across the system, including lane / transaction-related data, back office processing data, and associated financial data, to support both separate and integrated reporting on video tolling activity
- Logging and Audit Data: Revisions to support auditability of all new and revised system functions
- User Security: System or configuration modifications necessary to provide appropriate access to new and revised system functions

Until a detailed set of business requirements is assembled and the current system functionality is looked at in greater detail, the extent of the potential modifications will not be clear.

3.6 Transition / Implementation

Although it may seem obvious, careful consideration must be given to the transition from current operation, to current operation plus video tolling demonstration, to the transition of video tolling on the remaining bridges. Interim phases may require parallel processes, particularly in the back office where all seven bridges must be supported regardless of the tolling methods in use. A clear and detailed transition plan will be needed.

4.0 Conclusions

Generally speaking, it is clear that the existing systems can accommodate video tolling without extensive redesign.

- The lane systems and equipment may be utilized almost as-is, pending decisions on differential toll rates handling.
- The new VES will allow for the incorporation of front cameras, increasing the capture rate and potential accuracy of the system for both violations and video tolling.
- The interfacing components will only need modification if the transmission of files with new toll rate differential features require it.
- Image file sizes are a concern, with the associated storage and communications capacity issues. Thorough analysis will be needed in these areas.
- Consideration of the current system of record, and the required output from that system, is necessary.
- Potential modifications to Vector to accommodate video tolling processes will be required.
- Careful attention to demonstration and transition planning will be a necessity.

None of these items are insurmountable, especially in light of the full capabilities of the systems outlined in this document. On the surface, video tolling appears simple. But, as Authorities get into business rules, operational issues, and system impacts, what seems easy becomes a larger challenge.

Further analysis, in project deliverables to follow, will delve further into details and costs, resulting in recommendations for adoption by BATA.

Appendix A: Reference Materials

BAFO Proposal Violation Enforcement System for the Toll Bridges in the San Francisco Bay Area January 25, 2008	TRMI Systems Integration 5120 Route 209 PO Box 10 Accord, NY 12404 845.626.8655
VES BATA Project Schedule 031808 TWK	TRMI Systems Integration 5120 Route 209 PO Box 10 Accord, NY 12404 845.626.8655
Request for Proposal Violation Enforcement System for the Toll Bridges in the San Francisco Bay Area October 22, 2007	Bay Area Toll Authority Joseph P. Bort MetroCenter 101 Eighth Street Oakland, CA 94607-4700 510.817.5715
Regional BATA Interface Control Document Version 1.6.8 Final April 28, 2006	ACS State and Local Solutions, 111 Maryland Ave. Rockville, MD 20850 240-314-5000
Video Tolling Concept Review – Draft CDRL 1.1 April 30, 2008	PBS&J 353 Sacramento Street, Suite 1000 San Francisco, California 94111

Appendix B: Image File Transfers

In order to understand how much storage space and communications bandwidth is needed, the size and content of each transaction file including images must be understood. The following information is provided for general understanding, but actual file processing is done in accordance with the BATA Interface Control Document.

VES Image Processing Overview

If the vehicle does not pay cash or return a valid ETC transponder code, the lane License Plate Recognition (LPR) processor will prepare a composite image for the OCR. When the LPR receives the violation message, it will retrieve the corresponding set of vehicle images from local storage and locate the license plate within each image, if it was captured. Since each original image, front or rear, covers an area of approximately 5 feet high by 9 feet wide, a segment of the image will be cropped to the size of the license plate. This "patch" image will be provided for use by the OCR software, for more efficient operation. The cropped license plate image is a patch of the best images available in the 4 taken of the vehicle, and will be a 5th image added to the image set.

Once the image is cropped, OCR will be applied to determine the license plate string and state. The OCR engine also assigns a "confidence rating", which reflects the likelihood that the plate number read by the OCR is accurate. This information is attached to the violation data from the BATA lane controller and sent to the Plaza VNS. The 4 JPEG images and the patch image in bitmap (.bmp) format are sent to the Plaza VES Image Warehouse (also referred to as the Network Area Storage, or NAS), attached to the VNS.

Image File Transfers

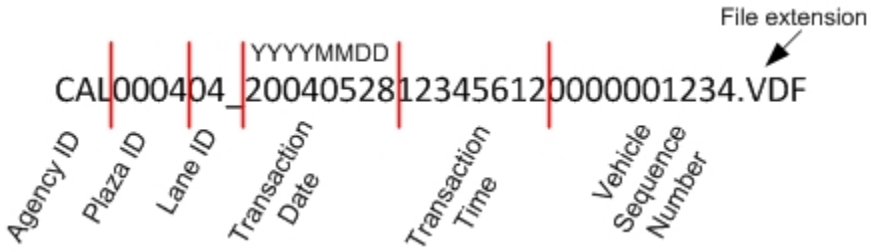
The current VES transfers up to 4 JPEG images and 1 cropped bitmap image for each vehicle / transaction to Vector. It is expected that the new TRMI VES will also send 4 JPEG images and 1 bitmap image. Each compressed JPEG image is approximately 15 KB in the current VES, for a combined image set file size of approximately 75 KB. The new VES is expected to have a larger image file size of about 300 KB (compressed), so the 5 images would be in a zipped file of up to 1.5 MB. These are conservative estimates, and TRMI will continue to modify the file sizes as they design and develop the new VES system.

The file that contains the vehicle images, plate image and data is called the Violation Image Data File. The file extension assigned to it is VDF. Images are packaged with the VDF file in a zipped file. The zipped file name will contain the following data for a single transaction:

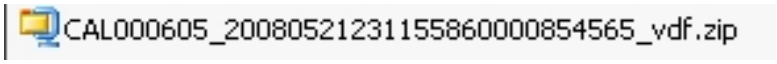
File Naming Convention

Field	Description
AGENCY_ID	Always “CAL”
PLAZA_ID	0002 through 0008 (values below)
LANE_ID	01 to 99
TRX_DATE	YYYYMMDD
TRX_TIME	HHMMSSTT (TT in milliseconds)
VEHICLE_SEQUENCE_NUMBER	10 digits (0000000001 to 9999999999)

An original VDF file name would appear as:



A zipped file name would appear as:



Plaza IDs are:

ID	Bridge
02	Antioch
03	Richmond
04	Bay Bridge
05	San Mateo
06	Dumbarton
07	Carquinez
08	Benicia

VDF Data Format

The violation transaction data contained in each VDF file is:

Field Name	Type/Size	Description/Valid Values
AGENCY_ID	CHAR (3)	Agency where the violation transaction occurred. (CALTRANS – "CAL" and Golden Gate – "GGB")
PLAZA_ID	CHAR (4)	Plaza where the violation transaction occurred. (02-08)
LANE_ID	CHAR (3)	Lane where the violation transaction occurred.
TRX_DATE	CHAR (8)	Violation transaction occurrence date. Format: YYYYMMDD
TRX_TIME	CHAR (8)	Violation transaction occurrence time. Format: HHMMSSTT (TT in milliseconds)
VEHICLE_SEQUENCE_NUM	CHAR (8)	The unique vehicle transaction sequence number generated by lane. Values: 00000000 – 99999999
OCR_READ_CONFIDENCE	CHAR (3)	Over all Read confidence from the VIP (OCR Reader). Default to spaces.
PLATE_NUMBER	CHAR (10)	Plate Number of the vehicle. Default to spaces.
PLATE_STATE	CHAR (4)	Plate State of the vehicle. Default to spaces.
NUMBER_OF_IMAGES_TRX	CHAR (1)	Number of Images for this transaction
IMAGE_INDEX_NUMBER	CHAR (1)	Image Index number used by OCR to read plate number and plate state. Default to spaces.
FILLER	CHAR (10)	Reserved for Future
LINEFEED	CHAR (1)	LF
Detail Record Total	64	

An example of the data is shown below. The OCR read confidence number is not used in the old VES, but will be used by the new VES. It is assumed that an OCR read confidence number below a BATA established threshold will cause the transaction file and images to be sent for manual review by BPS in Texas.

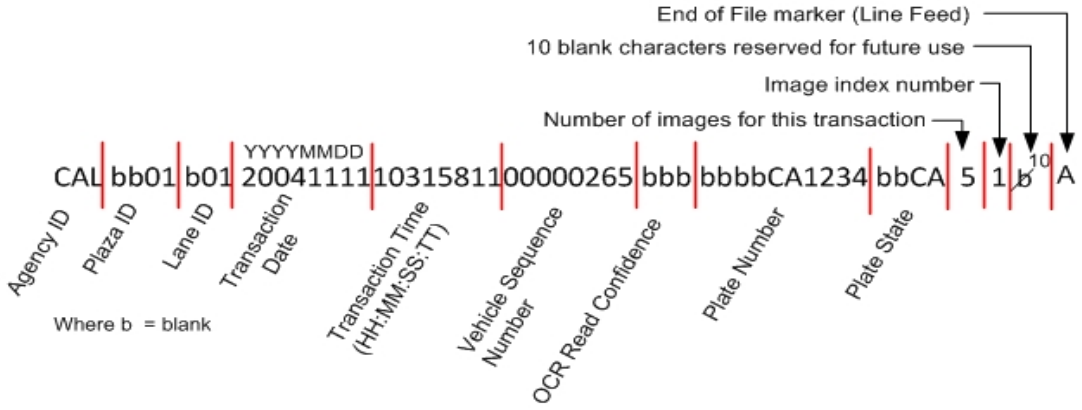


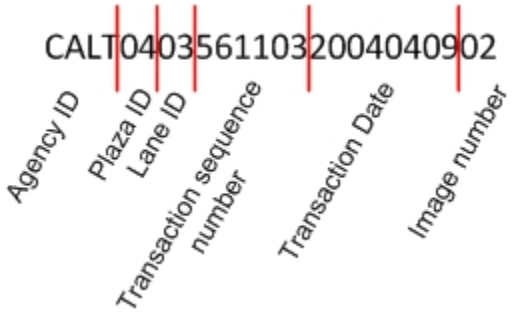
Image File Format

For each violation transaction with associated images, a zipped VDF file is created containing the 5 associated images. An example of a typical zipped file would be the following:

CAL000404_20040528123456120000 1234_vdf.zip. This file contains:

- CAL000404_20040528123456120000 1234.VDF
- CALT04035611032004040902.jpg
- CALT04035611032004040903.jpg
- CALT04035611032004040904.jpg
- CALT04035611032004040905.jpg
- CALT04035611032004040991.bmp

The image file name format is:



The current VES provides the following files in a zipped VDF file, as shown in Figure 1. It is expected that the new VES will produce a file as large as 1.5 MB. TRMI is currently working to compress the images to much less than the average 300 KB image size their system currently produces after compression, but the VDF file is still expected to be larger than the current one.

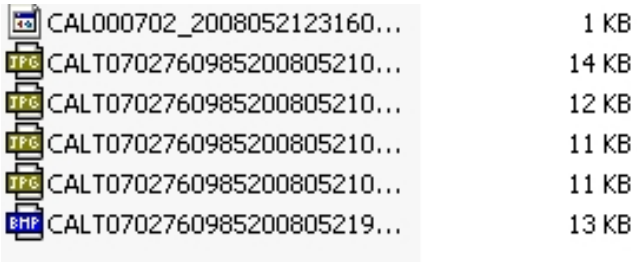


Figure 1 Files contained in the VDF Zipped File

Appendix C: DMV File Transfers

DMV Server

BATA maintains an interface to the California DMV in order to request and receive registered owner name and address information for vehicles that violate. This information is currently used to create and send violation notices, but would also be used for video tolling.

BATA's interface to the California DMV is through a DMV server located in the Caltrans District 4 office. Vector sends all DMV information requests in twice-daily batches through the Interface Server, which routes them to the BATA / Caltrans DMV server. It in turn forwards requests to the California DMV server in Sacramento, and receives response data back along the same path.

DMV Request File Format

DMV request data files are batched, on average, twice daily for transmission to the DMV via the BATA / Caltrans DMV Server. The file name is a simple date/time format with a DMV file extension:

YYYYMMDDHHMM.DMV

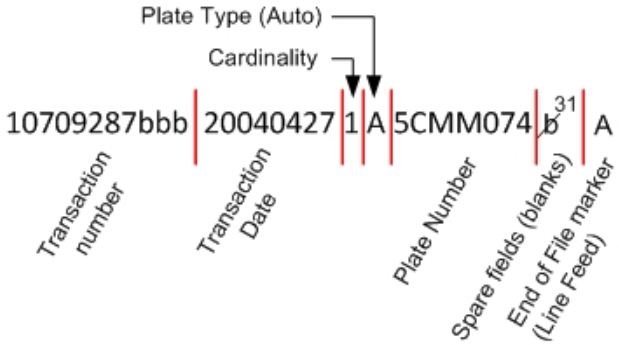
Lookups are currently performed on California license plates only. Out of state DMV exchange for the 13 states with the highest violator volume is in development and expected to begin in Fall 2008. Requests will be made via the ACS DMV request interface, but will follow a different path than the California plate requests.

This file contains license plate numbers that are to be sent to the California DMV for license plate lookup. Each data file in the request consists of transaction information and plate information.

Field Name	Type/Size	Description/Valid Values
TRANSACTION_NUMBER	CHAR (11)	Unique violation transaction identifier. Values 00000000000 to 99999999999
TRANSACTION_DATE	CHAR (8)	Date when transaction occurred. Format: YYYYMMDD
CARDINALITY	CHAR (1)	Gives the number of file codes for the plate. Values: 1- 5

PLATE_TYPE	CHAR (1)	Type of plate: A - Auto, Historical Vehicle B - Vessels (provided on tape image inquiries only C - Commercial E - Exempt F - OHV H - Ham Operator I - Apportioned (Pro-Rate Base) L - Environmental License Plate M - Motorcycle P - Prorate ID Commercial and Trailer S - Special Vehicles T - Trailer, Horseless
PLATE_NO	CHAR (7)	License Plate Number
FILLER	CHAR (31)	Spaces
LINEFEED	CHAR (1)	CR/LF
Detail Record Total	60	

An example of the data file is:



Completion of plate type information is performed in Vector, based on the plate number format.

DMV Response File Format

The Vector software receives one file per day containing all responses from the California DMV for the name and address requests. The response files are routed from the DMV through the BATA / Caltrans DMV Server to the Interface Server to the Vector software. The file name is a simple date/time format with a DAT file extension:

YYYYMMDDHHMM.DAT

The records in the file are formatted as follows:

Field Name	Type/Size	Description/Valid Values
TRANSACTION_NUMBER	CHAR (11)	This field is a duplicate of the transaction number in the request file, which contains all 11 digits, right justified, left padded with zeros. Values 00000000000 to 99999999999
TRANSACTION_DATE	CHAR (8)	Date when transaction occurred. Format: YYYYMMDD
PLATE_NO	CHAR (7)	License Plate Number
REQUEST_DATE	CHAR (8)	DMV Server Request Date. Format: YYYYMMDD
REQUEST_TIME	CHAR (6)	DMV Server Request Time. Format: HHMMSS
RETURN_CODE	CHAR (1)	Match found in the DMV database – 1 Plate not present in the DMV database – 0
PLATE_NO_MODEL_YEAR	CHAR (8)	Either the plate# or the year and make of the vehicle depending on the return code. If the return code is 0 then the former is the value and if 1 the latter is. Because, this is an eight-character field, only the first 4 characters of the vehicle make or model is included.
TEXT_1	CHAR (136)	Free form text field. If the return code is 0, the text may contain non-alphanumeric characters that are right justified following the end of the previous field. If the return code is 1, the text is structured as:10 spaces followed by Name followed by some space followed by address followed by zip. For a return code of 1 the text is always padded with leading spaces of 10 char length.
Linefeed	CHAR (1)	End of line character is CR/LF. Note that CR/LF is an ACII DA which is 2 characters so it is assumed that only Line Feed is used – the ASCII letter A.
Detail Record Total	**186**	

An example of a return data file from the DMV is not shown, since it is processed internally by the RCSC.

BATA is required by California statute to issue a violation notice within 21 days of when the violation occurred in order for the violation to be eligible for DMV registration hold. Contractually, ACS is required by BATA to issue a notice within 17 days of image capture. If the second notice of toll evasion is not paid within 45 days from the date of the notice, a registration hold request is sent to the DMV to prevent the owner of the violating vehicle from renewing their vehicle registration. When the violation has been paid or dismissed, an automatic DMV release notice is sent to remove the hold.

ATTACHMENT F:

Task 6.0 Financial Impact Analysis

Technical Memorandum – Final

BATA Video Tolling Demonstration Project

Task 6.0: Financial Impact Analysis

December 23, 2008

Prepared for:
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DOCUMENT CONTROL PANEL		
File Name:	*Financial Impact Analysis*	
File Location:		
Deliverable Number:	6.0	
Version Number:	10	
	Name	**Date**
Created By:	Dailer	08/29/08
	Yang	08/29/08
Reviewed By:	YY, GVD	09/01 - 05/08
	YY, GVD	09/08/08
	JD	09/16/08
	LL	09/21/08
	YY	10/10/08
	Bausher	12/23/08
Modified By:	YY, GVD	09/12/08
	YY, GVD	09/25/08
	YY, GVD	10/10/08
	YY	12/23/08
	JD	12/23/08
Completed By:	J Dillard	12/23/08

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1.0 Introduction

Task 6.0, Financial Impact Analysis, calls for a comprehensive financial analysis of the potential impacts of Video Tolling implementation. Some of the documentation reviewed for this analysis included historical data related to traffic volumes, toll revenue, operations costs and budgets, violations, contractual pricing points, etc. The review included operational data at the plaza level and at the CSC back office level. Other documents reviewed were MTC Annual Reports, Bridge Traffic and Revenue Reports, the Survey of Bay Area Commuters, and Data and findings from the analysis of video tolling concepts from Task 3.0, Concept of Operations, Technical Memorandum.

Specific Task 6.0 requirements call for projection of changes to BATA's operational costs, including decreased operations costs related to cash collection operations as the requirements for cash collections are reduced or replaced by Video Tolling, and increased operational costs for Back Office Processing such as image review, increased CSC account maintenance, invoicing costs, and increased or changed noticing costs, etc. In addition, in order to implement Video Tolling there are certain related capital expenditures that must be estimated.

In order to determine the potential impacts on operations costs, an attempt was made to isolate those costs directly associated with the collection of cash tolls, the processing of ETC transactions, and the processing of violations. Any changes to Traffic and Revenue numbers will have a direct impact on those costs.

To facilitate analysis of BATA's current and projected operations costs, PBS&J developed an Operations Cost Model. The intent of the Operations Cost Model is to provide BATA with a reasonable projection of direct operations costs by collection mode and to show the potential impacts of the implementation of Video Tolling. PBS&J developed the cost model based on information and data provided by BATA and will present that model and the results in this Technical Memorandum.

The model provides a means to establish the relationships of the different modes to each other and identify both potential operational savings and cost increases. The model is intended to provide BATA with a tool to run various scenarios based on the percentage of transactions and revenues assumed for each of the collection categories.

1.1 Purpose of Document

The purpose of this document is to explain each section of the Operations Cost Model. The Model was developed by dividing the operations costs into four collections modes or cost centers. Each of the Collection Modes is analyzed separately and then combined into an interactive model that allows for "what if" scenarios. The Collection Modes include Cash Collections, ETC Collections, Video Collections and Violations Processing. Through this analysis, projections and comparisons are made for the changes in operational costs as a result of Video Tolling, including any changes to ETC operations and violation processing costs.

1.2 Document Overview

Section 2.0 of this document provides a discussion of the operations costs for each of the Collection Modes, including the assumptions made, relevant data analysis for each mode, and pricing points applied for various components.

Section 3.0 focuses on the Consolidated Cost Projection Model, reflecting the assumptions and input points for the combined model.

Section 4.0 provides a comparison of "current cost of operations" to the cost of operations resulting from adding various Video Tolling options.

Section 5.0 discusses assumptions related to violation processing and the projected violation associated revenues.

Section 6.0 discusses the potential areas of Capital Improvement Costs including:

- FasTrak transponders
- CSC System modification, Web site modification, and IVR modifications
- Video Enforcement System
- Lane system replacement
- Signage
- Marketing Campaign

Section 7.0 summarizes the analysis relative to the Video Tolling operational concept.

2.0 Collection Mode Cost Analysis

In order to develop an understanding of the BATA operational costs, available historical cost and pricing data was gathered. BATA provided a great deal of data and information in various forms including:

- Budget and cost data for FY 2004 through FY 2008
- Pricing points for the CSC system and operations
- Historical data regarding the number of:
  - ETC Accounts and transponders
  - Images reviewed
  - Notices issued
  - Violations, DMV holds, etc.

Budget Categories

Under the current budgeting structure, cost categories are separated by organization and therefore budgeted and tracked as Caltrans and BATA cost line items. These categories are presented below:

Caltrans Operations and Maintenance
Toll Collection and Operation Service
Toll Facility Maintenance
Bridge Facility Maintenance
Caltrans Accounting and Administration
Caltrans Coordination
Caltrans ETC Operations
BATA Operations and Maintenance
ETC - CSC Operations
ETC - Banking/Credit Card Fees
ETC - ATCAS Facility and In-lane Maintenance
ETC - ATCAS Hardware/Software Maintenance
ETC - Collections Contract
DMV Expense

Table 1 – Caltrans and BATA Budget Categories

When looking at operations costs, an attempt was made to isolate those directly impacted by the potential change in the level of operations. So, if there is a change in the transactions, revenue or work effort, the resulting categories would need to indicate that change. In order to properly analyze the related operational costs, they were restructured into categories that would reflect these modifications. In the process of reorganizing these cost categories, some accounts were moved from one budget section to another; some accounts that did not have a direct effect on collection operations were removed altogether; some categories were added to accommodate items contained in larger sections; and some accounts were subdivided to add

more specificity to the analysis. Table 2 displays the budget accounts that were removed for the operations cost analysis, with explanations provided for each. Table 3 reflects the Budget Accounts used in the analysis for Cash Collection. Table 4 shows the accounts and categories used in analyzing ETC operations costs.

Categories Removed from Cash Collection	
Toll Facility Maintenance	Toll facility maintenance was removed because the facilities maintenance will remain regardless of the collection mode.
Bridge Facility Maintenance	Bridge Maintenance is not a direct component of operations costs.
Caltrans Accounting and Administration	Caltrans accounting and administrative costs are not dependent on the collection mode.
Categories Removed from CSC Operations	
ETC - ATCAS Facility and In-lane Maintenance	It is assumed that system maintenance will be relatively equal no matter what system is in place, and the decision to either maintain or replace the current system is independent of the operational impacts of video tolling.
ETC - ATCAS Hardware/Software Maintenance	It is assumed that system maintenance will be relatively equal no matter what system is in place, and the decision to either maintain or replace the current system is independent of the operational impacts of video tolling.
ETC - Collections Contract	The Collections Contract was removed from this analysis it is assumed that costs associated with this contract will be directly off-set by related additional revenues. In addition, there is no historical data to show a trend line.

Table 2 – Budget Categories Removed from Cost Analysis

Cash Collection Direct Costs Used in Analysis	
Toll Collection and Operation Service	This is the total Cash collection operations costs as shown in the Budget and Financial Statements. This account was split into two sub categories – Fixed and Variable Operations Costs.
Sub-Account - Fixed Base Operations Costs	This is the Base Operations costs expected to be in place even if Cash Collections are zero. This consists of the administrative positions which include Captains, Lieutenants, and Sergeants.
Sub-Account - Variable Operations Costs	The variable operations costs here are the toll collectors, which will vary depending on the level of cash collection.
Caltrans Coordination	This item within the budget is projected at a flat rate.
Bank Fees	This is the Banking and armored car costs associated with cash collections. These are normally contained in a larger account with other charges.

Table 3 – Budget Categories Used in Cash Collection Cost Analysis

ETC Direct Operations Costs Used in Analysis	
ETC - CSC Operations	The pricing point for ETC CSC Operations Costs comes down to the ETC Account Maintenance fees. Pricing points within the CSC contract, historical account data and pricing data were used to perform analysis and establish correlations.
Caltrans ETC Operations	For budget and accounting purposes, the Caltrans ETC Operations costs are included in the categories above for cash collections. This has been done historically because there was an apparent division of labor here for budget purposes. For operations cost analysis, this category was added to the cost of CSC operations.
ETC - Banking/Credit Card Fees	No changes were made to this account.
DMV Expense - Holds	The costs associated with this account were moved to the operations costs for processing violations.

Table 4 – Budget Categories Used in ETC Cost Analysis

Data Analysis

When analyzing the operational cost data, an attempt was made to establish: relevant correlations of various data, such as the correlation of cash handling fees to cash revenues; trend lines for various data; relevancy and dependencies of data; contract pricing points; and current costs and volumes.

From the results of the analysis of the above data, an Operations Cost Model was developed based on the various modes of collections. Each collection mode component was developed separately and somewhat differently depending on the data available and contract pricing points. The model developed has four primary components: Cash Collections, ETC Collections, Video Toll Collection, and Violations Processing.

Please note that the Video Toll Collection is introduced as a new category and that violations processing costs are analyzed separately in their own category. Once Video Toll Collection starts, it changes the collection and violation paradigm. With Video Tolling in place, all transactions are treated as revenue transactions and all users are treated as customers. The general processes for both Video Tolling and Violation processing are in use today and, for the most part, are recorded under the ETC Operations costs. So, in order to properly identify costs, the work items for Video Tolling and Violation processing must be identified and separated from the ETC process.

2.1 Cash Collection Operations

As mentioned above, in the analysis of the Cash Collections direct operating costs, four major categories that would directly impact the Cost of Cash Collection Operations were identified. These are:

- Caltrans Coordination costs,
- Fixed Cash Collections Operations costs,
- Variable Cash Collections Operations costs, and
- Banking and armored car fees

2.1.1 Caltrans Coordination Costs

Caltrans Coordination costs were assumed to be fixed for the operations cost model. As reflected in Figure 1, below, historical costs had been declining since 2004, but it was conservatively assumed for this model that the costs of Caltrans Coordination would be constant at $515,000 per year, which is the budget figure for Fiscal Year 09.

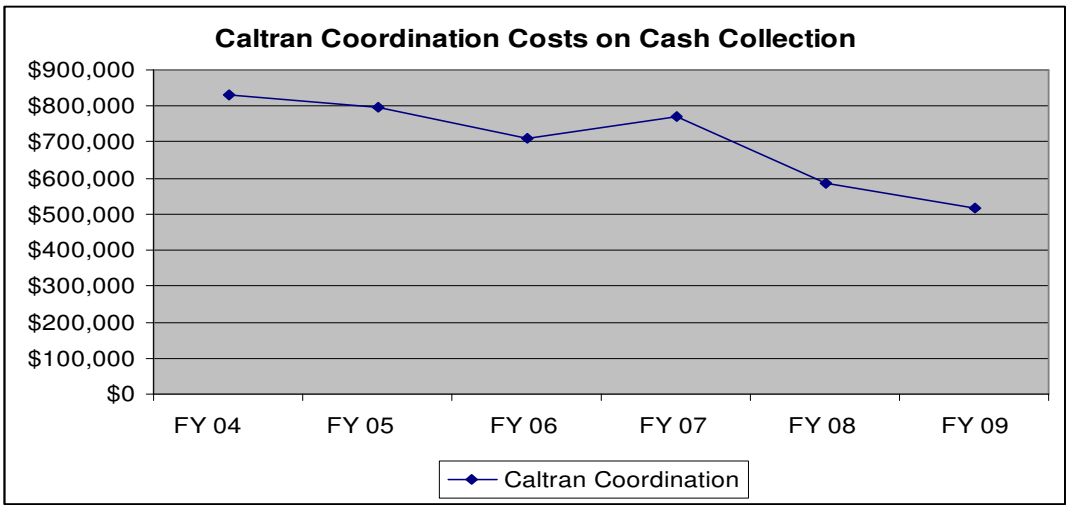

Figure 1 – Historical Caltrans Coordination Costs on Cash Collection

2.1.2 Fixed Cash Operations Costs

In order to project impacts to the overhead costs of cash toll collection, it was assumed that some operations costs would remain even if Cash Collections at the plazas was eliminated. It was further assumed that these remaining costs would be associated with the administration and security of the plazas. The current structure for management and administrative positions is presented below, with the estimated level of salaries applied to each category.

Base Operations Costs			
Required Positions	**Number**	**Salary**	**Totals**
Captains	4	$95,040	$380,160
Toll Lieutenants	20	$79,200	$1,584,000
Toll Sergeants	35	$66,000	$2,310,000
Office Techs	4	$55,000	$220,000
Associate CT Administrator	1	$55,000	$55,000
Total Fixed Base Operations			**$4,549,160**

Table 5 – Fixed Cash Operations Costs

The amount of Fixed Cash operations costs for the model was set at $4,549,160 per year, which represents a conservative, worst-case scenario. There would likely be a reduction in management positions, so these numbers may in reality be reduced, depending on operating policies and contractual issues.

2.1.3 Variable Cash Operations Costs

When the costs of management and administrative positions are removed from cash operations, the result is the isolation of the Cash Toll Collection operations costs, which may be viewed as variable costs. With regard to the cost per transaction, historical data analysis shows the cost per transaction of cash collection increasing as cash transaction volumes decreased. Cash transaction volumes decreased from 95.4 million in Fiscal Year 2004 to 59.2 million in Fiscal

Year 2008. The total cash operations cost remained relatively the same at approximately $25 million per year, and the Variable Cash Operations was approximately $20 million per year for the same five year period. If a portion of total cash operations costs is considered to be fixed as indicated in Section 2.1.2, the remainder reflects variable cash operations costs. Figure 2 below shows the almost flat trend line of the cash operational costs over the last several years. At the same time, Figure 3 reflects a decreasing traffic trend line, with a resultant increasing cost per cash transaction as illustrated in Figure 4.

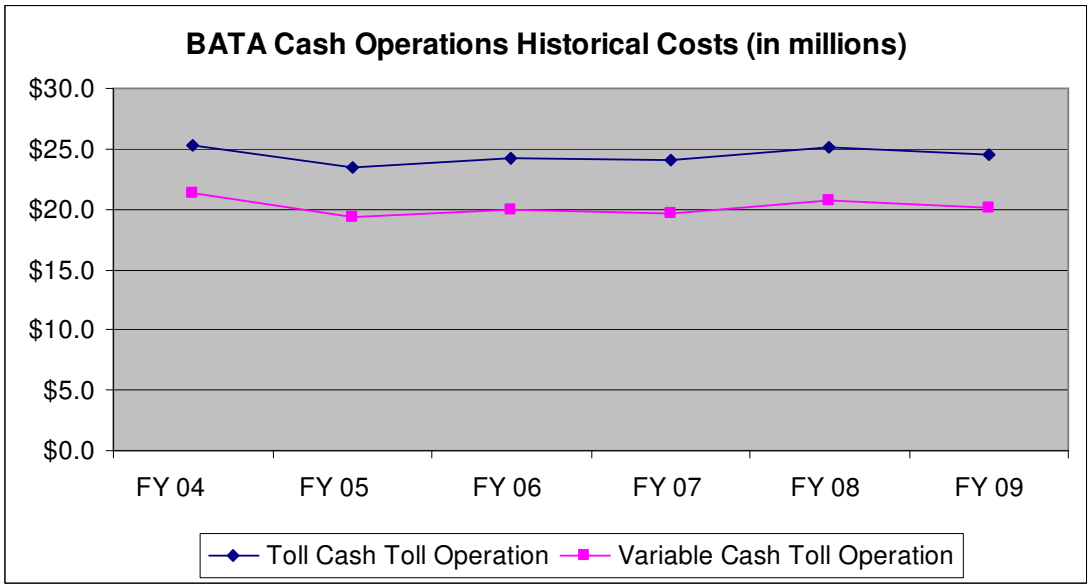

Figure 2 – Historical Cash Operations Costs

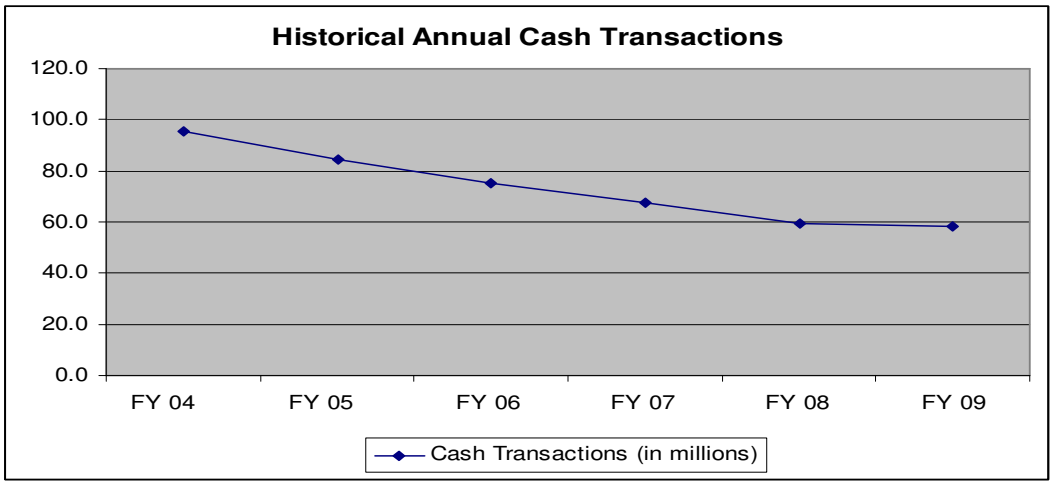

Figure 3 – Historical Annual Cash Transactions

Figure 4 below reflects the variable cash collection cost per transaction, which has gone from $0.22 in Fiscal Year 2004 to approximately $0.35 in Fiscal Year 2008.

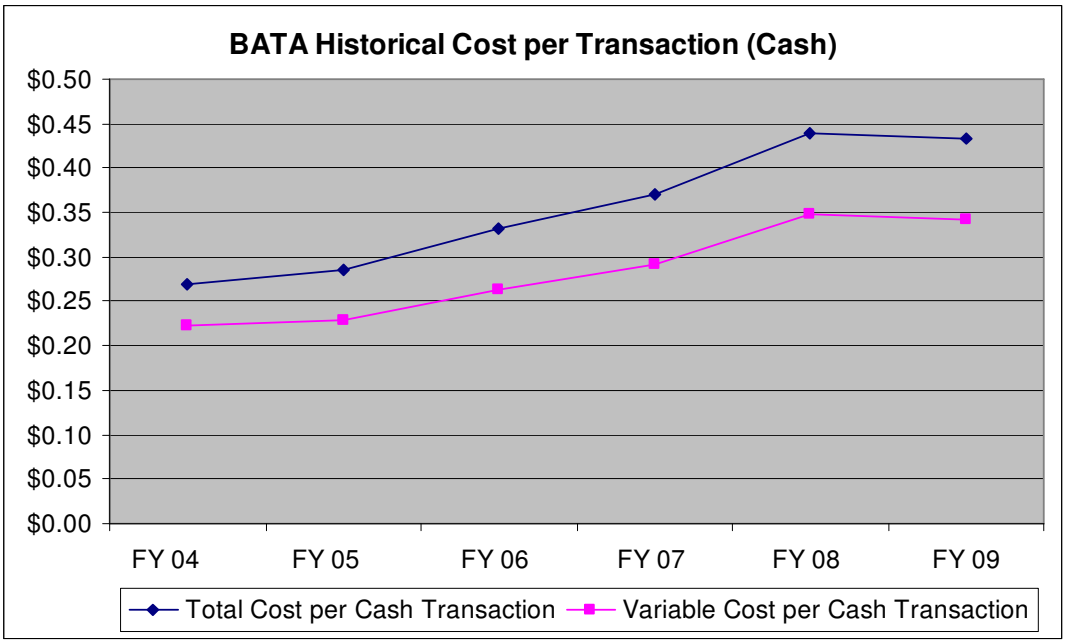

Figure 4 – Historical Variable Cost per Cash Transaction

The Operations Cost Model assumes that, if one result of moving to video tolls is to reduce or eliminate cash toll collection, then as video tolling progresses and cash transaction volumes continue to decrease, there will be a corresponding decrease in the total cost of cash collection operations. As a result, the cost per transaction for cash collection will remain constant. The model for this component uses the variable cash cost per transaction going forward as a means of estimating the decrease in costs. The variable cost per transaction used for this function is $0.342 for the future years. This is the calculated cost per transaction using the Fiscal Year 2009 budget, which is consistent with the historical data and the budget assumption that cash transactions will remain the same. The Model is designed so that if the ETC and Video penetration rates for the model are set to account for 100% of the transactions and the cash transactions go to zero, the Variable Cash Collections costs will also go to zero.

2.1.4 Bank Fees – Cash Handling and Armored Car

Banking fees for cash collection consist of bank cash counting and handling and armored car costs for pickup and delivery. Data analysis reflected a correlation between bank fees and cash revenue collected. Despite the fact that cash transaction volumes have decreased, cash revenue collected has increased quite considerably from $111 million in Fiscal Year 2004 to $244 million in Fiscal Year 2008, due to several toll increases. As a result, banking fees as a percentage of cash revenues collected have actually decreased over the years from 0.41% to 0.31%. For the past three years the percentage has flattened out as presented in Figure 5 below. Therefore, for estimating purposes the projected banking fees for cash handling are

assumed to be 0.31% of projected cash revenues. As a result, when cash revenue goes to zero, cash handling bank fees will also go to zero.

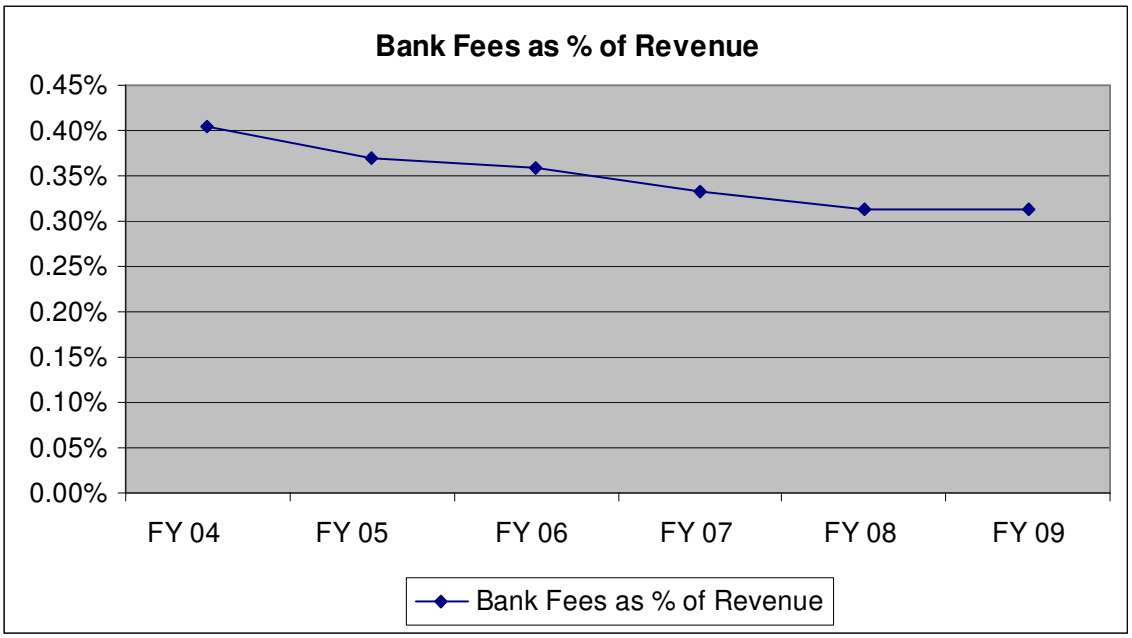

Figure 5 – Historical Bank Fees as Percentage of Cash Revenue

2.2 ETC Collection Operations

The direct ETC Operations Cost components used for the cost estimation model were:

- Caltrans ETC Operations
- ETC-CSC Operations-Account Maintenance
- ETC Banking/Credit Card Fees

In the current budgeting structure, the ETC Operations Costs include Account Maintenance, Image Review, Noticing, DMV Holds, and Banking/Credit Card Fees. In order to separate ETC processing and Video Tolling processing, the Account Maintenance costs were isolated through analysis of the ACS billing fees and the pricing points for the Account Maintenance activities. The Banking/Credit Card fees were also isolated and the data was analyzed to establish the correlation between the Credit Card fees and the ETC revenues. Caltrans ETC Operations costs were included in the analysis because they have a direct impact on the cost of operations.

The remaining components of the current ETC Operations Costs are included in the Video Tolling Section and Violation Processing Section estimates. These include the Image Review processes and fees, the Noticing/Invoice processes and fees, and the DMV Hold processes and fees.

2.2.1 Caltrans ETC Operations

The Caltrans ETC Operations Cost component has been declining since the CSC operations changeover occurred in 2005. Over the past three years this account has gone from $630,000 in Fiscal Year 2006 to $435,000 in Fiscal year 2008. For Fiscal Year 2009, this account has been budgeted for $289,000. For this model the FY 2009 budgeted figure of $289,000 has been included and conservatively projected to be constant for the five year projection period.

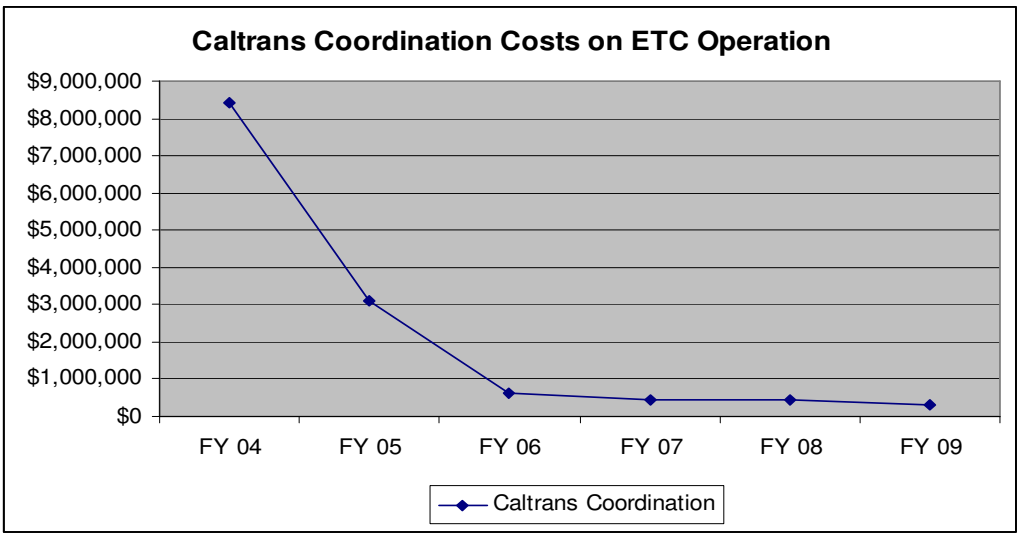

Figure 6 – Historical Caltrans Coordination Costs on ETC Operation

2.2.2 ETC CSC Operations-Account Maintenance

Account Maintenance Fees are the cornerstone of CSC Operations costs as they relate to ETC. The ACS contract calls for a 4 tier charging system, set up in the following structure:

Private Accounts 1 to 400,000	Monthly fee of $1.455 per account
Private Accounts 400,001 to 500,000	Monthly fee of $1.415 per account
Private Accounts > 500,000	Monthly fee of $1.295 per account
Business Accounts	Monthly fee of $2.600 per account

Since BATA exceeded the 500,000 account threshold in May 2006, all additional accounts are charged at the $1.295 fee level except for business accounts, which are negligible at 2,500 out of 768,412 accounts, or 0.33% of total accounts. So, as it relates to estimating Account Maintenance costs, the $1.295 fee will be applied to all additional accounts for the model and estimation purposes. Since this is a contractual amount and was subject to a public solicitation, the same fee level was assumed for Video Accounts and used to estimate Video Tolling Operational costs.

One of the issues encountered during development of the model was estimation of the number of additional accounts and the basis for applying account maintenance fees for the additional

accounts. Transactions per account was established, based on current data, and then applied to develop estimated future accounts. Once the average transactions per account is established, it is applied to the total ETC transactions estimated for the year, which results in the average accounts for the year. From that point, you can calculate estimated account maintenance fees for that particular year.

During analysis, a trend line became apparent, as illustrated in Table 6 below. As ETC transactions and ETC accounts increased the number of transactions per account decreased. This indicates that BATA is capturing more infrequent users of the bridges. There developed an inverse relationship between the number of ETC accounts and the number of transactions per account, assuming the overall ETC transactions increased.

Historical ETC Transactions Analysis						
	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
ETC Transactions (millions)	29.3	34.5	42.9	49.3	55.3	56.0
Average ETC Accounts (000)	222	300	491	583	727	772
Average Transactions per Account	132	115	88	84	76	74

Table 6 – Historical ETC Transactions Analysis

In developing the model, the first assumption is that the account base at the end of FY 08 will not decrease, and therefore the monthly cost for Account Maintenance at the end of FY 08 will provide a basis for future estimates. Once the account base is established, it is necessary to estimate the change in the account base and the added account maintenance fees for that change. It is also assumed that both ETC transactions will increase and the number of accounts will increase over time, as a result of increased ETC penetration. The amount of those increases is determined by the penetration rate established by BATA.

2.2.3 ETC Banking and Credit Card Fees

In the Banking/Credit Card fees analysis, the total Banking/CC Fees were compared to the ETC gross revenue processed and converted to percentages. This analysis was based on historical data provided by BATA, in which both BATA and Golden Gate Bridge are included with a roughly 83% and 17% split, respectively. The BATA's Banking/CC Fee data reflected a steady but small decline from 1.99% in FY 04 to 1.98% FY 07. Then in FY 08, there was a larger drop in the percentage to 1.70%, as illustrated in Table 7 below. The estimates provided through the FY 09 budget categories set the Banking/CC Fees at 1.81%. The Banking / Credit Card fee rate was conservatively set at 1.80% for model ETC estimates.

ETC Banking and Credit Card Fees Analysis					
	FY 04	**FY 05**	**FY 06**	**FY 07**	**FY 08**
ETC Toll Revenue	$34,154,499	$71,960,861	$135,588,615	$180,754,450	$233,076,141
BATA Banking/Credit Card Fees	Estimated @ $680,600	Estimated @ $1,435,900	$2,687,711	$3,574,710	$3,963,877
ETC Banking Fees as % of ETC Revenue	1.99%	2.00%	1.98%	1.98%	1.70%

Table 7 – ETC Banking and Credit Card Fees Analysis

2.3 Video Toll Collection Operations

When Video Tolling is added to the existing toll collection operation, all transactions will be processed as FasTrak (ETC), Cash or Video. The Video Tolling process makes use of technologies and procedures used as part of the existing I-Tolling and violations processes, but uses the resulting data in a different manner. All previously defined "violators" will become potential customers. The costs categories associated with Video Tolling operations are:

- Video account maintenance costs,
- Banking / credit card fees,
- Image review costs, and
- Invoice processing costs (VT 3 only).

As discussed in the Task 3.0, Concept of Operations, document, three types of potential Video Tolling accounts are being considered:

- VT 1: REG/PRE/BAL – Pre-registered, pre-paid video tolling based on debiting toll amounts from a pre-established account balance.
- VT 2: REG/PRE/CC – Pre-registered, Credit Card paid video tolling based on charging the customer's credit card for each toll transaction.
- VT 3: UNREG/POST – Unregistered, post-paid (invoiced) video tolling.

In the model, we have assumed four Options for processing video accounts and transactions:

Option 1 – Only VT 1 is offered;

Option 2 – Only VT 2 is offered;

Option 3 – Only VT 3 is offered; and

Option 4 –All three types of Video Tolling are offered.

The percentages for each Option assumed and analyzed within the model are as shown in Table 8 below. The percentages shown reflect the proportions of non-cash / non-ETC transactions processed under each video tolling option:

Video Tolling Options					
	FY 09	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Option 1	100% VT 1	100% VT 1	100% VT 1	100% VT 1	100% VT 1
Option 2	100% VT 2	100% VT 2	100% VT 2	100% VT 2	100% VT 2
Option 3	100% VT 3	100% VT 3	100% VT 3	100% VT 3	100% VT 3
Option 4	80% VT 3 20% VT 1&2	75% VT 3 25% VT 1&2	70% VT 3 30% VT 1&2	65% VT 3 35% VT 1&2	60% VT 3 40% VT 1&2

Table 8 – Video Tolling Options

2.3.1 Account Maintenance Costs

The actual monthly video account maintenance cost depends upon the agreement negotiated between BATA and ACS. For the purposes of this exercise, the existing account fee of $1.295 per account per month was used for all types of video accounts, including the registered video accounts (VT 1 & VT 2) and the unregistered video accounts (VT 3). The rate of $1.295 is ACS'

current rate for ETC account monthly maintenance when the number of accounts exceeds 500,000, as discussed in Section 2.2.2.

The number of video accounts is estimated from the projected annual video transactions and the estimated average annual transactions per video account. BATA has provided T&R projections for the next five years, with the total annual transactions projected at 114,500,000 each fiscal year. The model will allow BATA to change the assumptions on the percentage of transaction breaks among ETC, Cash and Video, but the submitted estimates assume that 10% of all transactions will be Video transactions starting in FY 09. Estimated annual video transactions are calculated from the percentage of video transactions and total annual transactions.

An analysis was performed of the historical data on the number of existing FasTrak accounts and the total annual ETC transactions. As discussed in Section 2.2.2, there is an inverse relationship in the data between ETC accounts and ETC Transactions – as accounts increase, transactions per account decrease. It is assumed here that the same fundamental mechanics will apply to the Video Accounts.

A key data point and assumption in the video analysis is the initial average annual number of transactions per account. This number is used to determine the estimated number of accounts necessary to accommodate the estimated video transactions.

BATA contracted Godbe Research & Analysis to survey non-FasTrak customers. The data provided in the report "Survey of Bay Area Commuters", dated April 2004, was used to develop the initial estimate of average annual transactions per video account. Part of the Survey questioned non-FasTrak users on their frequency of use of the BATA facilities. Table 9 below presents that data and develops a weighted average per week which is then converted to an annual trip number.

Survey of Bay Area Commuters (non-FasTrak users)			
Frequency of Bridge Crossings	**Times per Week**	**%**	**Weighted Average**
7 times a week	7	2.30%	0.161
6 Times a Week	6	1.10%	0.066
5 times a Week	5	5.90%	0.295
4 times per week	4	3.00%	0.120
3 times per week	3	4.00%	0.120
2 times per week	2	9.30%	0.186
1 time per week	1	21.00%	0.210
less than 1 time per week	0.5	53.40%	0.267
Trips per Week		100.00%	1.425
Weeks per Year			52.000
Transactions per Account/Year			**74.1**

Table 9 – Survey of Bay Area Commuters Summary

Projected Account Maintenance costs are estimated based on the estimated video tolling penetration rate, total transactions, estimated average annual video transactions per video account, and the video account maintenance fee.

2.3.2 Video Tolling Banking / Credit Card Fees

The historical data on BATA ETC operation shows that banking fees have ranged from 1.70% to 1.99% between 2004 and 2008. It is assumed that Banking/CC fees for ETC will be the same for VT 1 and VT 3, estimated at 1.80% of video revenue. The VT 2 option may require a higher rate if the transactions are processed on a per transaction basis, depending on BATA's agreement with their credit card processors. On this basis, the fee has been estimated the fee to be 2.75% of VT 2 revenue. In the event all three types of Video Accounts are offered, the Banking/CC fees are estimated at 2.40% of video tolling revenue.

- Option 1 – VT-1 Accounts 1.80%
- Option 2 – VT-2 Accounts 2.75%
- Option 3 – VT-3 Accounts 1.80%
- Option 4 – Combination of VT account types 2.40%

2.3.3 Image Review Costs

All video transactions / images must go through either OCR or human review in order to be posted to accounts or marked as unreadable. It is assumed that the new VES will be in place for the video tolling operation, with 50% of the images from the new VES passing the designated confidence level to be processed via OCR, with no human review. The remaining images are projected to go through the human review process.

In the image review costs estimation, the existing rate of $0.09 for each image reviewed was used, consistent with the rate currently being charged by ACS for violation image processing. Instead of reviewing every single image, the back office processor will review only those images that the OCR application cannot successfully process, or other images manually selected for review.

2.3.4 Invoice Processing Costs

Invoice costs will exist only under VT 3, which requires an invoice for post-paid transactions. Options 3 and 4 include invoicing estimates because both Options include VT 3 accounts. After the initial VT 3 account creation, the VT 3 account is assumed to be invoiced on a monthly basis. The number of monthly statements being mailed will equal the number of VT 3 accounts. For this study, a rate of $0.754 was used for each invoice processed, the same rate ACS currently charges for each violation notice processed.

VT 1 & 2 accounts are registered accounts with payment information required, so there are no invoice mailings needed under Option 1 and 2. Statements, however, should be available through the website.

2.4 Violations Processing Operations under the Video Process

The violation process begins when the video toll invoice is not paid (VT 3), or when the payment can't be collected from the pre-paid account (VT 1) or credit card (VT 2). The main costs associated with violation processing are the violation notice costs and the DMV Hold costs.

For this study, the existing rates of $0.754 for each violation notice processed and $3 for each DMV hold were used. It is also assumed that new legislation related to violation processing will increase the current 21-day violation noticing requirement (in order to be eligible for DMV hold) to a timeframe that will accommodate violation noticing under a video tolling program.

In an effort to estimate the number of violation notices that will be generated, an input / assumption has been set up in the model for the percentage of video accounts converting to violation status due to non-payment, as shown in Figure 7 below. Overall, it is assumed that the violation rate will go down over time, as the public is educated and operations become more stable. For the purposes of this exercise, the number of violation notices to be mailed is calculated based on the average transactions per month per account on all video accounts that turn into violation status at the end of month, because each violation transaction will generate one violation notice, as required by California Statute. The initial 10% level for video account violation translates into a similar overall violation rate currently being realized by BATA, which is approximately 1%.

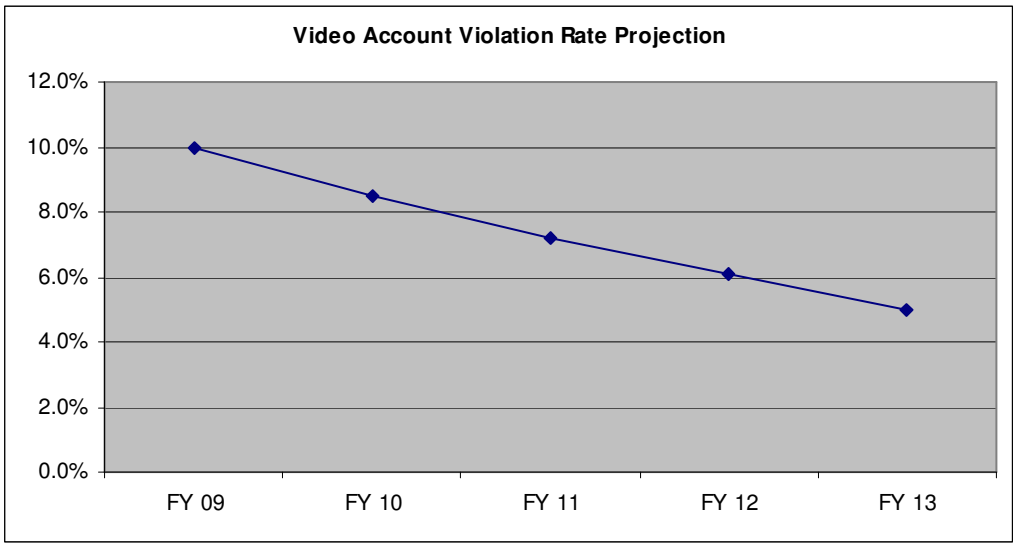

Figure 7 – Video Account Violation Rate Projection

From the assumed video account violation rate, we can calculate the number of 1st time violation notices that need to be sent. Based on proposed violation notice processing procedure, which is assumed to be the same as the current one, the back office processor will send out a 1st Notice, 2nd Notice and DMV Hold. In the model, assumptions have been established for the processing rate of 1st Notice, 2nd Notice and DMV Hold at 65%, 25%, and 20% respectively, which are based on BATA's current invoicing processing data. The rate of $0.754 for each notice will be applied to the number of 1st Notices sent in order to calculate the total notice processing costs. For the notice sent for DMV Hold, $3 each is charged by DMV, and we have included that as the second part of violation process costs.

3.0 BATA Video Tolling Costs Projection Model

This section provides a discussion of the model as it is presented in the spreadsheet, including assumptions and overall inputs required to operate the BATA video tolling costs projection model. In general, the model has been divided into five tabs: Consolidated Model Tab 00, Cash Operation Costs Analysis Tab 01, ETC Costs Analysis Tab 02, Video Costs Analysis Tab 03 and Violation Revenue and Cost 04. The Consolidated Model includes analysis of all four Video Tolling Options. Therefore, Tab 00 is a consolidation of all the values contained in Tabs 01, 02, 03 and 04. Appendix A, Input Summary, includes assumptions and existing data used to develop the model. Also for comparative purposes, Appendix B, No Video Toll Scenario, illustrates the "do nothing" option.

3.1 Consolidated Model Tab 00

On the Consolidated Model tab, the primary input points are ETC and Video penetration percentages, with Cash calculated as the remainder of transactions based on these two inputs. The BATA VT cost model is primarily based on the estimated penetration percentages for the ETC transactions and the Video Transactions. These percentages provide the major input for projecting the direct operations costs for all four components. As the ETC and Video percentages change, the Cash percentage automatically adjusts. These percentages are automatically applied to the overall projected Traffic and Revenue and calculate the distribution of Revenue and Transactions across the three modes, as illustrated in Table 10 below. Details of the Consolidated Model analysis are presented in Appendix C, Consolidated Model.

3.1.1 Traffic & Revenue Projections

The traffic and revenue projections shown in the table below were provided by BATA. The projected revenue and transactions are essential elements of the model. If these basic elements change, then the outputs of the model change accordingly.

The ETC and Video Tolling market penetration rates are the inputs that drive the various cost projections in the model. The Cash penetration rate is automatically calculated as a result of the first two. Based on these three categories, revenue and transactions are calculated for each category.

As shown in Table 10, BATA's total toll revenue and transactions are projected to remain the same for the next five years, at $477,465,000 and 114,500,000 transactions. The ETC penetration is estimated to grow slowly, from 50% in FY09 to 54% in FY13. The Cash penetration is projected to decrease as the Video penetration increases, when more and more motorists start adopting the video tolling payment option.

	Traffic & Revenue Projections				
	FY 09	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Total Toll Revenue Projections	**$477,465,000**	**$477,465,000**	**$477,465,000**	**$477,465,000**	**$477,465,000**
Total Toll Transactions Projections	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**
Average Toll	**$4.17**	**$4.17**	**$4.17**	**$4.17**	**$4.17**
Cash Collection	40.00%	34.00%	28.00%	22.00%	16.00%
ETC Penetration Rate	50.00%	51.00%	52.00%	53.00%	54.00%
Video Tolling Percentage	10.00%	15.00%	20.00%	25.00%	30.00%
Percentage Total	100.00%	100.00%	100.00%	100.00%	100.00%
Cash Revenue	**$190,986,000**	**$162,338,100**	**$133,690,200**	**$105,042,300**	**$76,394,400**
Cash Transactions	**45,800,000**	**38,930,000**	**32,060,000**	**25,190,000**	**18,320,000**
ETC Revenue	**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions	**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**
Video Revenue	**$47,746,500**	**$71,619,750**	**$95,493,000**	**$119,366,250**	**$143,239,500**
Video Transactions	**11,450,000**	**17,175,000**	**22,900,000**	**28,625,000**	**34,350,000**

Table 10 – Traffic & Revenue Projections

3.1.2 Operations Costs – Cash, ETC, Video Tolling, Violations Processing

Most of the variable cost components are calculated from either the computed Revenue or Transactions. The model inputs above assume that the ETC penetration will increase slightly in future years. Cash transactions will decrease as Video transactions increase. These assumptions can be changed by adjusting the rates above.

Other areas that allow input if assumptions are changed are discussed below under each section. As an illustration of the model, Table 11 provides the roll down of the Operations Cost Projections for each collection mode assuming Video Tolling Option 4, plus violation processing, based on the market penetration assumptions shown in the previous Table 10. As shown in Table 11, if all three video tolling options were implemented, the total estimated annual operations costs would range from approximately $46.8 million to $51.2 million.

	FY 09	FY 10	FY 11	FY 12	FY 13
Cash Operations Costs					
Caltrans Coordination	$515,000	$515,000	$515,000	$515,000	$515,000
Base Cash Operations Costs	$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Variable Cash Operations Costs	$15,663,600	$13,314,060	$10,964,520	$8,614,980	$6,265,440
Bank Fees (Cash Handling)	$592,057	$503,248	$414,440	$325,631	$236,823
Cash Operations Costs	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
Cash Toll Cost/Transaction	$0.465	$0.485	$0.513	$0.556	$0.631
% of Average Toll	11.16%	11.63%	12.30%	13.33%	15.14%
ETC Direct Operations Costs					
Caltrans ETC Operations	$289,000	$289,000	$289,000	$289,000	$289,000
ETC - Account Maintenance	$13,586,153	$14,018,048	$14,463,706	$14,923,797	$15,399,031
Bank Fees (CC Processing)	$4,297,185	$4,383,129	$4,469,072	$4,555,016	$4,640,960
DMV Expense	$0	$0	$0	$0	$0
ETC Operations Costs	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
ETC Cost/Transaction	$0.317	$0.320	$0.323	$0.326	$0.329
% of Average Toll	7.61%	7.68%	7.74%	7.81%	7.88%
Video Operations Costs	**Option 4-All VTs**				
Video Account Maintenance	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fees	$1,145,916	$1,718,874	$2,291,832	$2,864,790	$3,437,748
Image Review Cost	$875,925	$1,140,764	$1,405,602	$1,670,441	$1,935,279
Invoice Fee (VT 3 Only)	$1,119,996	$1,618,744	$2,071,992	$2,475,726	$2,913,739
Video Operations Costs	**$5,546,337**	**$8,185,319**	**$10,853,226**	**$13,552,611**	**$16,627,375**
Video Cost/Transaction	$0.484	$0.477	$0.474	$0.473	$0.484
% of Average Toll	11.62%	11.43%	11.37%	11.35%	11.61%
Violation Processing Costs					
Violation Notice Cost	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
TOTALS	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Cash Operations	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
ETC Operations	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
Video Operations	**$5,546,337**	**$8,185,319**	**$10,853,226**	**$13,552,611**	**$16,627,375**
Violation Processing	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
Total	**$46,803,508**	**$48,007,361**	**$49,059,750**	**$50,016,846**	**$51,170,315**

Table 11 – Consolidated Model Cost Projections for Option-4

3.2 Cash Operation Costs Analysis Tab 01

A historical analysis of BATA's cash transaction collection was conducted. The inputs that drive the projected cash collection costs are the estimated cash revenue and transactions, which

come from the consolidated model tab shown in Table 10. Details of the Cash Operation Costs analysis are presented in Appendix D.

3.3 ETC Costs Analysis Tab 02

This tab is similar to the cash operations costs analysis tab 01. The inputs that derive the projected ETC costs are the estimated ETC transactions, revenues and average annual transactions per ETC account. The first two come from the consolidated model tab, and the last one is estimated from BATA's historical ETC data. Please see discussions of these components in Section 2. Details of the ETC Costs analysis are presented in Appendix E.

3.4 Video Costs Analysis Tab 03

The inputs and assumptions on the video costs analysis tab are a little more complicated than the others because there are several assumptions that must be made regarding various aspects of the Video Tolling process. Details of the Video Costs analysis are presented in Appendix F.

- **Average annual transactions per video account.** This data component is used to estimate the number of video accounts to be established and maintained. Based on the Survey of Bay Area Commuters, the Model starts at 74 transactions per video account and decreases over time as more and more infrequent drivers use the service.
- **Percentage of VT 3 accounts.** This is for Option 4 only, which includes all VT account types. As the percentage of VT 3 accounts is entered the percentage of VT 1&2 accounts is automatically adjusted. The number of VT 3 accounts must be estimated separately, because VT 3 accounts generate invoice fees.
- **Percentage of images via OCR processing.** This assumption determines the number of images that will pass the designated confidence level and be processed completely via OCR. At BATA's request, we have set the OCR level at 50% for conservative estimation. This means the remaining 50% of the images will have to go through human review.
- **Percentage of "Unreadable" images during human review.** This percentage was set at 20% based on historical data. This percentage will not affect the image review costs overall, but the unreadable images are included in the calculation of "true violations", and this percentage impacts the calculations for processing video toll accounts, invoices and violations.
- **Video account violation rate.** For violation estimation, we assume a percentage of video accounts will turn into violations for various reasons. This assumption will drive the number of violation notices that need to be processed each fiscal year.
- **Bank fees.** The last input parameter in the Video Costs Analysis tab is the bank fees as a percentage of total video revenue. Those derived from ETC historical analyses have been used as benchmarks, with fluctuations according to each Option's unique characteristics, as discussed in Section 2.3.2.

4.0 Comparison of "No Video Tolling" Collection Costs with Various Video Tolling Options

In order to establish a clear comparison of current operations (i.e., no video tolling) to the various video tolling options included in the model, an analysis was conducted for a "No Video Toll" scenario. The model projects BATA's operations costs for the next five years based on several assumptions. Under this scenario, it is assumed that a little over 10% of all transactions would remain as "Non-ETC / Non-Cash" transactions, which is consistent with what BATA is experiencing today. ETC penetration will grow slightly, which means that Cash percentage will decrease slightly. Total operation costs will range from $45.9 to $46.5 million for the next five years, which includes Cash, ETC and Violation processing. The cost estimation here excludes the same operations presented earlier in the memo, such as facility and toll system maintenance, hardware and software maintenance, and so forth. Details of the No Video Tolling Scenario analysis are presented in Appendix B.

4.1 Traffic and Revenue Projection and Operation Costs - "No Video Toll" Scenario

The ETC penetration rate governs the spreadsheet and the Traffic and Revenue split as follows:

	FY 09	FY 10	FY 11	FY 12	FY 13
Revenue	**$477,465,000**	**$477,465,000**	**$477,465,000**	**$477,465,000**	**$477,465,000**
Transactions	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**
Average Toll	**$4.17**	**$4.17**	**$4.17**	**$4.17**	**$4.17**
Cash Collection Percentage	50.00%	49.00%	48.00%	47.00%	46.00%
ETC Penetration Rate	50.00%	51.00%	52.00%	53.00%	54.00%
Percentage Total	100.00%	100.00%	100.00%	100.00%	100.00%
Cash Revenue	**$238,732,500**	**$233,957,850**	**$229,183,200**	**$224,408,550**	**$219,633,900**
Cash Transactions	**57,250,000**	**56,105,000**	**54,960,000**	**53,815,000**	**52,670,000**
ETC Revenue	**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions	**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**
Total Cash Operation Costs	$25,383,731	$24,977,339	$24,570,948	$24,164,557	$23,758,165
Total ETC Costs	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
Total Violation Processing Costs	$2,371,478	$2,371,478	$2,371,478	$2,371,478	$2,371,478
Total Operations Costs	**$45,927,547**	**$46,038,994**	**$46,164,205**	**$46,303,847**	**$46,458,634**

Table 12 – Summary of Transactions, Revenues and Costs under "No Video Toll"

4.2 Comparison of Operation Costs under Each VT Option

4.2.1 Initial Results

The total operations costs for the No Video Toll scenario for the projected period is presented in Table 13 and compared to the Operations costs of the VT Options. The details of this comparison are included in Appendix H.

	FY 09	FY 10	FY 11	FY 12	FY 13
Total "No Video" Operations Costs	$45,927,547	$46,038,994	$46,164,205	$46,303,847	$46,458,634
Option 1 (VT 1 Only)					
Total Operations Costs VT 1	$45,397,034	$45,958,898	$46,414,800	$46,824,923	$47,397,139
Costs Differential – VT 1	$530,513	$80,096	($250,595)	($521,076)	($938,505)
Option 2 (VT 2 Only)					
Total Operations Costs VT 2	$45,850,625	$46,639,286	$47,321,983	$47,958,902	$48,757,914
Costs Differential – VT 2	$76,921	($600,292)	($1,157,778)	($1,655,055)	($2,299,280)
Option 3 (VT 3 Only)					
Total Operations Costs VT 3	$46,797,028	$48,117,223	$49,374,788	$50,633,732	$52,253,370
Costs Differential – VT 3	($869,482)	($2,078,229)	($3,210,583)	($4,329,884)	($5,794,736)
Option 4 (All VTs)					
Total Operations Costs All VTs	$46,803,508	$48,007,361	$49,059,750	$50,016,846	$51,170,315
Costs Differential – All VTs	($875,962)	($1,968,367)	($2,895,545)	($3,712,999)	($4,711,681)

Table 13 – Total Operation Cost Projections Comparison

Note that Options 1 and 2, which include just VT 1 and VT 2, there is an initial overall savings, compared to the No Video Toll scenario. There is a lower cost associated with VT 1 and VT 2, because there are no Invoice Costs incurred. These Options do require establishing accounts and pre-registration of license plates. Option 1 has an initial savings of about $530,000 in FY09 and $80,000 in FY10. Option 2 has an initial year savings of approximately $77,000. The main difference between these two Options is that VT 2 is expected to incur higher credit card fees. VT 1 accounts would be pre-paid and structured to be replenished about once a month, whereas with VT 2, account transactions would be processed through the credit card as transactions are incurred. This could result in a higher magnitude of transactions at a lower dollar value, which will incur a higher processing fee. In Options 3 and 4, which include VT 3, the overall costs are higher across the board, in association with the processing of invoices.

4.2.2 Projection Period Results

Over the five year projection period, there is a general increase across the board because it is assumed the market penetration rate for Video Tolling increases, and as a result, transactions, accounts, and account maintenance costs increase. In the case of VT 3, invoice costs increase also. However, one of the primary reasons for the cost differential in the out years, especially

with VT 1 and VT 2, is the fixed portion of the Cash Collection costs. In the later years there is a higher cost differential.

4.2.3 Potential Surcharge Analysis

An analysis was conducted to determine what surcharge, if any, should be assessed per video tolling transaction. This surcharge could be calculated in two ways, as described below:

Break-Even Surcharge: This surcharge would offset the increase in operations costs from a video tolling program. In other words, video tolling surcharge would only be as high as to break even, when compared to the no video tolling option. The surcharge can be calculated by taking the increase in operations cost from video tolling (as compared to no video tolling) and dividing it by total collectable video transactions, where collectable video transactions exclude transactions from unreadable images and video tolling transactions that turn into violation notices). Table 14 summarizes the potential break-even surcharges projected for the next five years.

- **Option 1 (VT-1)** would **not** initially require a surcharge per transaction for the first two years; however, a surcharge of $0.05 would be required in FY11, FY 12 and FY13 to break even.
- **Option 2 (VT-2)** would **not** initially require a surcharge per transaction; however, a surcharge of $0.05 would be required in FY 10; and beginning in FY11, a surcharge of $0.10 would be required to break even.
- **Option 3 (VT-3)** would require a surcharge per transaction in the initial year of $0.15. The surcharge would need to be increased to $0.20 in FY10 through FY12 and $0.25 in FY13 in order to break even.
- **Option 4 (VT-All)** would require a surcharge per transaction of $0.15 for the initial two years, but increasing to $0.20 beginning in FY11, to break even.

	FY 09	FY 10	FY 11	FY 12	FY 13
Operation Costs "No Video Toll"	**$45,927,547**	**$46,038,994**	**$46,164,205**	**$46,303,847**	**$46,458,634**
Video Toll Penetration Rate	**10%**	**15%**	**20%**	**25%**	**30%**
Collectable Video Transactions	**8,358,500**	**13,180,095**	**18,127,640**	**23,166,785**	**28,331,880**
Operation Costs Option 1 (VT 1)	**$45,397,034**	**$45,958,898**	**$46,414,800**	**$46,824,923**	**$47,397,139**
Operation Costs Differential	**($530,513)**	**($80,096)**	**$250,595**	**$521,076**	**$938,505**
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Surcharge on Video Transaction	$0.00	$0.00	$0.05	$0.05	$0.05
Total Surcharge Revenue VT1	**$0**	**$0**	**$906,382**	**$1,158,339**	**$1,416,594**
Operation Costs Option 2 (VT 2)	**$45,850,625**	**$46,639,286**	**$47,321,983**	**$47,958,902**	**$48,757,914**
Operation Costs Differential	**($76,921)**	**$600,292**	**$1,157,778**	**$1,655,055**	**$2,299,280**
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Surcharge on Video Transaction	$0.00	$0.05	$0.10	$0.10	$0.10
Total Surcharge Revenue VT2	**$0**	**$659,005**	**$1,812,764**	**$2,316,679**	**$2,833,188**
Operation Costs Option 3 (VT 3)	**$46,797,028**	**$48,117,223**	**$49,374,788**	**$50,633,732**	**$52,253,370**
Operation Costs Differential	**$869,482**	**$2,078,229**	**$3,210,583**	**$4,329,884**	**$5,794,736**
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Surcharge on Video Transaction	$0.15	$0.20	$0.20	$0.20	$0.25
Total Surcharge Revenue VT3	**$1,253,775**	**$2,636,019**	**$3,625,528**	**$5,791,696**	**$7,082,970**
Operation Costs Option 4 (VT-All)	**$46,803,508**	**$48,007,361**	**$49,059,750**	**$50,016,846**	**$51,170,315**
Operation Costs Differential	**$875,962**	**$1,968,367**	**$2,895,545**	**$3,712,999**	**$4,711,681**
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Surcharge on Video Transaction	$0.15	$0.15	$0.20	$0.20	$0.20
Total Surcharge Revenue VT-All	**$1,253,775**	**$1,977,014**	**$3,625,528**	**$4,633,357**	**$5,666,376**

Table 14 – Potential Video Tolling Surcharge (Break-Even)

Cost-Per-Transaction Surcharge: This potential surcharge can be calculated by taking the total operations cost from video tolling and dividing it by the total number of video transactions. Table 15 summarizes the potential break-even surcharges projected for the next five years.

Because BATA currently has a solid commuter base, the implementation of VT is projected to add more infrequent customers to the account base. These customers can be expected to have fewer transactions per month, regardless of their account type. As a result, the overall cost per transaction is projected to rise gradually over time.

	FY 09	FY 10	FY 11	FY 12	FY 13
Option 1 (VT 1 only)	$0.36	$0.36	$0.36	$0.36	$0.37
Option 2 (VT 2 only)	$0.40	$0.40	$0.40	$0.40	$0.41
Option 3 (VT 3 only)	$0.48	$0.48	$0.49	$0.50	$0.52
Option 4 (All VTs)	$0.48	$0.48	$0.47	$0.47	$0.48

Table 15 – Potential Video Tolling Surcharge (Cost-Per-Transaction)

5.0 Violation Revenue and Leakage Analysis

5.1 Violation Revenue Estimate

When the invoice for a video account is not paid, the transactions included in that invoice become violations. BATA must send each violation transaction a violation notice, according to California Statute. It is assumed that BATA will continue to process violation notices under current procedures by sending the 1st Notice, the 2nd Notice and DMV Hold following the implementation of Video Tolling. Based on the video account violation rate discussed in Section 2.4, the figure below shows the estimated numbers of violation notices to be sent out each fiscal year:

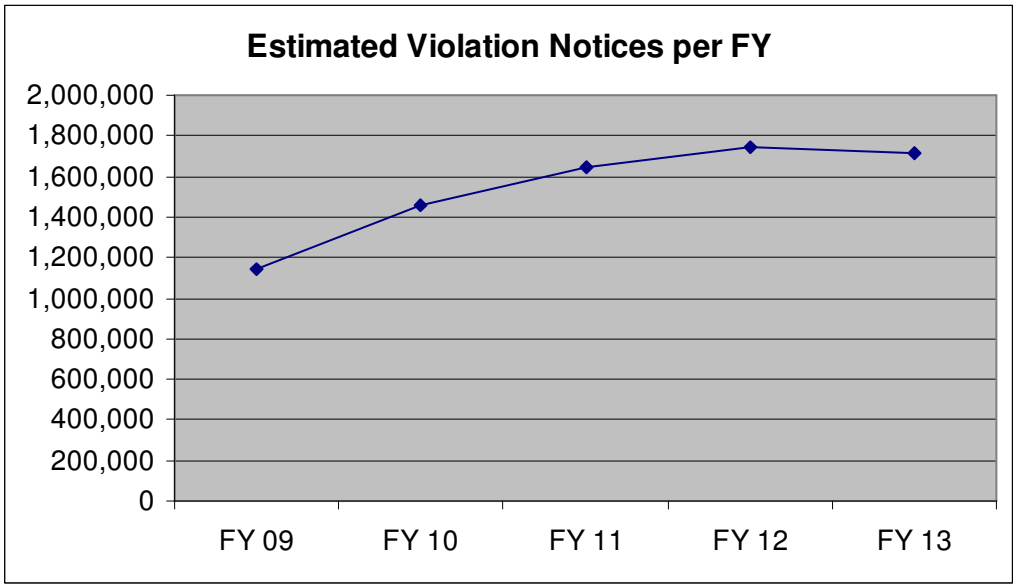

Figure 8 – Estimated Violation Notice per Fiscal Year

The detailed Violation Costs and Revenue Analysis is contained in Appendix G. The number of violation notices collected determines the violation revenue. To estimate the notices collected, the main inputs are the violation processing rates for the 1st Notice, 2nd Notice and DMV Hold. Historical data shows that 79% of violations are successfully processed. In our model, we have set up the processing rates after sending the 1st Notice, the 2nd Notice, and DMV Hold at 65%, 25% and 20%, respectively. Based on these assumed rates, we have calculated the cumulative percent-processed to be 79%, which means there are still 21% of outstanding violation notices unpaid after these three steps. This is similar to BATA's current violation processing outcome.

Violation processing costs have been separated to provide for consistent comparisons, and key factors associated violation processing costs are presented below. Please note that the input parameters here are the same as previously mentioned in the Violation Processing Tab, including:

- OCR %
- 1st Violation Notice Collection rate
- 2nd Violation Notice Collection rate
- After DMV collection rate

During the violation payment process, a number of penalties may be waived for a variety of reasons, such as tolls debited to FasTrak account, tolls paid within the courtesy period, and so forth. Inputs have been included for percentage of penalties waived during each of three payment stages. Based on FY06/07 to FY08/08 violation processing data, the percentages of penalties waived for 1st Notice, 2nd Notice and DMV Hold was set at 77%, 54% and 4%, respectively.

For those violation notices where no penalties are waived, the average fine amount for the 1st Notice is assumed to be $29.17, which includes the average toll of $4.17 plus the penalty of $25. The average fine amount for the 2nd Notice is assumed to be $74.17, which includes the average toll of $4.17 plus the penalty of $70 ($25+$45).

The estimated violation revenue for FY 09 with a 10% penetration rate for Video Tolling is expected to be approximately $15.3 million. The estimated violation revenue for FY 13 with a 30% penetration rate is projected to be approximately $23.0 million, as summarized in Table 16 below:

Option4 - Analysis	All VTs				
	FY 09	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Tolls & Penalty Fees					
Average Tolls (per transaction)	$4.17	$4.17	$4.17	$4.17	$4.17
1st Notice Penalty	$25.00	$25.00	$25.00	$25.00	$25.00
2nd Notice Penalty	$70.00	$70.00	$70.00	$70.00	$70.00
Average Fine for 1st Notice	$29.17	$29.17	$29.17	$29.17	$29.17
Average Fine for 2nd Notice	$74.17	$74.17	$74.17	$74.17	$74.17
Notices Generated (All VT)					
# of All Video Accounts	154,730	238,542	327,143	420,956	536,719
% of Video Accounts Becoming Violation per Month	10.0%	8.5%	7.2%	6.1%	5.0%
# of Video Accounts Turning into Violation Status	15,473	20,276	23,554	25,678	26,836
Average Transactions per Video Account per Month	6.2	6.0	5.8	5.7	5.3
# of Violation Notice per Month (1 transaction 1 notice)	95,417	121,656	137,400	145,510	143,125
# of Months per FY	12	12	12	12	12
# of Violation Notice per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
Violation Notice Collection					
1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%
Revenue on 1st Notice					
Revenue from 1st Notice	$21,709,773	$27,679,960	$31,262,072	$33,107,403	$32,564,659
% of $25 Penalty Waived	77%	77%	77%	77%	77%
Estimated after Waiving Fees	$7,382,960	$9,413,274	$10,631,462	$11,259,014	$11,074,440
Revenue on 2nd Notice					
Revenue from 2nd Notice	$7,430,907	$9,474,406	$10,700,506	$11,332,133	$11,146,360
% of $70 Penalty Waived	54%	54%	54%	54%	54%
Estimated after Waiving Fees	$3,643,819	$4,645,870	$5,247,100	$5,556,825	$5,465,729
Violation DMV Hold					
Revenue – After DMV Hold	$4,458,544	$5,684,644	$6,420,304	$6,799,280	$6,687,816
% of $70 Penalty Waived	4%	4%	4%	4%	4%
Estimated after Waiving Fees	$4,280,202	$5,457,258	$6,163,491	$6,527,309	$6,420,304
Total Violation Revenue	**$15,306,982**	**$19,516,402**	**$22,042,054**	**$23,343,147**	**$22,960,473**

Table 16 – Violation Revenue Projection (All VT options)

5.2 Revenue Leakage Analysis

Implementation of video tolling will likely increase revenue leakage. An analysis was conducted to estimate the level of leakage over the five-year analysis period. The revenue leakage has

been captured in the analysis at three places: 1) Unsuccessful transferred images from lane to the CSC (currently set at 0% in the model, as it is assumed that the new VES will result in close to 100% successful transferred images); 2) Unreadable images during human review due to issues such as, no plates, dealer plates, obstructed plates, etc (currently set at 20% in the model); and 3) Non-responded violation notices. As shown in Table 17 below, the revenue leakage with video tolling is estimated to be around $9 million for the first year, and it could increase to about $20 million in FY 13 if it is assumed that 30% of all transactions are processed as video tolls. However, it is important to note that the revenue leakage would be off-set by the violation revenue, as illustrated in Table 17 below.

	FY 09	FY 10	FY 11	FY 12	FY 13
Violation Revenue (with No Video Toll)	**$15,919,261**	**$15,919,261**	**$15,919,261**	**$15,919,261**	**$15,919,261**
Revenue Leakage (with No Video Toll)	**($8,491,238)**	**($8,491,238)**	**($8,491,238)**	**($8,491,238)**	**($8,491,238)**
Violation Revenue (with Video Toll)	**$15,306,982**	**$19,516,402**	**$22,042,054**	**$23,343,147**	**$22,960,473**
Revenue Leakage (with Video Toll)	**($9,119,582)**	**($11,849,488)**	**($14,469,099)**	**($17,008,497)**	**($19,437,600)**

Table 17 – Projected Revenue Leakage

6.0 Capital Improvement Costs

Capital Improvements required to implement Video Tolling are discussed in this section. Five areas may be impacted, as follows:

- Transponders (ETC)
- Back Office Systems (BOS) enhancements, including the application, website and IVR. These estimates must be obtained from ACS.
- VES – In-lane VES equipment is already under contract with TRMI, which will include new cameras with in-lane OCR capabilities.
- Lane System – decision has been made to replace the ATCAS lane system.
- Signage
- Marketing / Public Education

6.1 Back office System - Enhancements

Back Office System Enhancements required for full implementation of the Video Tolling program will require estimates from ACS. ACS' Vector system will need to accommodate the requirements for all types of video accounts. These enhancements would include:

- The ability to invoice Unregistered Video Tolling customers, tracking outstanding invoices and determining when they become violators.
- Updates to the website to allow for video toll registration and account maintenance.
- Updates to the IVR to allow video customers to perform the Video account maintenance processes, make payments, etc.

As stated in Task 3.0 Concept of Operations document, one of the most significant items driving implementation costs for video tolling will be the potential systems modifications. The Back Office System will require upgrading to accommodate the changes and additions to the processing of Video Tolling Accounts. The following amounts were provided by the current BOS Contractor.

Capital Expense Category	VT Option	Estimated Cost
Back Office System Modifications (ACS / Vector)	Option 1 (VT 1 only)	$983,125
	Option 2 (VT 2 only)	$1,057,385
	Option 3 (VT 3 only)	$1,140,959
	Option 4 (All VTs)	$2,431,469

Table 18 – Back Office System Modifications Estimate

Several areas of analysis were also included in the Task 5.0 Technology Review deliverable with regard to systems and infrastructure modifications outside of Vector. These could include image storage and transmission capacities across the Interface Server, DMV Server, and associated infrastructure, image review capabilities, and actions necessary to maintain the current ATCAS as the system of record for toll transaction data.

6.2 Video Enforcement System - Equipment

A Contract is currently in effect to replace all the VES lane equipment including cameras. This new system will provide enhanced images and OCR capabilities in the lane, using a state-of-the-art video system. Since the new VES will provide the adequate roadside system needs, additional capital costs for VES modifications at the lane level are not anticipated.

6.3 Lane System Replacement

The decision has also been made to replace BATA's existing ATCAS toll collection system. System requirements and RFP documents are currently being developed. A new lane system will enhance the toll collection processes in every mode, including video tolling, and will provide for better accounting of all transactions on the BATA bridges.

6.4 Other Capital Requirements or Expenditures

6.4.1 New Bridge Signage

New bridge signing will need to be investigated and designed to inform customers of new traffic patterns and toll collection processes. No estimates were made regarding Bridge/Plaza signing at this point. To the extent possible, existing CMSs will be used to include video tolling messages.

6.4.2 Marketing and Public Information

A marketing campaign will be an essential part of a successful Video Tolling program. As stated in Task 3.0 Concept of Operations document, although any or all of the three video tolling options could be implemented without marketing and/or public outreach, it would limit the success of the program. In particular, VT1 and VT2 would be virtually invisible to the potential customer without some sort of promotion. VT3 would gradually become visible, as violators received invoices and people began to ask questions, but the other two options have no similar method of gradual introduction.

As an indication of the costs involved in marketing the Video Tolling Program, the marketing firm SWIRL has provided BATA with estimates for two different marketing campaigns. These estimates are for $745,000 and $895,000, depending on the level of media BATA wants to implement.

Also as stated in the Task 3.0 document, it will be beneficial to continue promoting the ETC / FasTrak program, as the FasTrak program is still the most economical method of collection. It is important that the potential audience understands that violations will still be pursued following the new options if transactions remain unpaid.

7.0 Summary and Conclusions

7.1 Cost Operations Model

After analyzing BATA's existing toll collection operation and various historical and budgeted data points, the base assumptions and formulas were established for the BATA Video Tolling Operations Cost Projections Model. The model provides some estimates and answers based on the various inputs and assumptions, as discussed in the earlier sections of this document. The primary outputs are the cost projections associated with Cash Collection, ETC, Video Tolling and Violation Processing under different scenarios.

The main inputs and related assumptions that must be addressed on a per year basis are:

- ETC Market Penetration Rate
- Video Tolling Market Penetration Rate
- Fixed Operations Amount (both Cash and ETC)
- Banking & Credit Card Fees – Percentage of Revenue
- Transactions per Account on an Annual Basis for both ETC and Video
- Percentage of ETC transactions processed as I-Toll/V-Toll
- Optical Character Recognition (OCR) - Percentage of Automatic Processing
- Unreadable Images – Percentage
- Invoices & Notices Paid – Percentages
- Monthly Video account violation Rate
- Collection & waiver percentages on notices

The model also provides a comparison of the costs with Video Tolling to the existing operation model under the "No Video Tolling" option.

7.2 Costs Savings from Reduced Cash Collection

BATA would save on Cash Collection Operations costs in each year, assuming that the variable operations component would be reduced proportionately as Cash Transactions were reduced. Under each of the four Options analyzed based on the Video Tolling penetration rates the savings in comparison to the No Video Tolling Scenario are presented as follows:

	Video Penetration Rate	Cash Collection Savings
Year 1	10%	($4,064,000)
Year 2	15%	($6,096,000)
Year 3	20%	($8,128,000)
Year 4	25%	($10,160,000)
Year 5	30%	($12,192,000)

There would be savings in every year because there is a reduction in cash transactions each year. Under all of the Video Options, the penetration rate is assumed to be the same for the purposes of this document. However, BATA can use the model to assume different penetration rates for each video tolling option, if it so desires.

The only two scenarios that produced an overall reduction in operations costs were Option 1 (VT 1) and Option 2 (VT 2), both occurring in year one.

- Option 1 (VT 1) shows an overall reduction of operations costs in the initial year of **$530,000**.
- Option 2 (VT 2) shows an overall reduction in operations costs in the initial year of **$77,000**.

The overall savings in the later years is offset by the higher cash cost per transaction and higher violation processing costs. As cash transactions are reduced, the Fixed Cash Operations costs are held constant, as assumed in this model, and therefore the cost per cash transaction increases.

7.3 Video Tolling Operations Costs-Gradual Implementation

The projected costs for Video Tolling would in effect gradually replace the cash operations costs. These Video Tolling Operations costs are calculated at the penetration rates provided above and are presented in Table 19 below. VT 1 and VT 2 show the lower cost because there are no invoicing costs associated with these accounts.

Options	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Option 1 (VT 1 Only)	$4,140,000	$6,137,000	$8,208,000	$10,361,000	$12,854,000
Option 2 (VT 2 Only)	$4,593,000	$6,817,000	$9,115,000	$11,495,000	$14,215,000
Option 3 (VT 3 Only)	$5,540,000	$8,295,000	$11,168,000	$14,169,000	$17,710,000
Option 4 (All VTs)	$5,546,000	$8,185,000	$10,853,000	$13,553,000	$16,627,000

Table 19 – Video Tolling Costs

Under all scenarios the costs for processing violations are about the same. There are some differences, because of the manner in which transactions are being processed overall under the various options. However, these differences are not significant.

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix A – Input Summary

BATA OPERATIONS COST ANALYSIS FOR VIDEO TOLLING

Inputs Summary

Tab - 00 Consolidated Model	FY 09	FY 10	FY 11	FY 12	FY 13
ETC Penetration	50%	51%	52%	53%	54%
Video Penetration	10%	15%	20%	25%	30%
Tab - 01 Cash Operations Costs Analysis	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Fixed Operations Costs - Caltrans Coordination	$515,000	$515,000	$515,000	$515,000	$515,000
Fixed Operations Costs - Base Cash Operations	$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Direct Variable Cost - per transaction	$0.342	$0.342	$0.342	$0.342	$0.342
Bank Fees / Cash Handling - Percentage of Cash Revenue	0.31%	0.31%	0.31%	0.31%	0.31%
Tab - 02 ETC Costs Analysis	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Fixed Operations Costs - Caltrans ETC Operations	$289,000	$289,000	$289,000	$289,000	$289,000
ETC Account Monthly Maintenance Fee	$1.295	$1.295	$1.295	$1.295	$1.295
ETC Banking / Credit Card Fee - Percentage of ETC Revenue	1.80%	1.80%	1.80%	1.80%	1.80%
Tab - 03 Video Costs Analysis	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Number of Annual Transactions per Video Account	74	72	70	68	64
Percentage Break between VT 3 and VT 1&2 Accounts (All VTs)	80%	75%	70%	65%	60%
Percentage ETC Transaction Processed as I-Toll/V-Toll	14%	14%	14%	14%	14%
Percentage of Unsuccessful Transferred Images	0%	0%	0%	0%	0%
Percentage All Images Processed by OCR	50%	50%	50%	50%	50%
Percentage Images Marked as Unreadables During Human Review	20%	20%	20%	20%	20%
Video Account Monthly Maintenace Fee - $1.295	$1.295	$1.295	$1.295	$1.295	$1.295
Image Review - $0.09 per image	$0.09	$0.09	$0.09	$0.09	$0.09
Video Account Invoice Fee - $0.754 each (All VTs & VT-3 Only)	$0.754	$0.754	$0.754	$0.754	$0.754
Bank Fees / Credit Card as % of Video Revenue (VT-1 Only)	1.80%	1.80%	1.80%	1.80%	1.80%
Bank Fees / Credit Card as % of Video Revenue (VT-2 Only)	2.75%	2.75%	2.75%	2.75%	2.75%
Bank Fees / Credit Card as % of Video Revenue (VT-3 Only)	1.80%	1.80%	1.80%	1.80%	1.80%
Bank Fees / Credit Card as % of Video Revenue (All VTs)	2.40%	2.40%	2.40%	2.40%	2.40%
Tab - 04 Violation Revenue & Cost	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Video Account Violation Rates	10.0%	8.5%	7.2%	6.1%	5.0%
Violation Notice Processing Rate on 1st Notice	65%	65%	65%	65%	65%
Violation Notice Processing Rate on 2nd Notice	25%	25%	25%	25%	25%
Violation Notice Processing Rate on DMV Hold	20%	20%	20%	20%	20%
Penalty Waivings on 1st Notice	77%	77%	77%	77%	77%
Penalty Waivings on 2nd Notice	54%	54%	54%	54%	54%
Penalty Waivings on DMV Hold	4%	4%	4%	4%	4%
Violation Notice Fee	$0.754	$0.754	$0.754	$0.754	$0.754
DMV Hold	$3.00	$3.00	$3.00	$3.00	$3.00
Tab - No Video Toll	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
	FY 09	**FY 10**	**FY 11**	**FY 12**	**FY 13**
ETC Penetration Rate	50%	51%	52%	53%	54%
Percentage of All Transactions as Non-Cash / Non-ETC*	10.4%	10.4%	10.4%	10.4%	10.4%
Percentage of Non-Cash / Non-ETC Processed as I-Toll/V-Toll	75%	75%	75%	75%	75%
Percentage of Non-Cash / Non-ETC Marked as Unreadables	15%	15%	15%	15%	15%

* includes V-Tolls, I-Tolls, Unreadables, and Violations.

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix B – No Video Toll Scenario

BATA OPERATIONS COST ANALYSIS FOR VIDEO TOLLING

No Video Toll

OPERATIONS COST ESTIMATES

		Traffic & Revenue Projections (No VT)				
		FY 09	FY 10	FY 11	FY 12	FY 13
Revenue		**$477,465,000**	**$477,465,000**	**$477,465,000**	**$477,465,000**	**$477,465,000**
Transactions		**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**
Average Toll		**$4.17**	**$4.17**	**$4.17**	**$4.17**	**$4.17**
Cash Collection Percentage		50.00%	49.00%	48.00%	47.00%	46.00%
ETC Penetration Rate		50.00%	51.00%	52.00%	53.00%	54.00%
Percentage Total		100.00%	100.00%	100.00%	100.00%	100.00%
Cash Revenue		**$238,732,500**	**$233,957,850**	**$229,183,200**	**$224,408,550**	**$219,633,900**
Cash Transactions		**57,250,000**	**56,105,000**	**54,960,000**	**53,815,000**	**52,670,000**
ETC Revenue		**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions		**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**

		Operations Costs - Projected (No VT)				
Cash Operations Costs						
Caltrans Coordination		$515,000	$515,000	$515,000	$515,000	$515,000
Base Cash Operations Costs		$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Variable Cash Operations Costs (per transaction)		$0.342	$0.342	$0.342	$0.342	$0.342
Variable Cash Operations Costs		$19,579,500	$19,187,910	$18,796,320	$18,404,730	$18,013,140
Bank Fees (as % of revenue)		0.31%	0.31%	0.31%	0.31%	0.31%
Bank Fees		$740,071	$725,269	$710,468	$695,667	$680,865
Total Cash Operations Costs		**$25,383,731**	**$24,977,339**	**$24,570,948**	**$24,164,557**	**$23,758,165**
Cost/Transaction		**$0.44**	**$0.45**	**$0.45**	**$0.45**	**$0.45**
% of Average Toll		10.6%	10.7%	10.7%	10.8%	10.8%
ETC Operations Costs						
ETC Transactions per Account		74	73	72	71	70
ETC Accounts	727,439	772,072	799,864	828,542	858,149	888,731
ETC Account Change		44,633	27,792	28,678	29,607	30,581
ETC - Account Maintenance Monthly		$1.295	$1.295	$1.295	$1.295	$1.295
ETC - CSC Monthly-Account Maintenance		$1,132,179	$1,168,171	$1,205,309	$1,243,650	$1,283,253
	$1,074,380					
ETC - CSC Operations -Account Maintenance		$13,586,153	$14,018,048	$14,463,706	$14,923,797	$15,399,031
Caltrans ETC Operations		$289,000	$289,000	$289,000	$289,000	$289,000
ETC- Banking Fees (as % of revenue)		1.80%	1.80%	1.80%	1.80%	1.80%
ETC - Banking/Credit Card Fees		$4,297,185	$4,383,129	$4,469,072	$4,555,016	$4,640,960
Total ETC Operations Costs		**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
Cost/Transaction		**$0.32**	**$0.32**	**$0.32**	**$0.33**	**$0.33**
% of Average Toll		7.6%	7.7%	7.7%	7.8%	7.9%
Violation Processing Cost Estimates						
Non-Cash / Non-ETC Percentage		10.40%	10.40%	10.40%	10.40%	10.40%
Non-Cash / Non-ETC Transactions		11,908,000	11,908,000	11,908,000	11,908,000	11,908,000
% of Unsuccessful Transferred Images		0%	0%	0%	0%	0%
# of Unsuccessful Transferred Transactions (Lost Rev)		0	0	0	0	0
# of Transferred Images		11,908,000	11,908,000	11,908,000	11,908,000	11,908,000
% of OCR Processed		50%	50%	50%	50%	50%
% of CSR Reviewed		50%	50%	50%	50%	50%
% of Images Reviewed		5,954,000	5,954,000	5,954,000	5,954,000	5,954,000
V-Toll / I-Toll Transactions (estimated percentages)		75%	75%	75%	75%	75%
V-Toll / I-Toll Transactions		8,931,000	8,931,000	8,931,000	8,931,000	8,931,000
Unreadable Images (estimated percentages)		15%	15%	15%	15%	15%
Unreadable Images		1,786,200	1,786,200	1,786,200	1,786,200	1,786,200
Remaining Images for Violation Processing		1,190,800	1,190,800	1,190,800	1,190,800	1,190,800
1st Violation Notice Processing Rate		65%	65%	65%	65%	65%
2nd Violation Notice Processing Rate		25%	25%	25%	25%	25%
After DMV Hold (collected by DMV) Processing Rate		20%	20%	20%	20%	20%
Cumulative Percentage		79%	79%	79%	79%	79%
1st Violation Notice Sent Out		1,190,800	1,190,800	1,190,800	1,190,800	1,190,800
2nd Violation Notice Sent Out		416,780	416,780	416,780	416,780	416,780
Total Notice Sent Out	1,693,555	1,607,580	1,607,580	1,607,580	1,607,580	1,607,580
DMV Hold		312,585	312,585	312,585	312,585	312,585
Image Review (per image)		$0.09	$0.09	$0.09	$0.09	$0.09
Image Review Costs		$535,860	$535,860	$535,860	$535,860	$535,860
Violation Notice Fee (per notice)		$0.754	$0.754	$0.754	$0.754	$0.754
Violation Notice Costs		$897,863	$897,863	$897,863	$897,863	$897,863
DMV Hold (per hold)		$3	$3	$3	$3	$3
DMV Hold Costs		$937,755	$937,755	$937,755	$937,755	$937,755
Total Violation Processing Costs		**$2,371,478**	**$2,371,478**	**$2,371,478**	**$2,371,478**	**$2,371,478**
TOTALS						
Cash Operations		**$25,383,731**	**$24,977,339**	**$24,570,948**	**$24,164,557**	**$23,758,165**
ETC Operations		**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
Violation Processing		**$2,371,478**	**$2,371,478**	**$2,371,478**	**$2,371,478**	**$2,371,478**
Total Operations Costs		**$45,927,547**	**$46,038,994**	**$46,164,205**	**$46,303,847**	**$46,458,634**
Lost Revenue Analysis						
Lost Revenue Transactions						
Unsuccessful Transferred Transactions		0	0	0	0	0
Unreadable Images		1,786,200	1,786,200	1,786,200	1,786,200	1,786,200
Uncollectable Violations		250,068	250,068	250,068	250,068	250,068
Total Lost Revenue Transactions		2,036,268	2,036,268	2,036,268	2,036,268	2,036,268
Average Toll		$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Lost Revenue		**$8,491,238**	**$8,491,238**	**$8,491,238**	**$8,491,238**	**$8,491,238**

NOTES:
A - average number of ETC accounts each FY
B - Acutal account maintenance cost for June 08, as base monthly fee
C - estimated % of all Non-Cash / Non-ETC transactions posted to FT account
D - estimated % of all Non-Cash / Non-ETC transactions unreadable.

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix C – Consolidated Model

00 Consolidated Model

OPERATIONS COST ESTIMATES

VT-1 ONLY

	Traffic & Revenue Projections (VT 1 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Total Toll Revenue Projections	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**
Total Toll Transactions Projections	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**
Average Toll	**$4.17**	**$4.17**	**$4.17**	**$4.17**	**$4.17**
Cash Collection Percentage	40.00%	34.00%	28.00%	22.00%	16.00%
ETC Penetration Rate	50.00%	51.00%	52.00%	53.00%	54.00%
Video Tolling Percentage	10.00%	15.00%	20.00%	25.00%	30.00%
Percentage Total	100.00%	100.00%	100.00%	100.00%	100.00%
Cash Revenue	**$190,986,000**	**$162,338,100**	**$133,690,200**	**$105,042,300**	**$76,394,400**
Cash Transactions	**45,800,000**	**38,930,000**	**32,060,000**	**25,190,000**	**18,320,000**
ETC Revenue	**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions	**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**
Video Revenue	**$47,746,500**	**$71,619,750**	**$95,493,000**	**$119,366,250**	**$143,239,500**
Video Transactions	**11,450,000**	**17,175,000**	**22,900,000**	**28,625,000**	**34,350,000**

	Operations Costs - Projected (VT 1 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Cash Operations Cost Estimates					
Caltrans Coordination	$515,000	$515,000	$515,000	$515,000	$515,000
Base Cash Operations Costs (Caps, Lts, Sgts)	$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Variable Cash Operations Costs	$15,663,600	$13,314,060	$10,964,520	$8,614,980	$6,265,440
Bank Fees (Cash Handling)	$592,057	$503,248	$414,440	$325,631	$236,823
Total Cash Operations Costs	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
Cash Toll Collection Cost/Transaction	$0.47	$0.49	$0.51	$0.56	$0.63
Collection Cost/Transaction as % of Average Toll	11.2%	11.6%	12.3%	13.3%	15.1%
ETC Direct Operations Costs					
Caltrans ETC Operations	$289,000	$289,000	$289,000	$289,000	$289,000
ETC - CSC Operations -Account Maintenance	$13,586,153	$14,018,048	$14,463,706	$14,923,797	$15,399,031
Bank Fees (Credit Card Processing)	$4,297,185	$4,383,129	$4,469,072	$4,555,016	$4,640,960
DMV Expense	$0	$0	$0	$0	$0
Total ETC Operations Costs	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
ETC Cost/Transaction	$0.32	$0.32	$0.32	$0.33	$0.33
ETC Cost/Transaction as % of Average Toll	7.6%	7.7%	7.7%	7.8%	7.9%
Video Direct Operations Costs	VT 1 Only				
Video - CSC Account Maintenance	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fees	$859,437	$1,289,156	$1,718,874	$2,148,593	$2,578,311
Image Review Cost	$875,925	$1,140,764	$1,405,602	$1,670,441	$1,935,279
Invoice Fee (VT 3 Accounts Only)	n/a	n/a	n/a	n/a	n/a
Total Video Operations Costs	**$4,139,862**	**$6,136,857**	**$8,208,276**	**$10,360,687**	**$12,854,199**
Video Cost/Transaction	$0.36	$0.36	$0.36	$0.36	$0.37
Video Cost/Transaction as % of Average Toll	8.7%	8.6%	8.6%	8.7%	9.0%
Violation Processing Costs					
Violation Notice Cost	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
TOTALS					
Cash Operations	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
ETC Operations	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
Video Operations	**$4,139,862**	**$6,136,857**	**$8,208,276**	**$10,360,687**	**$12,854,199**
Violation Processing	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
Total	**$45,397,034**	**$45,958,898**	**$46,414,800**	**$46,824,923**	**$47,397,139**

Video Toll Transaction Costs Comparison	**FY 09**	**FY 10**	**FY 11**	**FY 12**	**FY 13**
All VTs	$0.48	$0.48	$0.47	$0.47	$0.48
VT - 1 Only	$0.36	$0.36	$0.36	$0.36	$0.37
VT - 2 Only	$0.40	$0.40	$0.40	$0.40	$0.41
VT - 3 Only	$0.48	$0.48	$0.49	$0.50	$0.52

Lost Revenue Analysis					
Lost Revenue Transactions					
Unsuccessful Transferred Transactions	0	0	0	0	0
Unreadable Images	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
Uncollectable Violations	240,450	306,574	346,248	366,686	360,675
Total Lost Revenue Transactions	2,186,950	2,841,604	3,469,808	4,078,776	4,661,295
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Lost Revenue	**$9,119,582**	**$11,849,488**	**$14,469,099**	**$17,008,497**	**$19,437,600**

00 Consolidated Model

OPERATIONS COST ESTIMATES

VT-2 ONLY

	Traffic & Revenue Projections (VT 2 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Total Toll Revenue Projections	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**
Total Toll Transactions Projections	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**
Average Toll	**$4.17**	**$4.17**	**$4.17**	**$4.17**	**$4.17**
Cash Collection Percentage	40.00%	34.00%	28.00%	22.00%	16.00%
ETC Penetration Rate	50.00%	51.00%	52.00%	53.00%	54.00%
Video Tolling Percentage	10.00%	15.00%	20.00%	25.00%	30.00%
Percentage Total	100.00%	100.00%	100.00%	100.00%	100.00%
Cash Revenue	**$190,986,000**	**$162,338,100**	**$133,690,200**	**$105,042,300**	**$76,394,400**
Cash Transactions	**45,800,000**	**38,930,000**	**32,060,000**	**25,190,000**	**18,320,000**
ETC Revenue	**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions	**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**
Video Revenue	**$47,746,500**	**$71,619,750**	**$95,493,000**	**$119,366,250**	**$143,239,500**
Video Transactions	**11,450,000**	**17,175,000**	**22,900,000**	**28,625,000**	**34,350,000**

	Operations Costs - Projected (VT 2 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Cash Operations Cost Estimates					
Caltrans Coordination	$515,000	$515,000	$515,000	$515,000	$515,000
Base Cash Operations Costs (Caps, Lts, Sgts)	$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Variable Cash Operations Costs	$15,663,600	$13,314,060	$10,964,520	$8,614,980	$6,265,440
Bank Fees (Cash Handling)	$592,057	$503,248	$414,440	$325,631	$236,823
Total Cash Operations Costs	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
Cash Toll Collection Cost/Transaction	$0.47	$0.49	$0.51	$0.56	$0.63
Collection Cost/Transaction as % of Average Toll	11.2%	11.6%	12.3%	13.3%	15.1%
ETC Direct Operations Costs					
Caltrans ETC Operations	$289,000	$289,000	$289,000	$289,000	$289,000
ETC - CSC Operations -Account Maintenance	$13,586,153	$14,018,048	$14,463,706	$14,923,797	$15,399,031
Bank Fees (Credit Card Processing)	$4,297,185	$4,383,129	$4,469,072	$4,555,016	$4,640,960
DMV Expense	$0	$0	$0	$0	$0
Total ETC Operations Costs	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
ETC Cost/Transaction	$0.32	$0.32	$0.32	$0.33	$0.33
ETC Cost/Transaction as % of Average Toll	7.6%	7.7%	7.7%	7.8%	7.9%
Video Direct Operations Costs	VT 2 Only				
Video - CSC Account Maintenance	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fees	$1,313,029	$1,969,543	$2,626,058	$3,282,572	$3,939,086
Image Review Cost	$875,925	$1,140,764	$1,405,602	$1,670,441	$1,935,279
Invoice Fee (VT 3 Accounts Only)	n/a	n/a	n/a	n/a	n/a
Total Video Operations Costs	**$4,593,454**	**$6,817,244**	**$9,115,460**	**$11,494,667**	**$14,214,975**
Video Cost/Transaction	$0.40	$0.40	$0.40	$0.40	$0.41
Video Cost/Transaction as % of Average Toll	9.6%	9.5%	9.5%	9.6%	9.9%
Violation Processing Costs					
Violation Notice Cost	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
TOTALS					
Cash Operations	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
ETC Operations	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
Video Operations	**$4,593,454**	**$6,817,244**	**$9,115,460**	**$11,494,667**	**$14,214,975**
Violation Processing	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
Total	**$45,850,625**	**$46,639,286**	**$47,321,983**	**$47,958,902**	**$48,757,914**

Video Toll Transaction Costs Comparison	FY 09	FY 10	FY 11	FY 12	FY 13
All VTs	$0.48	$0.48	$0.47	$0.47	$0.48
VT - 1 Only	$0.36	$0.36	$0.36	$0.36	$0.37
VT - 2 Only	$0.40	$0.40	$0.40	$0.40	$0.41
VT - 3 Only	$0.48	$0.48	$0.49	$0.50	$0.52

Lost Revenue Analysis					
Lost Revenue Transactions					
Unsuccessful Transferred Transactions	0	0	0	0	0
Unreadable Images	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
Uncollectable Violations	240,450	306,574	346,248	366,686	360,675
Total Lost Revenue Transactions	2,186,950	2,841,604	3,469,808	4,078,776	4,661,295
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Lost Revenue	**$9,119,582**	**$11,849,488**	**$14,469,099**	**$17,008,497**	**$19,437,600**

BATA OPERATIONS COST ANALYSIS FOR VIDEO TOLLING

00 Consolidated Model

OPERATIONS COST ESTIMATES

VT-3 ONLY

	Traffic & Revenue Projections (VT 3 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Total Toll Revenue Projections	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**
Total Toll Transactions Projections	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**
Average Toll	**$4.17**	**$4.17**	**$4.17**	**$4.17**	**$4.17**
Cash Collection Percentage	40.00%	34.00%	28.00%	22.00%	16.00%
ETC Penetration Rate	50.00%	51.00%	52.00%	53.00%	54.00%
Video Tolling Percentage	10.00%	15.00%	20.00%	25.00%	30.00%
Percentage Total	100.00%	100.00%	100.00%	100.00%	100.00%
Cash Revenue	**$190,986,000**	**$162,338,100**	**$133,690,200**	**$105,042,300**	**$76,394,400**
Cash Transactions	**45,800,000**	**38,930,000**	**32,060,000**	**25,190,000**	**18,320,000**
ETC Revenue	**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions	**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**
Video Revenue	**$47,746,500**	**$71,619,750**	**$95,493,000**	**$119,366,250**	**$143,239,500**
Video Transactions	**11,450,000**	**17,175,000**	**22,900,000**	**28,625,000**	**34,350,000**

	Operations Costs - Projected (VT 3 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Cash Operations Cost Estimates					
Caltrans Coordination	$515,000	$515,000	$515,000	$515,000	$515,000
Base Cash Operations Costs (Caps, Lts, Sgts)	$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Variable Cash Operations Costs	$15,663,600	$13,314,060	$10,964,520	$8,614,980	$6,265,440
Bank Fees (Cash Handling)	$592,057	$503,248	$414,440	$325,631	$236,823
Total Cash Operations Costs	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
Cash Toll Collection Cost/Transaction	$0.47	$0.49	$0.51	$0.56	$0.63
Collection Cost/Transaction as % of Average Toll	11.2%	11.6%	12.3%	13.3%	15.1%
ETC Direct Operations Costs					
Caltrans ETC Operations	$289,000	$289,000	$289,000	$289,000	$289,000
ETC - CSC Operations -Account Maintenance	$13,586,153	$14,018,048	$14,463,706	$14,923,797	$15,399,031
Bank Fees (Credit Card Processing)	$4,297,185	$4,383,129	$4,469,072	$4,555,016	$4,640,960
DMV Expense	$0	$0	$0	$0	$0
Total ETC Operations Costs	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
ETC Cost/Transaction	$0.32	$0.32	$0.32	$0.33	$0.33
ETC Cost/Transaction as % of Average Toll	7.6%	7.7%	7.7%	7.8%	7.9%
Video Direct Operations Costs	VT 3 Only				
Video - CSC Account Maintenance	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fees	$859,437	$1,289,156	$1,718,874	$2,148,593	$2,578,311
Image Review Cost	$875,925	$1,140,764	$1,405,602	$1,670,441	$1,935,279
Invoice Fee (VT 3 Accounts Only)	$1,399,995	$2,158,325	$2,959,989	$3,808,809	$4,856,231
Total Video Operations Costs	**$5,539,857**	**$8,295,182**	**$11,168,265**	**$14,169,496**	**$17,710,431**
Video Cost/Transaction	$0.48	$0.48	$0.49	$0.50	$0.52
Video Cost/Transaction as % of Average Toll	11.6%	11.6%	11.7%	11.9%	12.4%
Violation Processing Costs					
Violation Notice Cost	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
TOTALS					
Cash Operations	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
ETC Operations	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
Video Operations	**$5,539,857**	**$8,295,182**	**$11,168,265**	**$14,169,496**	**$17,710,431**
Violation Processing	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
Total	**$46,797,028**	**$48,117,223**	**$49,374,788**	**$50,633,732**	**$52,253,370**

Video Toll Transaction Costs Comparison	FY 09	FY 10	FY 11	FY 12	FY 13
All VTs	$0.48	$0.48	$0.47	$0.47	$0.48
VT - 1 Only	$0.36	$0.36	$0.36	$0.36	$0.37
VT - 2 Only	$0.40	$0.40	$0.40	$0.40	$0.41
VT - 3 Only	$0.48	$0.48	$0.49	$0.50	$0.52

Lost Revenue Analysis					
Lost Revenue Transactions					
Unsuccessful Transferred Transactions	0	0	0	0	0
Unreadable Images	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
Uncollectable Violations	240,450	306,574	346,248	366,686	360,675
Total Lost Revenue Transactions	2,186,950	2,841,604	3,469,808	4,078,776	4,661,295
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Lost Revenue	**$9,119,582**	**$11,849,488**	**$14,469,099**	**$17,008,497**	**$19,437,600**

00 Consolidated Model

OPERATIONS COST ESTIMATES

ALL VTs

	Traffic & Revenue Projections (All VTs)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Total Toll Revenue Projections	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$ 477,465,000**	**$477,465,000**
Total Toll Transactions Projections	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**	**114,500,000**
Average Toll	**$4.17**	**$4.17**	**$4.17**	**$4.17**	**$4.17**
Cash Collection Percentage	40.00%	34.00%	28.00%	22.00%	16.00%
ETC Penetration Rate	50.00%	51.00%	52.00%	53.00%	54.00%
Video Tolling Percentage	10.00%	15.00%	20.00%	25.00%	30.00%
Percentage Total	100.00%	100.00%	100.00%	100.00%	100.00%
Cash Revenue	**$190,986,000**	**$162,338,100**	**$133,690,200**	**$105,042,300**	**$76,394,400**
Cash Transactions	**45,800,000**	**38,930,000**	**32,060,000**	**25,190,000**	**18,320,000**
ETC Revenue	**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions	**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**
Video Revenue	**$47,746,500**	**$71,619,750**	**$95,493,000**	**$119,366,250**	**$143,239,500**
Video Transactions	**11,450,000**	**17,175,000**	**22,900,000**	**28,625,000**	**34,350,000**

	Operations Costs - Projected (All VTs)				
	FY 09	FY 10	FY 11	FY 12	FY 13
Cash Operations Cost Estimates					
Caltrans Coordination	$515,000	$515,000	$515,000	$515,000	$515,000
Base Cash Operations Costs (Caps, Lts, Sgts)	$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Variable Cash Operations Costs	$15,663,600	$13,314,060	$10,964,520	$8,614,980	$6,265,440
Bank Fees (Cash Handling)	$592,057	$503,248	$414,440	$325,631	$236,823
Total Cash Operations Costs	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
Cash Toll Collection Cost/Transaction	$0.47	$0.49	$0.51	$0.56	$0.63
Collection Cost/Transaction as % of Average Toll	11.2%	11.6%	12.3%	13.3%	15.1%
ETC Direct Operations Costs					
Caltrans ETC Operations	$289,000	$289,000	$289,000	$289,000	$289,000
ETC - CSC Operations -Account Maintenance	$13,586,153	$14,018,048	$14,463,706	$14,923,797	$15,399,031
Bank Fees (Credit Card Processing)	$4,297,185	$4,383,129	$4,469,072	$4,555,016	$4,640,960
DMV Expense	$0	$0	$0	$0	$0
Total ETC Operations Costs	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
ETC Cost/Transaction	$0.32	$0.32	$0.32	$0.33	$0.33
ETC Cost/Transaction as % of Average Toll	7.6%	7.7%	7.7%	7.8%	7.9%
Video Direct Operations Costs	All VTs				
Video - CSC Account Maintenance	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fees	$1,145,916	$1,718,874	$2,291,832	$2,864,790	$3,437,748
Image Review Cost	$875,925	$1,140,764	$1,405,602	$1,670,441	$1,935,279
Invoice Fee (VT 3 Accounts Only)	$1,119,996	$1,618,744	$2,071,992	$2,475,726	$2,913,739
Total Video Operations Costs	**$5,546,337**	**$8,185,319**	**$10,853,226**	**$13,552,611**	**$16,627,375**
Video Cost/Transaction	$0.48	$0.48	$0.47	$0.47	$0.48
Video Cost/Transaction as % of Average Toll	11.6%	11.4%	11.4%	11.4%	11.6%
Violation Processing Costs					
Violation Notice Cost	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
TOTALS					
Cash Operations	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
ETC Operations	**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
Video Operations	**$5,546,337**	**$8,185,319**	**$10,853,226**	**$13,552,611**	**$16,627,375**
Violation Processing	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**
Total	**$46,803,508**	**$48,007,361**	**$49,059,750**	**$50,016,846**	**$51,170,315**

Video Toll Transaction Costs Comparison	FY 09	FY 10	FY 11	FY 12	FY 13
All VTs	$0.48	$0.48	$0.47	$0.47	$0.48
VT - 1 Only	$0.36	$0.36	$0.36	$0.36	$0.37
VT - 2 Only	$0.40	$0.40	$0.40	$0.40	$0.41
VT - 3 Only	$0.48	$0.48	$0.49	$0.50	$0.52

Lost Revenue Analysis					
Lost Revenue Transactions					
Unsuccessful Transferred Transactions	0	0	0	0	0
Unreadable Images	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
Uncollectable Violations	240,450	306,574	346,248	366,686	360,675
Total Lost Revenue Transactions	2,186,950	2,841,604	3,469,808	4,078,776	4,661,295
Average Toll	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Lost Revenue	**$9,119,582**	**$11,849,488**	**$14,469,099**	**$17,008,497**	**$19,437,600**

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix D – Cash Costs Analysis

01 Cash Ops Costs Analysis

BATA
CASH OPERATIONS MODEL
COST ANALYSIS

5-YEAR PROJECTIONS					
	FY 09	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Total Toll Revenue Projections	$ 477,465,000	$ 477,465,000	$ 477,465,000	$ 477,465,000	$477,465,000
Total Toll Transactions Projections	114,500,000	114,500,000	114,500,000	114,500,000	114,500,000
Cash Percentage	40.00%	34.00%	28.00%	22.00%	16.00%
ETC Penetration Rate	50.00%	51.00%	52.00%	53.00%	54.00%
Video Tolling Percentage	10.00%	15.00%	20.00%	25.00%	30.00%
Cash Revenue	**$190,986,000**	**$162,338,100**	**$133,690,200**	**$105,042,300**	**$76,394,400**
Cash Transactions	**45,800,000**	**38,930,000**	**32,060,000**	**25,190,000**	**18,320,000**

	FY 09	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Cash Operations Cost Estimates					
Caltrans Coordination	$515,000	$515,000	$515,000	$515,000	$515,000
Base Cash Operations Costs	$4,549,160	$4,549,160	$4,549,160	$4,549,160	$4,549,160
Variable Cash Operations Costs	$15,663,600	$13,314,060	$10,964,520	$8,614,980	$6,265,440
Bank Fees	$592,057	$503,248	$414,440	$325,631	$236,823
Total Cash Operations Costs	**$21,319,817**	**$18,881,468**	**$16,443,120**	**$14,004,771**	**$11,566,423**
Variable Cash Operations Cost (per transaction)	$0.342	$0.342	$0.342	$0.342	$0.342
Bank Fees (% of Revenue)	0.31%	0.31%	0.31%	0.31%	0.31%
Cost per Transaction	**$0.465**	**$0.485**	**$0.513**	**$0.556**	**$0.631**
Cost per Transaction as % Revenue	**11.16%**	**11.63%**	**12.30%**	**13.33%**	**15.14%**

HISTORICAL ANALYSIS						
	FY 04	**FY 05**	**FY 06**	**FY 07**	**FY 08**	**FY 09 Revised Budget**
Cash Operation						
Cash Toll Revenue	$111,021,703	$176,180,040	$239,293,798	$241,600,401	$244,271,654	$243,945,000
Cash Transactions	95,395,307	84,603,987	75,353,014	67,384,381	59,229,334	58,500,000
Average Toll per Cash Transaction	$1.16	$2.08	$3.18	$3.59	$4.12	$4.17

Cash Collection Direct Costs	**FY 04**	**FY 05**	**FY 06**	**FY 07**	**FY 08**	
Caltrans Coordination	$830,848	$798,663	$710,710	$772,000	$587,636	$515,000
Toll Collection and Operation Service	$25,302,909	$23,430,000	$24,159,961	$24,118,490	$25,194,005	$24,583,000
Total Fixed Base Operations	$4,027,339	$4,151,896	$4,280,305	$4,412,685	$4,549,160	$4,549,160
Variable Operations Costs	$21,275,570	$19,278,104	$19,879,656	$19,705,805	$20,644,845	$20,033,840
Bank Fees*	$450,000	$650,000	$855,878	$804,790	$764,813	$765,000
SubTotal Cash Collection Direct Costs	**$25,752,909**	**$24,080,000**	**$25,015,839**	**$24,923,280**	**$25,958,818**	**$25,348,000**
Bank Fees as a % of revenue	0.41%	0.37%	0.36%	0.33%	0.31%	0.31%
Total Direct Cost per Cash Transaction	**$0.27**	**$0.28**	**$0.33**	**$0.37**	**$0.44**	**$0.43**
Total Costs/Transaction as a % of Ave Toll	23.20%	13.67%	10.45%	10.32%	10.63%	10.39%
Direct Variable Ops Cost/Transaction	**$0.22**	**$0.23**	**$0.26**	**$0.29**	**$0.35**	**$0.342**
Dir Var Costs/Transaction as a % of Ave Toll	19.16%	10.94%	8.31%	8.16%	8.45%	8.21%

* Bank fees for FY 04, 05 & 08 are estimated.

Base Operations Costs
Required Positions

Captains	4	$95,040	$380,160
Toll Lieutenants	20	$79,200	$1,584,000
Toll Sergeants	35	$66,000	$2,310,000
Office Techs	4	$55,000	$220,000
Associate CT Administrator	1	$55,000	$55,000
Total Fixed Base Operations			$4,549,160

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix E – ETC Costs Analysis

02 ETC Costs Analysis

BATA
ETC OPERATIONS MODEL
COST ANALYSIS

5-YEAR PROJECTIONS						
		FY 09	**FY 10**	**FY 11**	**FY 12**	**FY 13**
Total Toll Revenue Projections		$ 477,465,000	$ 477,465,000	$ 477,465,000	$ 477,465,000	$ 477,465,000
Total Toll Transactions Projections		114,500,000	114,500,000	114,500,000	114,500,000	114,500,000
Cash Penetration Rate		40.00%	34.00%	28.00%	22.00%	16.00%
ETC Penetration Rate		50.00%	51.00%	52.00%	53.00%	54.00%
Video Penetration Rate		10.00%	15.00%	20.00%	25.00%	30.00%
ETC Revenue		**$238,732,500**	**$243,507,150**	**$248,281,800**	**$253,056,450**	**$257,831,100**
ETC Transactions		**57,250,000**	**58,395,000**	**59,540,000**	**60,685,000**	**61,830,000**
ETC Transactions per Average Account		74	73	72	71	70
Estimated Change in Transactions/Account		2	1	1	1	1
Change in ETC Transactions		1,915,897	1,145,000	1,145,000	1,145,000	1,145,000
Average ETC Accounts		772,072	799,864	828,542	858,149	888,731
Average ETC Account Change		44,633	27,792	28,678	29,607	30,581

ETC Direct Operations Costs						
Caltrans ETC Operations		$289,000	$289,000	$289,000	$289,000	$289,000
ETC - CSC Annually -Account Maintenance		$13,586,153	$14,018,048	$14,463,706	$14,923,797	$15,399,031
ETC - Banking/Credit Card Fees		$4,297,185	$4,383,129	$4,469,072	$4,555,016	$4,640,960
DMV Expense		$0	$0	$0	$0	$0
Total ETC Operation Costs		**$18,172,338**	**$18,690,177**	**$19,221,779**	**$19,767,813**	**$20,328,991**
ETC - CSC Monthly-Account Maintenace (per acct)		$1.295	$1.295	$1.295	$1.295	$1.295
ETC - CSC Monthly-Account Maintenance		$1,132,179	$1,168,171	$1,205,309	$1,243,650	$1,283,253
ETC - Banking/Credit Card (% of revenue)		1.80%	1.80%	1.80%	1.80%	1.80%
Cost per Transaction		**$0.317**	**$0.320**	**$0.323**	**$0.326**	**$0.329**
Cost per Transaction as % Revenue		**7.61%**	**7.68%**	**7.74%**	**7.81%**	**7.88%**

HISTORICAL ANALYSIS							Budget
ETC Operation	**FY 03**	**FY 04**	**FY 05**	**FY 06**	**FY 07**	**FY 08**	**FY 09**
ETC Toll Revenue		$34,154,499	$71,960,861	$ 135,588,615	$ 180,754,450	$ 233,076,141	$ 233,520,000
ETC Transactions	27,910,888	29,347,225	34,457,870	42,944,906	49,274,140	55,334,103	56,000,000
Average Toll per ETC Transaction		$1.16	$2.09	$3.16	$3.67	$4.21	$4.17
ETC Accounts @ end of FY		233,140	415,792	513,579	645,939	768,412	790,000
Average ETC Accounts per FY		222,312	299,932	490,623	583,177	727,439	772,072
ETC Transactions/**Average** Account	**NOTE A**	132	115	88	84	76	74
Change in ETC Transactions		1,436,337	5,110,645	8,487,036	6,329,234	6,059,963	665,897
Change in ETC Accounts			182,652	97,787	132,360	122,473	21,588
Change in Average ETC Accounts			77,620	190,691	92,555	144,261	44,633
Account Fee Base						$1,074,380	* June 08' Actual

ETC Direct Operations Costs		**FY 04**	**FY 05**	**FY 06**	**FY 07**	**FY 08**	**FY 09**
Caltrans ETC Operations		$8,403,409	$3,108,003	$630,000	$450,000	$435,000	$289,000
ETC - CSC Account Maintenance		$2,095,038	$8,249,000	$11,664,013	$14,443,304	$13,892,000	$16,098,460
ETC - Banking/Credit Card Fees		$680,600	$1,435,900	$2,687,711	$3,574,710	$3,963,877	$4,226,317
DMV Expense - Holds					$605,823	$955,617	$960,000
Total - ETC Direct Operations Costs		**$2,775,638**	**$9,684,900**	**$14,351,724**	**$18,623,837**	**$18,811,494**	**$21,284,777**
ETC Banking Fees as % of ETC Revenue		1.99%	2.00%	1.98%	1.98%	1.70%	1.81%
ETC Transactions		29,347,225	34,457,870	42,944,906	49,274,140	55,334,103	56,000,000
Change in ETC Transactions		n/a	5,110,645	8,487,036	6,329,234	6,059,963	665,897
Direct Cost/ETC Transaction		$0.095	$0.281	$0.334	$0.378	$0.340	$0.380
% of Revenue		8.13%	13.46%	10.58%	10.30%	8.07%	9.11%

ETC - Banking/Credit Card Fees		$820,000	$1,730,000	$ 3,238,206	$ 4,306,879	$ 4,775,756	$5,091,948
BATA portion (83%)		$680,600	$1,435,900	$2,687,711	$3,574,710	$3,963,877	$4,226,317
Golden Gate Bridge portion (17%)		$139,400	$294,100	$550,495	$732,169	$811,878	$865,631

NOTE A - Transactions per Account
It is assumed that for projection purposes for every increase of 1million transactions there will be a corresponding increase in accounts at a lower usage rate or the current rate 76 minus 1 per million of increased transactions.
So as transactions increase and accounts increase, the number of transactions per account will decrease.

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix F – Video Toll Costs Analysis

03 Video Tolling Costs Analysis

VIDEO TOLLING OPERATIONS MODEL	VT-1 ONLY				
	COST ANALYSIS (VT 1 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
T&R Projection					
Total Toll Revenue Projections	$477,465,000	$477,465,000	$477,465,000	$477,465,000	$477,465,000
Total Toll Transactions Projections	114,500,000	114,500,000	114,500,000	114,500,000	114,500,000
Transactions Projection (%)					
Cash Transactions	40.0%	34.0%	28.0%	22.0%	16.0%
ETC Transactions*	50.0%	51.0%	52.0%	53.0%	54.0%
Video Toll Transactions	10.0%	15.0%	20.0%	25.0%	30.0%
	100.0%	100.0%	100.0%	100.0%	100.0%
Transactions Projection					
Cash Transactions	45,800,000	38,930,000	32,060,000	25,190,000	18,320,000
ETC Transactions	57,250,000	58,395,000	59,540,000	60,685,000	61,830,000
Video Toll Transactions	11,450,000	17,175,000	22,900,000	28,625,000	34,350,000
Video Toll Transactions and Accounts					
# of Transactions per Video Account per FY**	74	72	70	68	64
# of Video Accounts	154,730	238,542	327,143	420,956	536,719
% of VT 3 Accounts***	n/a	n/a	n/a	n/a	n/a
% of VT 1 & 2 Accounts	n/a	n/a	n/a	n/a	n/a
# of VT 3 Accounts	n/a	n/a	n/a	n/a	n/a
# of VT 1 & 2 Accounts	n/a	n/a	n/a	n/a	n/a
Image Review					
% of ETC Processed as I-Toll/V-Toll	14%	14%	14%	14%	14%
ETC Images	8,015,000	8,175,300	8,335,600	8,495,900	8,656,200
Total Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Unsuccessful Transferred Images	0%	0%	0%	0%	0%
# of Unsuccessful Transferred Transactions (Lost Revenue)	0	0	0	0	0
# of Transferred Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Images via **OCR** Processing	50%	50%	50%	50%	50%
% of Images via Human Review	50%	50%	50%	50%	50%
# of Images for Human Review per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
% of Unreadable Images During Human Review	20%	20%	20%	20%	20%
# of Unreadable Images per FY	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
# of Readable Images per FY	7,786,000	10,140,120	12,494,240	14,848,360	17,202,480
Invoices (VT 3 Accounts Only)					
# of VT 3 Invoice per Month (1 account 1 invoice)	n/a	n/a	n/a	n/a	n/a
# of Months pe FY	n/a	n/a	n/a	n/a	n/a
# of VT 3 Invoice per FY	n/a	n/a	n/a	n/a	n/a
Account Maintenance Cost					
Account Maintenance Fee	$1.295	$1.295	$1.295	$1.295	$1.295
Monthly Account Maintenance Cost	$200,375	$308,911	$423,650	$545,138	$695,051
Annual Acct Maint. Costs	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fee					
Average Tolls	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Video Revenue	$47,746,500	$71,619,750	$95,493,000	$119,366,250	$143,239,500
Banking Fee as a percentage of Revenue	1.80%	1.80%	1.80%	1.80%	1.80%
Banking Fees	$859,437	$1,289,156	$1,718,874	$2,148,593	$2,578,311
Image Review Cost					
# of Images Reviewed per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
Image Review Fee	$0.09	$0.09	$0.09	$0.09	$0.09
Image Review Costs @ $0.09 per Image	$875,925.00	$1,140,763.50	$1,405,602.00	$1,670,440.50	$1,935,279.00
Invoice Fee (VT 3 Accounts Only)					
# of VT 3 Invoice per FY	n/a	n/a	n/a	n/a	n/a
Invoice Fee (VT 3 Accounts Only)	n/a	n/a	n/a	n/a	n/a
Annual Invoice Costs @ $0.754 per Invoice	n/a	n/a	n/a	n/a	n/a
Total Video Tolling Costs	**$4,139,862**	**$6,136,857**	**$8,208,276**	**$10,360,687**	**$12,854,199**
Average Costs per Video Transaction	**$0.36**	**$0.36**	**$0.36**	**$0.36**	**$0.37**

03 Video Tolling Costs Analysis

VIDEO TOLLING OPERATIONS MODEL	VT-2 ONLY				
	COST ANALYSIS (VT 2 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
T&R Projection					
Total Toll Revenue Projections	$477,465,000	$477,465,000	$477,465,000	$477,465,000	$477,465,000
Total Toll Transactions Projections	114,500,000	114,500,000	114,500,000	114,500,000	114,500,000
Transactions Projection (%)					
Cash Transactions	40.0%	34.0%	28.0%	22.0%	16.0%
ETC Transactions*	50.0%	51.0%	52.0%	53.0%	54.0%
Video Toll Transactions	10.0%	15.0%	20.0%	25.0%	30.0%
	100.0%	100.0%	100.0%	100.0%	100.0%
Transactions Projection					
Cash Transactions	45,800,000	38,930,000	32,060,000	25,190,000	18,320,000
ETC Transactions	57,250,000	58,395,000	59,540,000	60,685,000	61,830,000
Video Toll Transactions	11,450,000	17,175,000	22,900,000	28,625,000	34,350,000
Video Toll Transactions and Accounts					
# of Transactions per Video Account per FY**	74	72	70	68	64
# of Video Accounts	154,730	238,542	327,143	420,956	536,719
% of VT 3 Accounts***	n/a	n/a	n/a	n/a	n/a
% of VT 1 & 2 Accounts	n/a	n/a	n/a	n/a	n/a
# of VT 3 Accounts	n/a	n/a	n/a	n/a	n/a
# of VT 1 & 2 Accounts	n/a	n/a	n/a	n/a	n/a
Image Review					
% of ETC Processed as I-Toll/V-Toll	14%	14%	14%	14%	14%
ETC Images	8,015,000	8,175,300	8,335,600	8,495,900	8,656,200
Total Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Unsuccessful Transferred Images	0%	0%	0%	0%	0%
# of Unsuccessful Transferred Transactions (Lost Revenue)	0	0	0	0	0
# of Transferred Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Images via **OCR** Processing	50%	50%	50%	50%	50%
% of Images via Human Review	50%	50%	50%	50%	50%
# of Images for Human Review per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
% of Unreadable Images During Human Review	20%	20%	20%	20%	20%
# of Unreadable Images per FY	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
# of Readable Images per FY	7,786,000	10,140,120	12,494,240	14,848,360	17,202,480
Invoices (VT 3 Accounts Only)					
# of VT 3 Invoice per Month (1 account 1 invoice)	n/a	n/a	n/a	n/a	n/a
# of Months pe FY	n/a	n/a	n/a	n/a	n/a
# of VT 3 Invoice per FY	n/a	n/a	n/a	n/a	n/a
Account Maintenance Cost					
Account Maintenance Fee	$1.295	$1.295	$1.295	$1.295	$1.295
Monthly Account Maintenance Cost	$200,375	$308,911	$423,650	$545,138	$695,051
Annual Acct Maint. Costs	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fee					
Average Tolls	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Video Revenue	$47,746,500	$71,619,750	$95,493,000	$119,366,250	$143,239,500
Banking Fee as a percentage of Revenue	2.75%	2.75%	2.75%	2.75%	2.75%
Banking Fees	$1,313,029	$1,969,543	$2,626,058	$3,282,572	$3,939,086
Image Review Cost					
# of Images Reviewed per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
Image Review Fee	$0.09	$0.09	$0.09	$0.09	$0.09
Image Review Costs @ $0.09 per Image	$875,925.00	$1,140,763.50	$1,405,602.00	$1,670,440.50	$1,935,279.00
Invoice Fee (VT 3 Accounts Only)					
# of VT 3 Invoice per FY	n/a	n/a	n/a	n/a	n/a
Invoice Fee (VT 3 Accounts Only)	n/a	n/a	n/a	n/a	n/a
Annual Invoice Costs @ $0.754 per Invoice	n/a	n/a	n/a	n/a	n/a
Total Video Tolling Costs	**$4,593,454**	**$6,817,244**	**$9,115,460**	**$11,494,667**	**$14,214,975**
Average Costs per Video Transaction	**$0.40**	**$0.40**	**$0.40**	**$0.40**	**$0.41**

03 Video Tolling Costs Analysis

VIDEO TOLLING OPERATIONS MODEL	VT-3 ONLY				
	COST ANALYSIS (VT 3 Only)				
	FY 09	FY 10	FY 11	FY 12	FY 13
T&R Projection					
Total Toll Revenue Projections	$477,465,000	$477,465,000	$477,465,000	$477,465,000	$477,465,000
Total Toll Transactions Projections	114,500,000	114,500,000	114,500,000	114,500,000	114,500,000
Transactions Projection (%)					
Cash Transactions	40.0%	34.0%	28.0%	22.0%	16.0%
ETC Transactions*	50.0%	51.0%	52.0%	53.0%	54.0%
Video Toll Transactions	10.0%	15.0%	20.0%	25.0%	30.0%
	100.0%	100.0%	100.0%	100.0%	100.0%
Transactions Projection					
Cash Transactions	45,800,000	38,930,000	32,060,000	25,190,000	18,320,000
ETC Transactions	57,250,000	58,395,000	59,540,000	60,685,000	61,830,000
Video Toll Transactions	11,450,000	17,175,000	22,900,000	28,625,000	34,350,000
Video Toll Transactions and Accounts					
# of Transactions per Video Account per FY**	74	72	70	68	64
# of Video Accounts	154,730	238,542	327,143	420,956	536,719
% of VT 3 Accounts***	n/a	n/a	n/a	n/a	n/a
% of VT 1 & 2 Accounts	n/a	n/a	n/a	n/a	n/a
# of VT 3 Accounts	n/a	n/a	n/a	n/a	n/a
# of VT 1 & 2 Accounts	n/a	n/a	n/a	n/a	n/a
Image Review					
% of ETC Processed as I-Toll/V-Toll	14%	14%	14%	14%	14%
ETC Images	8,015,000	8,175,300	8,335,600	8,495,900	8,656,200
Total Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Unsuccessful Transferred Images	0%	0%	0%	0%	0%
# of Unsuccessful Transferred Transactions (Lost Revenue)	0	0	0	0	0
# of Transferred Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Images via **OCR** Processing	50%	50%	50%	50%	50%
% of Images via Human Review	50%	50%	50%	50%	50%
# of Images for Human Review per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
% of Unreadable Images During Human Review	20%	20%	20%	20%	20%
# of Unreadable Images per FY	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
# of Readable Images per FY	7,786,000	10,140,120	12,494,240	14,848,360	17,202,480
Invoices (VT 3 Accounts Only)					
# of VT 3 Invoice per Month (1 account 1 invoice)	154,730	238,542	327,143	420,956	536,719
# of Months pe FY	12	12	12	12	12
# of VT 3 Invoice per FY	1,856,757	2,862,500	3,925,714	5,051,471	6,440,625
Account Maintenance Cost					
Account Maintenance Fee	$1.295	$1.295	$1.295	$1.295	$1.295
Monthly Account Maintenance Cost	$200,375	$308,911	$423,650	$545,138	$695,051
Annual Acct Maint. Costs	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fee					
Average Tolls	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Video Revenue	$47,746,500	$71,619,750	$95,493,000	$119,366,250	$143,239,500
Banking Fee as a percentage of Revenue	1.80%	1.80%	1.80%	1.80%	1.80%
Banking Fees	$859,437	$1,289,156	$1,718,874	$2,148,593	$2,578,311
Image Review Cost					
# of Images Reviewed per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
Image Review Fee	$0.09	$0.09	$0.09	$0.09	$0.09
Image Review Costs @ $0.09 per Image	$875,925.00	$1,140,763.50	$1,405,602.00	$1,670,440.50	$1,935,279.00
Invoice Fee (VT 3 Accounts Only)					
# of VT 3 Invoice per FY	1,856,757	2,862,500	3,925,714	5,051,471	6,440,625
Invoice Fee (VT 3 Accounts Only)	$0.754	$0.754	$0.754	$0.754	$0.754
Annual Invoice Costs @ $0.754 per Invoice	$1,399,995	$2,158,325	$2,959,989	$3,808,809	$4,856,231
Total Video Tolling Costs	**$5,539,857**	**$8,295,182**	**$11,168,265**	**$14,169,496**	**$17,710,431**
Average Costs per Video Transaction	**$0.48**	**$0.48**	**$0.49**	**$0.50**	**$0.52**

03 Video Tolling Costs Analysis

VIDEO TOLLING OPERATIONS MODEL	ALL VTs				
	COST ANALYSIS (All VTs Option)				
	FY 09	FY 10	FY 11	FY 12	FY 13
T&R Projection					
Total Toll Revenue Projections	$477,465,000	$477,465,000	$477,465,000	$477,465,000	$477,465,000
Total Toll Transactions Projections	114,500,000	114,500,000	114,500,000	114,500,000	114,500,000
Transactions Projection (%)					
Cash Transactions	40.0%	34.0%	28.0%	22.0%	16.0%
ETC Transactions*	50.0%	51.0%	52.0%	53.0%	54.0%
Video Toll Transactions	10.0%	15.0%	20.0%	25.0%	30.0%
	100.0%	100.0%	100.0%	100.0%	100.0%
Transactions Projection					
Cash Transactions	45,800,000	38,930,000	32,060,000	25,190,000	18,320,000
ETC Transactions	57,250,000	58,395,000	59,540,000	60,685,000	61,830,000
Video Toll Transactions	11,450,000	17,175,000	22,900,000	28,625,000	34,350,000
Video Toll Transactions and Accounts					
# of Transactions per Video Account per FY**	74	72	70	68	64
# of Video Accounts	154,730	238,542	327,143	420,956	536,719
% of VT 3 Accounts***	80%	75%	70%	65%	60%
% of VT 1 & 2 Accounts	20%	25%	30%	35%	40%
# of VT 3 Accounts	123,784	178,906	229,000	273,621	322,031
# of VT 1 & 2 Accounts	30,946	59,635	98,143	147,335	214,688
Image Review					
% of ETC Processed as I-Toll/V-Toll	14%	14%	14%	14%	14%
ETC Images	8,015,000	8,175,300	8,335,600	8,495,900	8,656,200
Total Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Unsuccessful Transferred Images	0%	0%	0%	0%	0%
# of Unsuccessful Transferred Transactions (Lost Revenue)	0	0	0	0	0
# of Transferred Images	19,465,000	25,350,300	31,235,600	37,120,900	43,006,200
% of Images via **OCR** Processing	50%	50%	50%	50%	50%
% of Images via Human Review	50%	50%	50%	50%	50%
# of Images for Human Review per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
% of Unreadable Images During Human Review	20%	20%	20%	20%	20%
# of Unreadable Images per FY	1,946,500	2,535,030	3,123,560	3,712,090	4,300,620
# of Readable Images per FY	7,786,000	10,140,120	12,494,240	14,848,360	17,202,480
Invoices (VT 3 Accounts Only)					
# of VT 3 Invoice per Month (1 account 1 invoice)	123,784	178,906	229,000	273,621	322,031
# of Months pe FY	12	12	12	12	12
# of VT 3 Invoice per FY	1,485,405	2,146,875	2,748,000	3,283,456	3,864,375
Account Maintenance Cost					
Account Maintenance Fee	$1.295	$1.295	$1.295	$1.295	$1.295
Monthly Account Maintenance Cost	$200,375	$308,911	$423,650	$545,138	$695,051
Annual Acct Maint. Costs	$2,404,500	$3,706,938	$5,083,800	$6,541,654	$8,340,609
Banking Fee					
Average Tolls	$4.17	$4.17	$4.17	$4.17	$4.17
Estimated Video Revenue	$47,746,500	$71,619,750	$95,493,000	$119,366,250	$143,239,500
Banking Fee as a percentage of Revenue	2.40%	2.40%	2.40%	2.40%	2.40%
Banking Fees	$1,145,916	$1,718,874	$2,291,832	$2,864,790	$3,437,748
Image Review Cost					
# of Images Reviewed per FY	9,732,500	12,675,150	15,617,800	18,560,450	21,503,100
Image Review Fee	$0.09	$0.09	$0.09	$0.09	$0.09
Image Review Costs @ $0.09 per Image	$875,925	$1,140,764	$1,405,602	$1,670,441	$1,935,279
Invoice Fee (VT 3 Accounts Only)					
# of VT 3 Invoice per FY	1,485,405	2,146,875	2,748,000	3,283,456	3,864,375
Invoice Fee (VT 3 Accounts Only)	$0.754	$0.754	$0.754	$0.754	$0.754
Annual Invoice Costs @ $0.754 per Invoice	$1,119,996	$1,618,744	$2,071,992	$2,475,726	$2,913,739
Total Video Tolling Costs	**$5,546,337**	**$8,185,319**	**$10,853,226**	**$13,552,611**	**$16,627,375**
Average Costs per Video Transaction	**$0.48**	**$0.48**	**$0.47**	**$0.47**	**$0.48**

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix G – Violation Cost and Revenue Analysis

04 Violation Revenue and Costs

VIOLATION REVENUE ESTIMATES

VT-1 ONLY

	VT 1 Only				
	FY09	FY10	FY11	FY12	FY13
Tolls & Penalty Fees					
Average Tolls (per transaction)	$4.17	$4.17	$4.17	$4.17	$4.17
1st Notice Penalty	$25.00	$25.00	$25.00	$25.00	$25.00
2nd Notice Penalty	$70.00	$70.00	$70.00	$70.00	$70.00
Average Fine Amount for 1st Notice	$29.17	$29.17	$29.17	$29.17	$29.17
Average Fine Amount for 2nd Notice	$74.17	$74.17	$74.17	$74.17	$74.17
Violation Rate (For Analysis Only)					
Overall Violation Rate (out of all transactions)	2.70%	3.49%	4.17%	4.77%	5.26%
Violation Analysis					
# of All Video Accounts	154,730	238,542	327,143	420,956	536,719
% of Video Accounts Becoming Violation per Month	10.0%	8.5%	7.2%	6.1%	5.0%
# of Video Accounts Turning into Violation Status	15,473	20,276	23,554	25,678	26,836
Average Transactions per Video Account per Month	6.2	6.0	5.8	5.7	5.3
# of Violation Notice per Month (1 transaction 1 notice)	95,417	121,656	137,400	145,510	143,125
# of Months per FY	12	12	12	12	12
# of Violation Notice per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
Violation Notice Paid / Collected					
1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%
Violation Revenue on 1st Notice					
Revenue	$21,709,773	$27,679,960	$31,262,072	$33,107,403	$32,564,659
% of Notice Waived $25 Penalty	77%	77%	77%	77%	77%
Estimated Revenue after Waiving Fees	$7,382,960	$9,413,274	$10,631,462	$11,259,014	$11,074,440
Violation Revenue on 2nd Notice					
Revenue	$7,430,907	$9,474,406	$10,700,506	$11,332,133	$11,146,360
% of Notice Waived $70 Penalty	54%	54%	54%	54%	54%
Estimated Revenue after Waiving Fees	$3,643,819	$4,645,870	$5,247,100	$5,556,825	$5,465,729
Violation Revenue after DMV Hold					
Revenue	$4,458,544	$5,684,644	$6,420,304	$6,799,280	$6,687,816
% of Notice Waived $70 Penalty	4%	4%	4%	4%	4%
Estimated Revenue after Waiving Fees	$4,280,202	$5,457,258	$6,163,491	$6,527,309	$6,420,304
Total Violation Revenue	**$15,306,982**	**$19,516,402**	**$22,042,054**	**$23,343,147**	**$22,960,473**

VIOLATION PROCESSING COST ESTIMATES

	2009	2010	2011	2012	2013
Violation Notice Fee					
# of 1st Notice Sent per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
# of 2nd Notice Sent per FY	400,750	510,956	577,080	611,144	601,125
Total Notices Sent per FY	1,545,750	1,970,831	2,225,880	2,357,269	2,318,625
Notice Fee	$0.754	$0.754	$0.754	$0.754	$0.754
Annual Violation Notice Costs @ $0.754 per 1st Notice	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost					
# of DMV Holds	300,563	383,217	432,810	458,358	450,844
DMV Hold Fee	$3.00	$3.00	$3.00	$3.00	$3.00
DMV Holds @ $3.00	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**

1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%

04 Violation Revenue and Costs

VIOLATION REVENUE ESTIMATES

VT-2 ONLY

	VT 2 Only				
	FY09	FY10	FY11	FY12	FY13
Tolls & Penalty Fees					
Average Tolls (per transaction)	$4.17	$4.17	$4.17	$4.17	$4.17
1st Notice Penalty	$25.00	$25.00	$25.00	$25.00	$25.00
2nd Notice Penalty	$70.00	$70.00	$70.00	$70.00	$70.00
Average Fine Amount for 1st Notice	$29.17	$29.17	$29.17	$29.17	$29.17
Average Fine Amount for 2nd Notice	$74.17	$74.17	$74.17	$74.17	$74.17
Violation Rate (For Analysis Only)					
Overall Violation Rate (out of all transactions)	2.70%	3.49%	4.17%	4.77%	5.26%
Violation Analysis					
# of All Video Accounts	154,730	238,542	327,143	420,956	536,719
% of Video Accounts Becoming Violation per Month	10.0%	8.5%	7.2%	6.1%	5.0%
# of Video Accounts Turning into Violation Status	15,473	20,276	23,554	25,678	26,836
Average Transactions per Video Account per Month	6.2	6.0	5.8	5.7	5.3
# of Violation Notice per Month (1 transaction 1 notice)	95,417	121,656	137,400	145,510	143,125
# of Months per FY	12	12	12	12	12
# of Violation Notice per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
Violation Notice Paid / Collected					
1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%
Violation Revenue on 1st Notice					
Revenue	$21,709,773	$27,679,960	$31,262,072	$33,107,403	$32,564,659
% of Notice Waived $25 Penalty	77%	77%	77%	77%	77%
Estimated Revenue after Waiving Fees	$7,382,960	$9,413,274	$10,631,462	$11,259,014	$11,074,440
Violation Revenue on 2nd Notice					
Revenue	$7,430,907	$9,474,406	$10,700,506	$11,332,133	$11,146,360
% of Notice Waived $70 Penalty	54%	54%	54%	54%	54%
Estimated Revenue after Waiving Fees	$3,643,819	$4,645,870	$5,247,100	$5,556,825	$5,465,729
Violation Revenue after DMV Hold					
Revenue	$4,458,544	$5,684,644	$6,420,304	$6,799,280	$6,687,816
% of Notice Waived $70 Penalty	4%	4%	4%	4%	4%
Estimated Revenue after Waiving Fees	$4,280,202	$5,457,258	$6,163,491	$6,527,309	$6,420,304
Total Violation Revenue	**$15,306,982**	**$19,516,402**	**$22,042,054**	**$23,343,147**	**$22,960,473**

VIOLATION PROCESSING COST ESTIMATES

	2009	2010	2011	2012	2013
Violation Notice Fee					
# of 1st Notice Sent per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
# of 2nd Notice Sent per FY	400,750	510,956	577,080	611,144	601,125
Total Notices Sent per FY	1,545,750	1,970,831	2,225,880	2,357,269	2,318,625
Notice Fee	$0.754	$0.754	$0.754	$0.754	$0.754
Annual Violation Notice Costs @ $0.754 per 1st Notice	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost					
# of DMV Holds	300,563	383,217	432,810	458,358	450,844
DMV Hold Fee	$3.00	$3.00	$3.00	$3.00	$3.00
DMV Holds @ $3.00	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**

1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%

04 Violation Revenue and Costs

VIOLATION REVENUE ESTIMATES

VT-3 ONLY

	VT 3 Only				
	FY09	FY10	FY11	FY12	FY13
Tolls & Penalty Fees					
Average Tolls (per transaction)	$4.17	$4.17	$4.17	$4.17	$4.17
1st Notice Penalty	$25.00	$25.00	$25.00	$25.00	$25.00
2nd Notice Penalty	$70.00	$70.00	$70.00	$70.00	$70.00
Average Fine Amount for 1st Notice	$29.17	$29.17	$29.17	$29.17	$29.17
Average Fine Amount for 2nd Notice	$74.17	$74.17	$74.17	$74.17	$74.17
Violation Rate (For Analysis Only)					
Overall Violation Rate (out of all transactions)	2.70%	3.49%	4.17%	4.77%	5.26%
Violation Analysis					
# of All Video Accounts	154,730	238,542	327,143	420,956	536,719
% of Video Accounts Becoming Violation per Month	10.0%	8.5%	7.2%	6.1%	5.0%
# of Video Accounts Turning into Violation Status	15,473	20,276	23,554	25,678	26,836
Average Transactions per Video Account per Month	6.2	6.0	5.8	5.7	5.3
# of Violation Notice per Month (1 transaction 1 notice)	95,417	121,656	137,400	145,510	143,125
# of Months per FY	12	12	12	12	12
# of Violation Notice per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
Violation Notice Paid / Collected					
1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%
Violation Revenue on 1st Notice					
Revenue	$21,709,773	$27,679,960	$31,262,072	$33,107,403	$32,564,659
% of Notice Waived $25 Penalty	77%	77%	77%	77%	77%
Estimated Revenue after Waiving Fees	$7,382,960	$9,413,274	$10,631,462	$11,259,014	$11,074,440
Violation Revenue on 2nd Notice					
Revenue	$7,430,907	$9,474,406	$10,700,506	$11,332,133	$11,146,360
% of Notice Waived $70 Penalty	54%	54%	54%	54%	54%
Estimated Revenue after Waiving Fees	$3,643,819	$4,645,870	$5,247,100	$5,556,825	$5,465,729
Violation Revenue after DMV Hold					
Revenue	$4,458,544	$5,684,644	$6,420,304	$6,799,280	$6,687,816
% of Notice Waived $70 Penalty	4%	4%	4%	4%	4%
Estimated Revenue after Waiving Fees	$4,280,202	$5,457,258	$6,163,491	$6,527,309	$6,420,304
Total Violation Revenue	**$15,306,982**	**$19,516,402**	**$22,042,054**	**$23,343,147**	**$22,960,473**

VIOLATION PROCESSING COST ESTIMATES

	2009	2010	2011	2012	2013
Violation Notice Fee					
# of 1st Notice Sent per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
# of 2nd Notice Sent per FY	400,750	510,956	577,080	611,144	601,125
Total Notices Sent per FY	1,545,750	1,970,831	2,225,880	2,357,269	2,318,625
Notice Fee	$0.754	$0.754	$0.754	$0.754	$0.754
Annual Violation Notice Costs @ $0.754 per 1st Notice	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost					
# of DMV Holds	300,563	383,217	432,810	458,358	450,844
DMV Hold Fee	$3.00	$3.00	$3.00	$3.00	$3.00
DMV Holds @ $3.00	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**

1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%

04 Violation Revenue and Costs

VIOLATION REVENUE ESTIMATES

ALL VTs

	All VTs				
	FY09	FY10	FY11	FY12	FY13
Tolls & Penalty Fees					
Average Tolls (per transaction)	$4.17	$4.17	$4.17	$4.17	$4.17
1st Notice Penalty	$25.00	$25.00	$25.00	$25.00	$25.00
2nd Notice Penalty	$70.00	$70.00	$70.00	$70.00	$70.00
Average Fine Amount for 1st Notice	$29.17	$29.17	$29.17	$29.17	$29.17
Average Fine Amount for 2nd Notice	$74.17	$74.17	$74.17	$74.17	$74.17
Violation Rate (For Analysis Only)					
Overall Violation Rate (out of all transactions)	2.70%	3.49%	4.17%	4.77%	5.26%
Violation Analysis					
# of All Video Accounts	154,730	238,542	327,143	420,956	536,719
% of Video Accounts Becoming Violation per Month	10.0%	8.5%	7.2%	6.1%	5.0%
# of Video Accounts Turning into Violation Status	15,473	20,276	23,554	25,678	26,836
Average Transactions per Video Account per Month	6.2	6.0	5.8	5.7	5.3
# of Violation Notice per Month (1 transaction 1 notice)	95,417	121,656	137,400	145,510	143,125
# of Months per FY	12	12	12	12	12
# of Violation Notice per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
Violation Notice Paid / Collected					
1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%
Violation Revenue on 1st Notice					
Revenue	$21,709,773	$27,679,960	$31,262,072	$33,107,403	$32,564,659
% of Notice Waived $25 Penalty	77%	77%	77%	77%	77%
Estimated Revenue after Waiving Fees	$7,382,960	$9,413,274	$10,631,462	$11,259,014	$11,074,440
Violation Revenue on 2nd Notice					
Revenue	$7,430,907	$9,474,406	$10,700,506	$11,332,133	$11,146,360
% of Notice Waived $70 Penalty	54%	54%	54%	54%	54%
Estimated Revenue after Waiving Fees	$3,643,819	$4,645,870	$5,247,100	$5,556,825	$5,465,729
Violation Revenue after DMV Hold					
Revenue	$4,458,544	$5,684,644	$6,420,304	$6,799,280	$6,687,816
% of Notice Waived $70 Penalty	4%	4%	4%	4%	4%
Estimated Revenue after Waiving Fees	$4,280,202	$5,457,258	$6,163,491	$6,527,309	$6,420,304
Total Violation Revenue	**$15,306,982**	**$19,516,402**	**$22,042,054**	**$23,343,147**	**$22,960,473**

VIOLATION PROCESSING COST ESTIMATES

	2009	2010	2011	2012	2013
Violation Notice Fee					
# of 1st Notice Sent per FY	1,145,000	1,459,875	1,648,800	1,746,125	1,717,500
# of 2nd Notice Sent per FY	400,750	510,956	577,080	611,144	601,125
Total Notices Sent per FY	1,545,750	1,970,831	2,225,880	2,357,269	2,318,625
Notice Fee	$0.754	$0.754	$0.754	$0.754	$0.754
Annual Violation Notice Costs @ $0.754 per 1st Notice	$863,330	$1,100,746	$1,243,195	$1,316,578	$1,294,995
DMV Holds Cost					
# of DMV Holds	300,563	383,217	432,810	458,358	450,844
DMV Hold Fee	$3.00	$3.00	$3.00	$3.00	$3.00
DMV Holds @ $3.00	$901,688	$1,149,652	$1,298,430	$1,375,073	$1,352,531
Total Violation Processing Costs	**$1,765,018**	**$2,250,397**	**$2,541,625**	**$2,691,652**	**$2,647,526**

1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%

04 Violation Revenue and Costs

VIOLATION REVENUE ESTIMATES

No Video Toll

	No Video Toll				
	FY09	FY10	FY11	FY12	FY13
Tolls & Penalty Fees					
Average Tolls (per transaction)	$4.17	$4.17	$4.17	$4.17	$4.17
1st Notice Penalty	$25.00	$25.00	$25.00	$25.00	$25.00
2nd Notice Penalty	$70.00	$70.00	$70.00	$70.00	$70.00
Average Fine Amount for 1st Notice	$29.17	$29.17	$29.17	$29.17	$29.17
Average Fine Amount for 2nd Notice	$74.17	$74.17	$74.17	$74.17	$74.17
Violation Rate (For Analysis Only)					
Overall Violation Rate (out of all transactions)	2.70%	3.49%	4.17%	4.77%	5.26%
Violation Analysis					
# of All Video Accounts	n/a	n/a	n/a	n/a	n/a
% of Video Accounts Becoming Violation per Month	n/a	n/a	n/a	n/a	n/a
# of Video Accounts Turning into Violation Status	n/a	n/a	n/a	n/a	n/a
Average Transactions per Video Account per Month	n/a	n/a	n/a	n/a	n/a
# of Violation Notice per Month (1 transaction 1 notice)	99,233	99,233	99,233	99,233	99,233
# of Months per FY	12	12	12	12	12
# of Violation Notice per FY	1,190,800	1,190,800	1,190,800	1,190,800	1,190,800
Violation Notice Paid / Collected					
1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%
Violation Revenue on 1st Notice					
Revenue	$22,578,163	$22,578,163	$22,578,163	$22,578,163	$22,578,163
% of Notice Waived $25 Penalty	77%	77%	77%	77%	77%
Estimated Revenue after Waiving Fees	$7,678,278	$7,678,278	$7,678,278	$7,678,278	$7,678,278
Violation Revenue on 2nd Notice					
Revenue	$7,728,143	$7,728,143	$7,728,143	$7,728,143	$7,728,143
% of Notice Waived $70 Penalty	54%	54%	54%	54%	54%
Estimated Revenue after Waiving Fees	$3,789,572	$3,789,572	$3,789,572	$3,789,572	$3,789,572
Violation Revenue after DMV Hold					
Revenue	$4,636,886	$4,636,886	$4,636,886	$4,636,886	$4,636,886
% of Notice Waived $70 Penalty	4%	4%	4%	4%	4%
Estimated Revenue after Waiving Fees	$4,451,410	$4,451,410	$4,451,410	$4,451,410	$4,451,410
Total Violation Revenue	**$15,919,261**	**$15,919,261**	**$15,919,261**	**$15,919,261**	**$15,919,261**

VIOLATION PROCESSING COST ESTIMATES

	2009	2010	2011	2012	2013
Violation Notice Fee					
# of 1st Notice Sent per FY	1,190,800	1,190,800	1,190,800	1,190,800	1,190,800
# of 2nd Notice Sent per FY	416,780	416,780	416,780	416,780	416,780
Total Notices Sent per FY	1,607,580	1,607,580	1,607,580	1,607,580	1,607,580
Notice Fee	$0.754	$0.754	$0.754	$0.754	$0.754
Annual Violation Notice Costs @ $0.754 per 1st Notice	$897,863	$897,863	$897,863	$897,863	$897,863
DMV Holds Cost					
# of DMV Holds	312,585	312,585	312,585	312,585	312,585
DMV Hold Fee	$3.00	$3.00	$3.00	$3.00	$3.00
DMV Holds @ $3.00	$937,755	$937,755	$937,755	$937,755	$937,755
Total Violation Processing Costs	**$1,835,618**	**$1,835,618**	**$1,835,618**	**$1,835,618**	**$1,835,618**

1st Violation Notice	65%	65%	65%	65%	65%
2nd Violation Notice	25%	25%	25%	25%	25%
After DMV Hold (collected by DMV)	20%	20%	20%	20%	20%
Cumulative Percentage	79%	79%	79%	79%	79%

BATA Video Tolling

Task 6 Financial Impact Analysis

Appendix H – No Video Toll and VT Options Comparison

BATA OPERATIONS COST ANALYSIS FOR VIDEO TOLLING

Results Detail Cost & Savings

VT 1 ONLY vs. NO VIDEO TOLL						
		FY 09	FY 10	FY 11	FY 12	FY 13
Cash Costs	Option 1	$21,319,817	$18,881,468	$16,443,120	$14,004,771	$11,566,423
	No Video	$25,383,731	$24,977,339	$24,570,948	$24,164,557	$23,758,165
	Difference	($4,063,914)	($6,095,871)	($8,127,828)	($10,159,785)	($12,191,742)
ETC Costs	Option 1	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	No Video	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	Difference	$0	$0	$0	$0	$0
Video Costs	Option 1	$4,139,862	$6,136,857	$8,208,276	$10,360,687	$12,854,199
	No Video	$0	$0	$0	$0	$0
	Difference	$4,139,862	$6,136,857	$8,208,276	$10,360,687	$12,854,199
Violation Costs	Option 1	$1,765,018	$2,250,397	$2,541,625	$2,691,652	$2,647,526
	No Video	$2,371,478	$2,371,478	$2,371,478	$2,371,478	$2,371,478
	Difference	($606,461)	($121,081)	$170,147	$320,173	$276,048
Total		**($530,513)**	**($80,096)**	**$250,595**	**$521,076**	**$938,505**

VT 2 ONLY vs. NO VIDEO TOLL						
		FY 09	FY 10	FY 11	FY 12	FY 13
Cash Costs	Option 2	$21,319,817	$18,881,468	$16,443,120	$14,004,771	$11,566,423
	No Video	$25,383,731	$24,977,339	$24,570,948	$24,164,557	$23,758,165
	Difference	($4,063,914)	($6,095,871)	($8,127,828)	($10,159,785)	($12,191,742)
ETC Costs	Option 2	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	No Video	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	Difference	$0	$0	$0	$0	$0
Video Costs	Option 2	$4,593,454	$6,817,244	$9,115,460	$11,494,667	$14,214,975
	No Video	$0	$0	$0	$0	$0
	Difference	$4,593,454	$6,817,244	$9,115,460	$11,494,667	$14,214,975
Violation Costs	Option 2	$1,765,018	$2,250,397	$2,541,625	$2,691,652	$2,647,526
	No Video	$2,371,478	$2,371,478	$2,371,478	$2,371,478	$2,371,478
	Difference	($606,461)	($121,081)	$170,147	$320,173	$276,048
Total		**($76,921)**	**$600,292**	**$1,157,778**	**$1,655,055**	**$2,299,280**

BATA OPERATIONS COST ANALYSIS FOR VIDEO TOLLING

Results Detail Cost & Savings

VT 3 ONLY vs. NO VIDEO TOLL						
		FY 09	FY 10	FY 11	FY 12	FY 13
Cash Costs	Option 3	$21,319,817	$18,881,468	$16,443,120	$14,004,771	$11,566,423
	No Video	$25,383,731	$24,977,339	$24,570,948	$24,164,557	$23,758,165
	Difference	($4,063,914)	($6,095,871)	($8,127,828)	($10,159,785)	($12,191,742)
ETC Costs	Option 3	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	No Video	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	Difference	$0	$0	$0	$0	$0
Video Costs	Option 3	$5,539,857	$8,295,182	$11,168,265	$14,169,496	$17,710,431
	No Video	$0	$0	$0	$0	$0
	Difference	$5,539,857	$8,295,182	$11,168,265	$14,169,496	$17,710,431
Violation Costs	Option 3	$1,765,018	$2,250,397	$2,541,625	$2,691,652	$2,647,526
	No Video	$2,371,478	$2,371,478	$2,371,478	$2,371,478	$2,371,478
	Difference	($606,461)	($121,081)	$170,147	$320,173	$276,048
Total		**$869,482**	**$2,078,229**	**$3,210,583**	**$4,329,884**	**$5,794,736**

ALL VTS vs. NO VIDEO TOLL						
		FY 09	FY 10	FY 11	FY 12	FY 13
Cash Costs	Option 4	$21,319,817	$18,881,468	$16,443,120	$14,004,771	$11,566,423
	No Video	$25,383,731	$24,977,339	$24,570,948	$24,164,557	$23,758,165
	Difference	($4,063,914)	($6,095,871)	($8,127,828)	($10,159,785)	($12,191,742)
ETC Costs	Option 4	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	No Video	$18,172,338	$18,690,177	$19,221,779	$19,767,813	$20,328,991
	Difference	$0	$0	$0	$0	$0
Video Costs	Option 4	$5,546,337	$8,185,319	$10,853,226	$13,552,611	$16,627,375
	No Video	$0	$0	$0	$0	$0
	Difference	$5,546,337	$8,185,319	$10,853,226	$13,552,611	$16,627,375
Violation Costs	Option 4	$1,765,018	$2,250,397	$2,541,625	$2,691,652	$2,647,526
	No Video	$2,371,478	$2,371,478	$2,371,478	$2,371,478	$2,371,478
	Difference	($606,461)	($121,081)	$170,147	$320,173	$276,048
Total		**$875,962**	**$1,968,367**	**$2,895,545**	**$3,712,999**	**$4,711,681**

ATTACHMENT G:

Task 7.0 Conversion Plan Concept

Technical Memorandum – Final

BATA Video Tolling Demonstration Project

Task 7.0: Conversion Plan Concept

February 6, 2009

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DOCUMENT CONTROL PANEL		
File Name:	*Technical Memorandum – Conversion Plan Concept*	
File Location:		
Deliverable Number:	7.0	
Version Number:	5	
	Name	**Date**
Created By:	Cardona	09/17/08
Reviewed By:	Dillard	10/6/08
	Lee	10/29/08
	Lee	11/14/08
Modified By:	Bausher	9/19/08
	Dillard	10/23/08
	Dillard	11/24/08
	Dillard	12/15/08
	Dillard	01/19/09
Completed By:	Dillard	02/06/09

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Appendix A: Video Tolling Implementation Schedule

1.0 Introduction

As noted in previous Bay Area Toll Authority (BATA) Video Tolling Demonstration Project deliverables, the move toward more automated methods of tolling, including video tolling, open road tolling (ORT), all-electronic toll collection (AETC), and cashless tolling, is spreading across the nation and the industry. BATA is pursuing video tolling under a State of California Transportation Congestion Relief Program (TCRP) grant, with objectives relating to congestion relief and cost savings.

1.1 Purpose of Memorandum

The purpose of this technical memorandum is to provide BATA with a Conversion Plan Concept that includes the tasks needed in order to complete conversion of the seven state-owned Bay Area toll bridges to video tolling. From the work related to the implementation of the demonstration pilot, to recommendations about the appropriate approach, to educating the public with regard to the various video tolling options, this conversion plan is designed to help facilitate the identification of potential conversion issues. This document will provide BATA with information on the steps required to implement video tolling and aid in a decision regarding how to move forward with a video tolling program in the Bay Area.

In the event that BATA chooses not to proceed with full-scale video tolling, it may also be necessary to reverse changes made in support of the demonstration project. This document will address that possibility, as well.

1.2 Context within Project and Toll Industry

The Conversion Plan Concept is part of a larger effort to evaluate the feasibility of implementing video tolling across all seven BATA bridges. Up until now, tasks under this project have gathered information and analyzed individual components key to the implementation of video tolling in general (i.e., legal, technology, facilities, financial). The Concept of Operations defined the potential approaches and options for implementing video tolling, and now the Conversion Plan provides specific steps for transitioning BATA's toll operation into video tolling.

Based on the information gathered in Task 1.0, Video Tolling Concepts Review, it is evident that a variety of agencies in the U.S. and abroad are using video tolling as a complement to Electronic Toll Collection (ETC). This is especially true for agencies moving to cashless tolling, as a means to retain the participation of those not currently using transponders. Although BATA is not currently adopting cashless tolling, video tolling is fully compatible with both ETC and cash tolling, and would put the authority in a position to move to cashless in the future, if desired.

1.3 Document Overview

Section 2.0 of this document will provide a high-level look at the remaining phases of the project, including the demonstration project, evaluation phase, BATA decision, and full-scale implementation. Section 3.0 will examine the potential conversion approaches and their pros and cons, resulting in a recommended approach. Section 4.0 will then provide a more detailed concept plan for the full implementation of video tolling across the system, assuming that the

demonstration project and evaluation were successful and the recommended approach was selected.

2.0 Conversion Overview

In order to proceed with video tolling (VT), a variety of steps are necessary to ensure the success of the demonstration project, provide information necessary for a longer-term decision, and support the full-scale implementation of video tolling across BATA's bridge system. This section will provide an overview of the necessary project phases as illustrated in Figure 1 below. Each phase will then be described in further detail in subsequent sections.

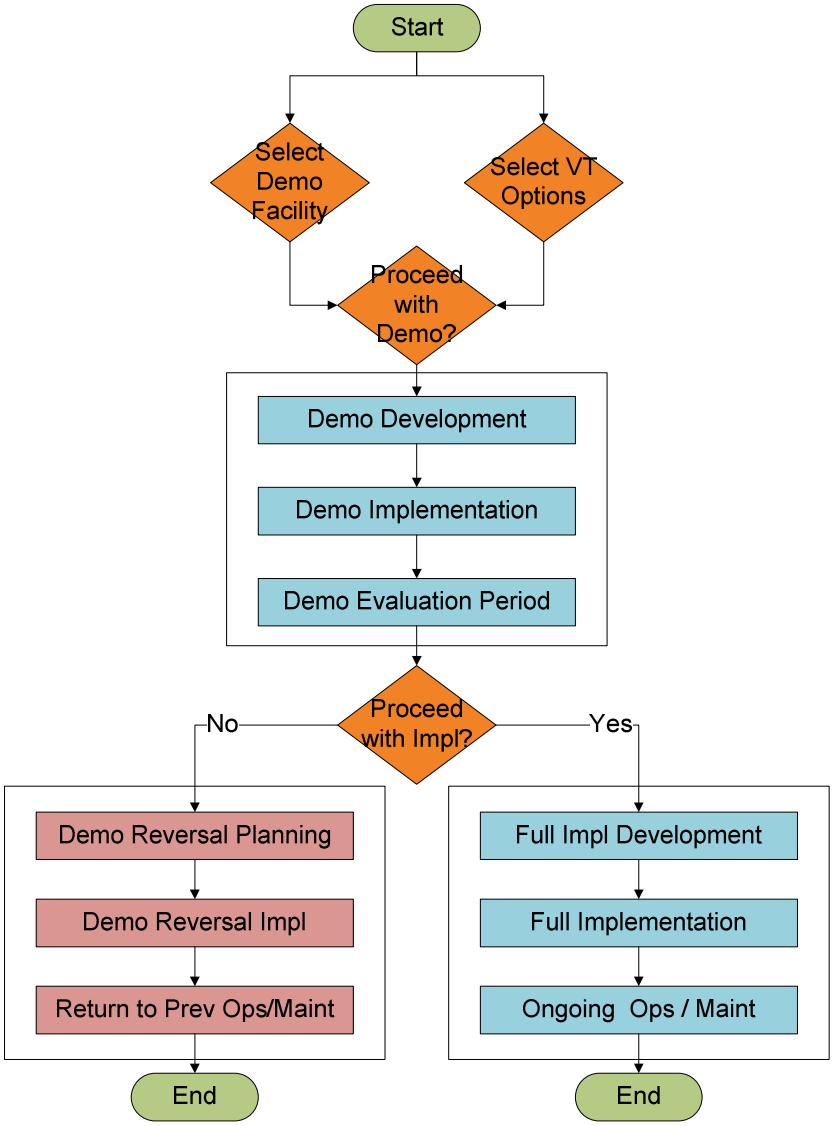


Figure 1: Conversion Overview

2.1 Key Considerations

In order to determine the most suitable conversion plan for the deployment of video tolling, several key points should be noted. These include basic definitions and contextual information associated with Figure 1 above, as well as the overall approach used for this document.

For the purposes of this deliverable:

- Program-level work (i.e., tasks not specific to any toll facility) occurs in two parts of Figure 1 – specifically, "Demo Development" and "Full Impl Development". This work may be relatively extensive, particularly when initializing the demonstration project, and will vary depending on the VT option(s) selected.

- Facility-specific work in each plaza / lane area is reflected within Figure 1 as "Demo Implementation" and "Full Implementation". These activities will drive the actual deployment of video tolling on each facility.

- Because a specific facility for the demo project has not been selected, this document will address implementation phasing without specifying which facility will be used for the demonstration, or in which order the remaining facilities will be deployed.

- Scheduling will be dependent upon BATA decisions, legislative actions, the BATA VES implementation schedule, and the back office vendor's schedule for modification of the back office system. The conceptual diagrams in this document will initially ignore schedule concerns, but they will be addressed separately, with allowances for the potential dependencies, in the final sections of the document.

- Demonstration project planning and detailed scheduling will take place as part of Task 9.0, Implementation Schedule and Budget. The demo project and subsequent evaluation period are included within this initial overview for context.

2.2 BATA Decision Points

Several decision points exist in the overall conversion process. They include the following, which are indicated as diamond shapes in Figure 1 above:

- BATA must choose to implement one or more of the video tolling types identified in Task 3.0, Concept of Operations, in accordance with the general business processes and rules also described in that deliverable. This decision is reflected in Figure 1 as "Select VT Options".

- A specific facility must be selected for the demonstration project based on Task 8.0, Facility Selection for Demonstration. This decision is reflected in Figure 1 as "Select Demo Facility".

- BATA's decision, shown in Figure 1 as "Proceed with Demo?", will trigger the activities necessary to begin Demo Project development.

- Following the demo evaluation period, BATA's decision will determine whether full implementation should be pursued, or the demo project should instead be reversed. This decision is illustrated as "Proceed with Impl?" in Figure 1.

2.3 Project Phases

Three distinct phases of the project are visible in Figure 1:

- Demonstration Project – Includes Demo Development, Demo Implementation, and Demo Evaluation Period.

- Demo Reversal – Includes Demo Reversal Plan, Demo Reversal, and Return to Prev Ops / Maint. This phase will be executed if the Demo Project evaluation results are not satisfactory and BATA decides not to pursue Full Implementation.

- Full Implementation – Includes Full Impl Development, Full Implementation, and Ongoing Ops / Maint. This phase will be executed if the Demo Project evaluation returns satisfactory results and BATA makes the decision to proceed.

Each phase will be described in further detail in subsequent sections of this document.

3.0 Demonstration Project

Following the completion of analysis and related documentation, the first phase of VT implementation will take place as a demonstration project. In essence, the demo is the implementation of video tolling on Bridge 1, although in a "pilot" mode. It may be that the Demo Project is implemented in stages, with a smaller defined group of focused users testing a limited implementation prior to full-scale demo deployment in a plaza.

However, much of the work required for full implementation will have to take place prior to the demo project, regardless of the scope of initial demo implementation. This is necessary in order for VT to work and for the evaluation of its benefits to be valid. A significant amount of program-level work (actions not specific to any particular toll facility, referred to here as "Demo Development") will be necessary for the demo, including activities described below.

Note that the Task 9.0 deliverable, Implementation Schedule and Budget, will focus in detail on preparation for deployment of the demonstration project. An overview of demonstration project steps and considerations are included in this document for context and understanding only.

3.1 Demo Development

Demo Development refers to program-level planning and preliminary development required prior to, or in parallel with, implementation of the demo project, as illustrated in Figure 2 below:

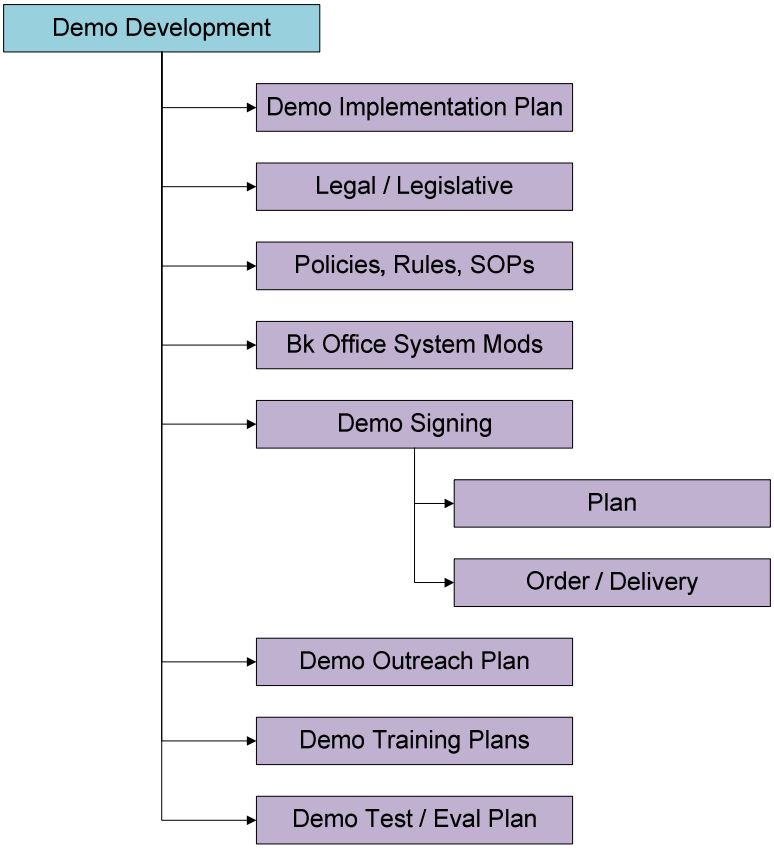


Figure 2: Demo Development Phase

The list of areas reflected in Figure 2 does not indicate any particular order of importance or delivery. Schedule issues will be addressed in a later section of this paper. A general description of each activity follows:

- Demo Implementation Plan: Task 9.0, Implementation Schedule and Budget, will detail out the specific tasks and cost estimates for the development and implementation of the demo project.

- Legal / Legislative: Any legislative or legal action necessary to clarify and/or authorize components of video tolling in order for the demo to proceed would need to be addressed here. Currently, however, legislative changes are not expected to be in place prior to the demo project. This should not prevent the demo development from proceeding, but may affect some parameters of the project.

For example, the authorization of a VT-related fee to recoup operational costs is expected to require legislative action. The demo project will have to operate under the legislation in place at the time, and since the necessary legislative actions cannot be put in place in time for the demo, the initial demonstration may either have to proceed without a VT-related fee or wait until new legislation supporting the fee goes into effect.

- Policies, Rules, SOPs: Agency policies, business rules, and standard operating procedures (SOPs) for the VT-related functions must be developed for use during the demo project. This will include both higher-level management decisions on direction and detailed procedures for new or modified functions like payment processing, customer service, and VT invoicing, if applicable.

- Back Office System Modifications: The requirements, design, development, and testing of the necessary changes to Vector, the system supporting the Regional Customer Service Center (RCSC) / back office, will be required for any level of VT operation. Necessary modifications to the supporting website and phone / interactive voice response (IVR) systems will also be addressed during this phase. The initial assessment of potential modifications was described in Task 5.0, Technology Review.

  Because the majority of the technical changes necessary to support VT will take place in the back office, not in the plazas and lanes, Vector is expected to be heavily impacted. These changes may be prioritized, so that critical functions are incorporated for the demo project and the remainder are reserved for completion during the demo evaluation period, for use at full implementation. However, because the demo project will require full functionality and enough reporting to ensure that appropriate data is available for the evaluation, the majority of changes necessary to support VT functions will be required at this point.

- Demo Signing:

  - Plan: An initial plan for video tolling-related signage will be needed specifically for the demo facility, based on issues noted in Task 4.0, Facilities Review. Many of the BATA toll plazas have Changeable Message Signs (CMS) in place, which can be used to communicate lane-specific VT messaging to the customer on fairly short notice. Also note that a separate BATA project is currently pursuing the deployment of CMS across all plaza lanes. However, if new or modified fixed signing is considered necessary, it will be important that a potential standard approach be developed prior to the demo project so that the approach can be tested.

  - Demo Sign Order / Delivery: Assuming that the demo project requires any fixed-mount signing, the signs should be ordered so that they can be delivered in time for demo implementation. This typically requires a certain amount of lead time for sign manufacture, which must be included in the schedule.

- Demo Outreach Plan: An initial public outreach / education plan will be required for the demo project. Based on direction set by BATA, the agency's marketing consultant will develop the initial outreach plan to support the initial demo rollout.

- Demo Training Plans: Training plans for lane toll collections staff, back office staff, and management staff will be necessary for the demo deployment. Although the demo will be a limited scope implementation, it can be expected to generate questions and concerns. Drivers will ask toll collectors, and FasTrak customers will ask RCSC customer service representatives, how VT impacts them and what actions they should take. All of the above must be prepared to answer those questions quickly and positively.

  In addition, the changes in customer service, payment types, invoicing if applicable, and other back office functions related to VT will require education of personnel in those areas. And, if changes are required to the process currently followed by cash lane toll collectors, they must be prepared to deploy that process without confusion.

- Demo Test / Eval Plan: Detailed plans for the testing and evaluation of the demo implementation will be needed before the demo is put in place. It will be critical that the system is tested thoroughly prior to being opened to the public. Advance planning of the necessary testing will be required at this point, to ensure that project personnel are prepared to test as soon as the system is ready and avoid delaying the project.

  In addition, it will be necessary to plan for the evaluation activities prior to implementation, to avoid missing data important to the evaluation. To ensure that a reliable and applicable baseline is available for comparison during evaluation, "before VT" traffic data should be collected in advance of demo project deployment and used to plan data monitoring during the demo project.

The system modifications and various plans may be "tweaked" during or after the demonstration project and evaluation phase, for use on future deployments. Adjustments would be made based on results noted, and must be documented and tracked to ensure that they provide improvement. Nonetheless, the substantial amount of work in the above areas will need to be up-front.

3.2 Demo Implementation

Following the necessary program-level work, several steps may be necessary to prepare the specific facility, which will be referred to as Bridge 1 for the purposes of this document. These steps are illustrated in Figure 3 below, and described in the subsequent text:

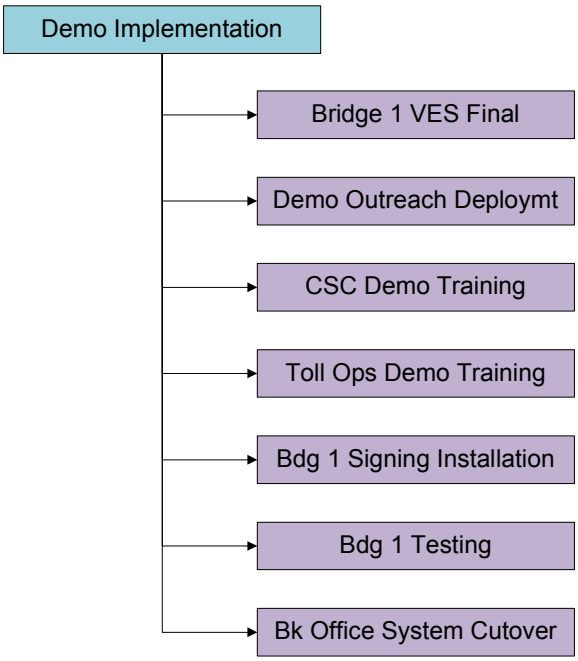


Figure 3: Demo Implementation

- Bridge 1 VES Final: In order to have a stable system in place for the demonstration project, it will benefit BATA to have the new VES for Bridge 1 installed, tested, and operationally stable prior to the demo. This will allow for isolated testing and evaluation related to VT, without potential confusion over which system and/or function might be causing any problems.

- Demo Outreach Deployment: Based on the initial public outreach / education plan prepared by BATA's marketing consultant, any outreach efforts identified for the demo project locale will need to be rolled out in advance of or in parallel with VT implementation on Bridge 1. This will ensure that the public knows what to do and minimizes potential VT-related issues. Any limited user base deployment prior to full demo deployment in a plaza might not require public education, depending on the users included.

  In addition, once the demo has been implemented, BATA should consider sending out "welcome" letters to new video tolling customers. Letters should provide further details about how video tolling will work, and should explain that the program is in a demonstration phase only and may or may not result in a full deployment roll-out, depending on the evaluation results from the demonstration.

- CSC Demo Training: In accordance with new SOPs and training plans, RCSC staff and management will require training. It will be very important that they understand which facility is supporting the VT demo, to assist with customer questions. In addition, VT-related back office functions, like invoicing, will require staff training.

- Toll Ops Demo Training: In accordance with the new SOPs and training plans, toll collections staff and management on Bridge 1 will need to be trained. This will allow them to adjust their operations as needed, and respond to driver questions and concerns.

- Bridge 1 Signing Installation: Based on BATA's initial video toll-related signing plan, individual signing changes should be made on Bridge 1 prior to the demo. These may include changes to the lane CMS messages, new or updated fixed signing on the canopy, and new approach signing on the roadway leading up to Bridge 1.

- Bridge 1 Testing: In parallel with the final demo implementation work, it will be necessary to test VT functionality, both on Bridge 1 and through the back office system, to ensure that it is properly operational prior to "going live". This may require one or more lanes to be shut down during acceptable periods so that test vehicles can drive through to create test data separate from live traffic data, or test data will create violations in the production system. It will also require that test data created in the lanes be routed to a test system in the back office, rather than the production Vector system used for all facilities. This data will need to be tracked through the test system, ensuring that it triggers the appropriate VT-related actions (e.g., invoicing, etc.) and does not create other issues.

- Back Office System Cutover: Once demo development, implementation, and testing are complete, the actual implementation of video tolling on Bridge 1 should only involve the back office switching the flow for transactions coming from Bridge 1 so that they flow through the VT process, instead of the current ETC-to-violations process. It will be critical to monitor this data flow for some time, not only to ensure that Bridge 1 data is flowing down the VT path, but to ensure that data from the other bridges is not.

Test completion and cutover will begin the operation of video tolling on Bridge 1, as well as the evaluation phase.

3.3 Demo Evaluation Period

An evaluation phase is specified as part of the demonstration project, to ensure that the demo is successful and to provide the data necessary for BATA to set an ongoing direction with regard to VT. The duration of this phase has initially been estimated at 6 months, but that timeframe may be adjusted as the project unfolds. Figure 4 below illustrates the activities occurring during this phase.

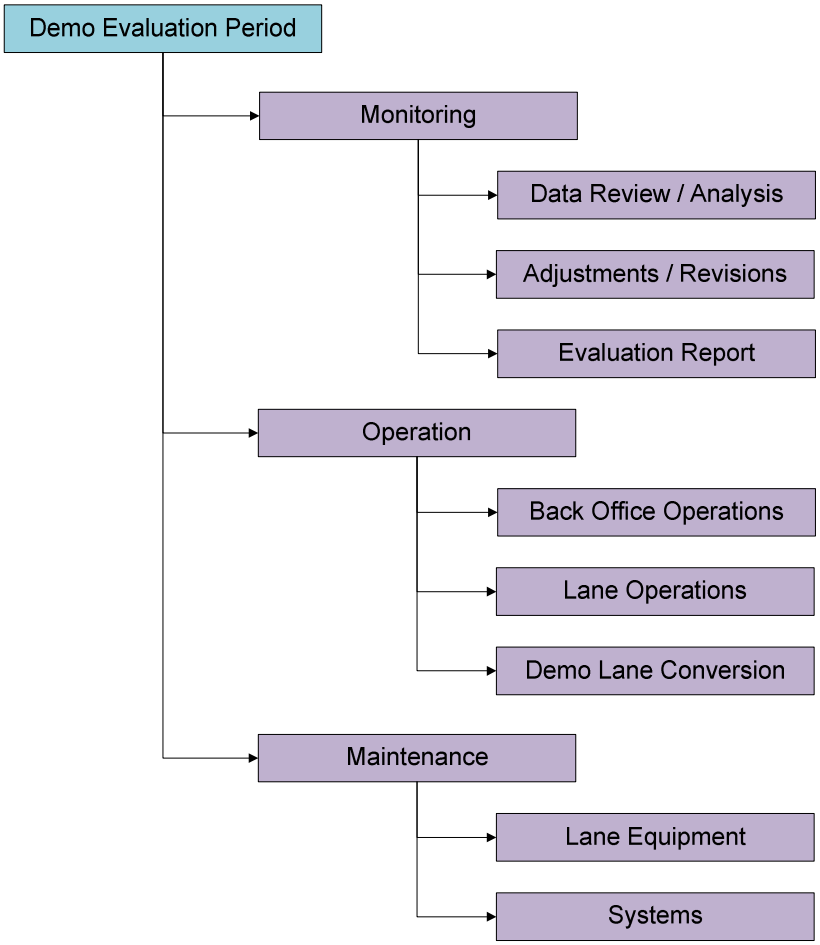


Figure 4: Demo Evaluation Period

During the evaluation period, data will be collected and monitored to identify the impacts of video tolling. Data collected may include traffic data, vehicle images, systems-related statistics, data flow logs through systems interfaces, volume and performance data, and other statistical information. It should also include information related to customer issues, including VT-related contacts and questions, issues reported, and general customer satisfaction.

This data will be used to analyze the impacts of VT on BATA's congestion relief and operations cost reduction objectives, and to identify any other impacts that may not have been foreseen.

The results will be documented in a deliverable detailed in Task 11.0, Evaluation Report, which will include consultant recommendations for further implementation.

Also during this period:

- Back office and toll operations will be ongoing. Operations should be as documented in the new SOPs for the demo project, added to the standard operations for existing functions.

- If necessary during the demo, cash lanes in the demo plaza may be converted to free-flow ETC plus video lanes. All of the necessary toll collection equipment will be in place for this conversion, but until other factors are considered during detailed planning, this operation will not be encouraged during the demo project. Lanes will only be converted if the demo implementation creates an unanticipated need that can't be met with the current configuration.

- Ongoing maintenance of lane / plaza / host toll collections systems and the supporting back office system will be maintained.

3.4 BATA Decision

Based on all of the above, but in particular on the Task 11.0 Evaluation Report, BATA will examine the facts and decide whether and how to proceed with video tolling. This point is illustrated in Figure 1 as "Proceed with Impl?". Decisions required at this point will include:

- Whether to proceed with full-scale implementation, or reverse out the demonstration project functionality

- If proceeding, determine:
  - Whether Bridge 1 video tolling and the supporting functions require "tweaking" before full implementation.
  - Which implementation approach to use, as described in Section 5.0.
  - The timeframe for full implementation.

- If not proceeding, determine the timeframe for reversal.

4.0 Demo Project Reversal

If, based on the decisions above, BATA chooses not to proceed with full implementation of VT across the remaining bridges, it may be necessary to reverse out some of the work done to deploy the demo project. This possibility is illustrated by the three steps of Demo Reversal in Figure 1. Each step is described in the following subsections.

4.1 Demo Reversal Planning

Even though BATA's operation would be returning to the previous standard procedures and systems during this phase, it is critical that appropriate planning and testing is included.

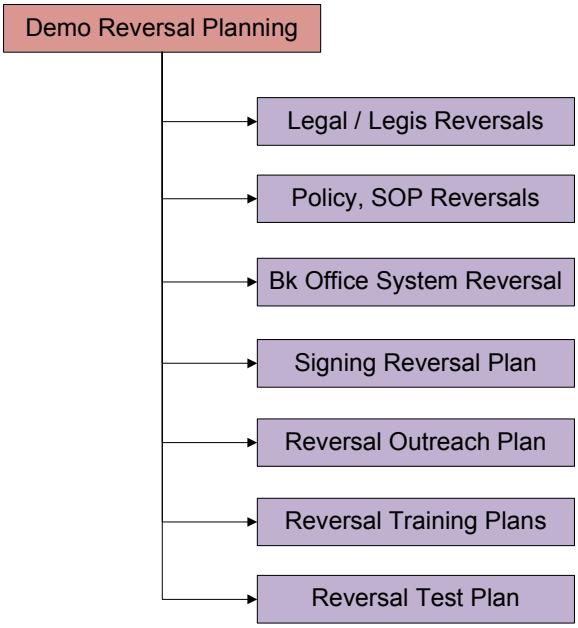


Figure 5: Demo Reversal Planning

- Legal and/or Legislative Adjustments: Since legislative actions taken to enable VT should only create an acceptable legal basis for enforcing it, no specific actions should be required if BATA chooses not to pursue it. However, legislation should be inspected to insure that leaving it in place doesn't create any issues.

- Policy, SOP Reversals: BATA policies, rules, and Standard Operating Procedures put in place for the Demo must be adjusted to allow operations to return to previous states.

- Back Office System Reversal: Although the modifications to Vector will be specific to VT processing, it does not necessarily follow that they would have to be reversed. Because both the VT processing path and the current ETC-to-violations processing path would still be in operation, the only critical action necessary would be switching Bridge 1 back

to standard ETC-to-violations processing. The remainder of the system modifications could remain in place without being used.

Consideration will also be needed for the data and accounts created during the demo project. VT accounts will either need to be converted to ETC accounts or discontinued, including customer, license plate, transaction, payment, and other associated data. Automated processes for handling those actions appropriately may be needed to ensure consistency.

- Signing Reversal Plan: It would be necessary to reverse any changes made to Bridge 1 CMS messages, as well as remove any fixed plaza signing and approach signing that was installed.

- Reversal Outreach Plan: To minimize confusion during the return to standard operations, some public education might be required. This possibility should be considered in the initial public education plan, to ensure that it could be done with minimal public impact.

  In addition, BATA should consider sending out letters to all video tolling customers taking part in the demonstration phase to inform them about the end of the demonstration project. Letters should include instructions for any actions they need to take, and possibly provide instructions on how to convert to an ETC account. The inclusion of a brief survey to gather feedback from pilot participants would be beneficial.

- Reversal Training Plan: It would be important to update the toll collection staff, back office staff, and associated management, to ensure that they knew which processing methods to pursue and how to answer questions from the public.

- Reversal Test Plan: Despite the fact that toll operations would be returning to their previous state, it is important to ensure that none of the Demo Project modifications have created any unanticipated changes to the systems and operation. In addition, it will be critical to ensure that all VT-related processes have been completely and successfully reversed.

4.2 Demo Reversal Implementation

Following completion of appropriate planning in the previous step, this phase will deploy those plans to return operations and systems to their previous state.

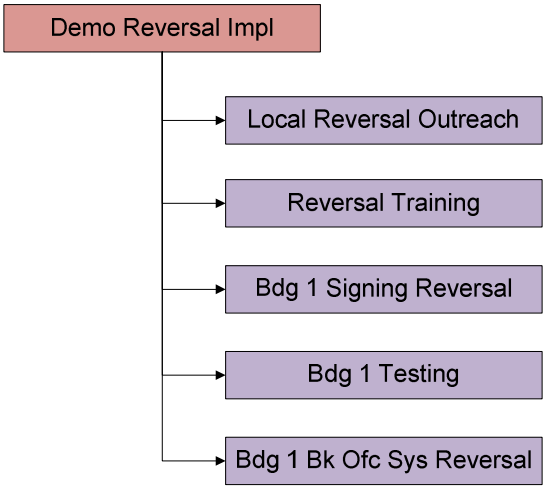


Figure 6: Demo Reversal

- Local Reversal Outreach: Deployment of the Reversal Outreach Plan developed in the previous step, to ensure that return to previous operation causes little or no public impact.

- CSC and Toll Ops Reversal Training: Implement training plan for CSC / Back Office staff and management, to ensure that the return to previous operations takes place as smoothly as possible.

- Bridge 1 Signing Reversal: Implement plan to reverse Bridge 1 CMS messages, fixed plaza signing and approach signing for the Demonstration Project.

- Bridge 1 Testing: Implement reversal test plan. Systems testing must be carried out to ensure that Demo Project modifications have not created any unanticipated changes to previous systems and operations.

- Bridge 1 Back Office System Reversal: Although the modifications to Vector may not be fully reversed, Bridge 1 systems processing will need to be switched back to the previous ETC-to-violations process. This will be done at the point of cutover back to previous operations, after testing is successfully completed.

Completion of all steps above would return BATA's toll operation to its previous state, including full lane / plaza toll collection, back office processing, CSC customer support, and ongoing maintenance. Increased monitoring should be kept in place for some time to ensure that no unanticipated impacts occur as a result of the Demo Project and subsequent Reversal.

5.0 Implementation Approach

Following completion of the Demonstration Project, Evaluation Phase, and associated BATA decision to proceed with Full Implementation, deployment of video tolling across all the remaining bridges can begin. One other key consideration is necessary prior to deployment – the Implementation Approach.

In order to provide adequate information to support BATA's decision-making, it is necessary to consider the possible methods of rolling out VT to the remaining bridges. Although a number of potential variations may exist, only two methods lend themselves to BATA's existing environment, as described below.

5.1 "Big Bang" Approach

One approach to the implementation of VT across the remaining BATA facilities is the "Big Bang" approach. This approach would involve converting all six of the remaining bridges to VT at the same time, thus minimizing customer and staff confusion regarding which bridges operate in which manner. Figure 7 below illustrates the concept, without addressing task durations or specific schedules.

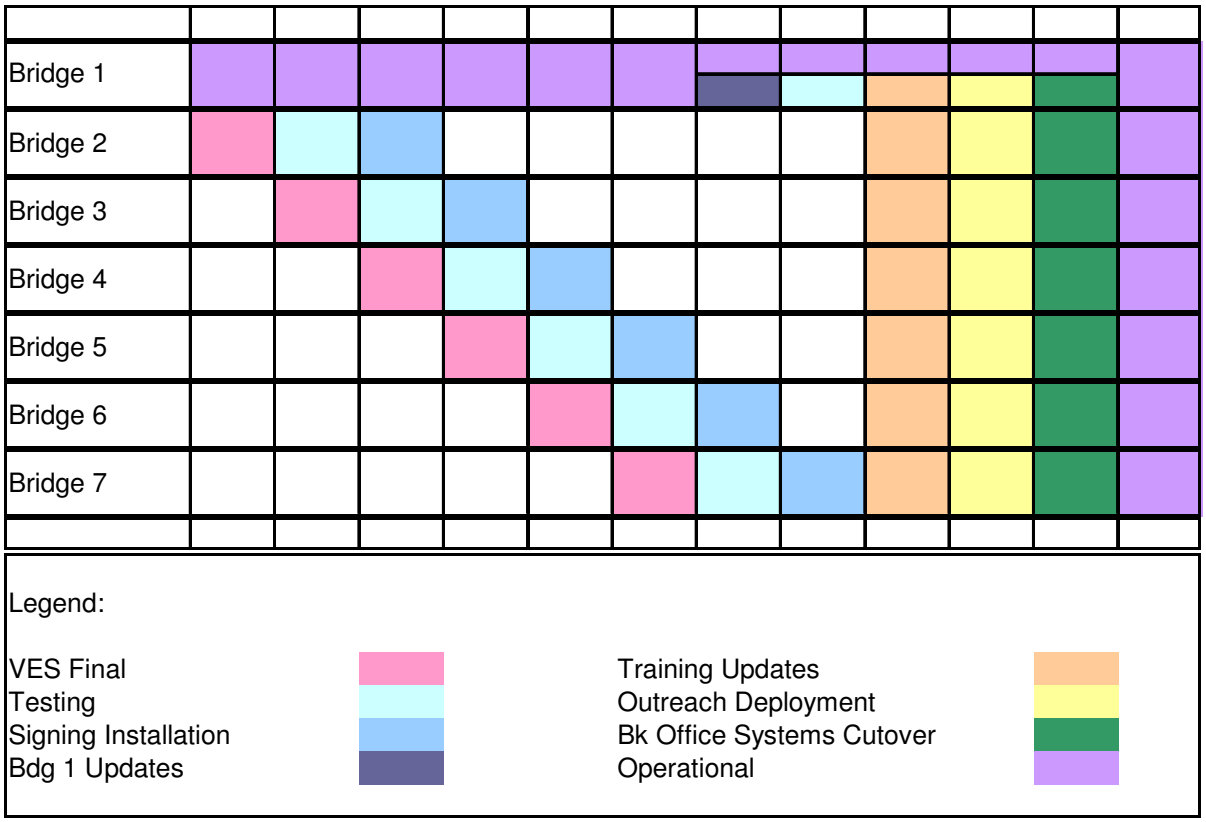


Figure 7: "Big Bang" Approach

This is a feasible option for BATA for two reasons:

- All seven of the BATA bridges are located within the Bay Area, thus sharing some portion of their customer bases.

- Back office system cutover to VT basically involves switching Bridges 2 through 7 over to the VT processing path.

As a result, the visible impacts of VT implementation would be less complex:

- Public outreach / education efforts could address the entire audience at once with a relatively simpler approach and messaging. This would ostensibly result in less customer confusion, and consequently, less impact to the customer service functions.

- Although customer inquiries might peak soon after cutover with this approach, responses could be more straightforward, and impacts to customer service would level out more quickly.

- Impacts to toll collection staff and back office processing staff would be handled at one time, not stretch over potentially months of separate implementations.

A few areas of concern do exist with this approach:

- Facility-specific changes, including signing modifications and toll collection staff training, would need to be completed for all bridges prior to cutover. Preparatory work would need to be phased in, due to the constraints caused by their geographic locations and the physical work necessary for individual plaza testing and signing installation. As a result, the gap between each plaza's readiness and implementation of VT would be different, with earlier plazas waiting the longest for deployment.

- Adding VT transactions from all six remaining bridges at once could have unanticipated systems impacts. For example, if any link in the chain of servers, routers, switches, and communications circuits was not capable of handling the volume, there would be no opportunity to recognize this issue before it impacted the entire system, potentially bringing all processing to a halt.

- Deploying all six of the remaining bridges at once does not lend itself to any form of individual facility testing just prior to cutover. This might not be an issue if the demo project returned no issues during the evaluation project that would require facility-specific testing during the final rollout, as the data monitoring necessary to ensure back office processing is occurring correctly would be handled at one location.

- Fallback plans would need to be significantly more complex. For example, if it was determined soon after cutover that VT processing needed to be stopped for some reason, it would be more difficult to reverse the six bridges just implemented than it

would be if only one had been switched over. This would be particularly true of staff and public education efforts.

Note that updates to Bridge 1 might or might not require additional training and/or public outreach, as illustrated by the orange and yellow half-squares. This is true for both the "Big Bang" and "Iterative" approaches. This would depend on the amount of "tweaking" required to the initial demo project to bring it in line with the new bridges. For example, the CSC and Toll Ops staff training might need to include a training update for Bridge 1, so that they understood changes to the approach already in place there. The public might also need to be updated, for the same reason. It is to be hoped that the Bridge 1 approach would not require that level of modification, but it cannot be guaranteed at this point.

5.2 Iterative Conversion Approach

The alternative to the "Big Bang" approach described in the previous section would be a serial conversion approach, converting Bridges 2 through 7 to VT one at a time. Each bridge would be prepared separately, with cutover immediately following readiness, as illustrated in Figure 8 below.

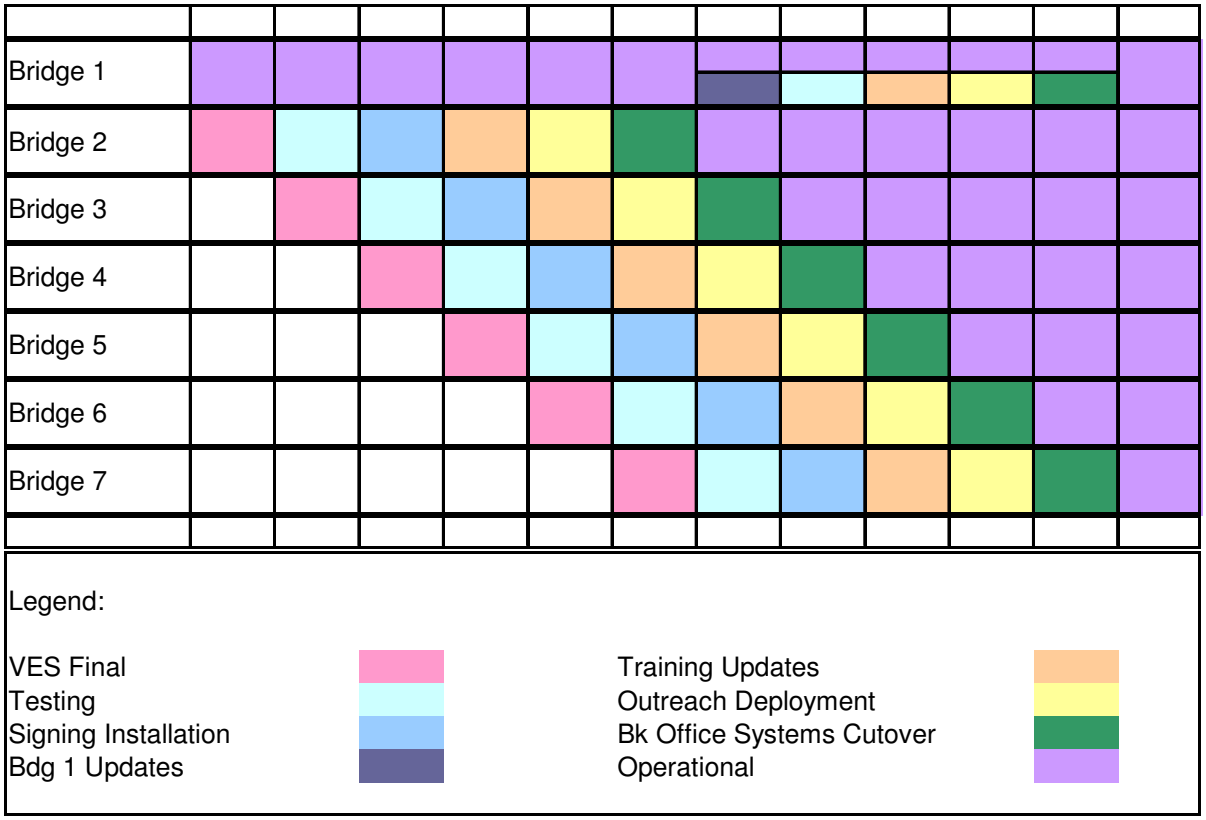


Figure 8: Iterative Conversion Approach

The iterative approach could be expected to address several areas of concern created by the previous approach, as follows:

- Each bridge could have VT deployed once the VES installation and testing was complete, reducing the delay between the demo project and the beginning of full implementation.

- Impacts to back office processing, particularly VT transaction, invoice, and payment volumes, would be added gradually.

- Systems impacts could be recognized and corrected before they impacted the entire system. Usage and remaining capacity levels could be monitored closely with each new deployment, enabling BATA to reverse a single deployment if anything anticipated did occur.

- Individual facility-specific testing, if necessary, could be better supported just prior to cutover.

- Fallback plans would be relatively simple, compared to the "Big Bang" approach, with only one facility involved at a time.

However, the approach to customer service, training, and public outreach/ education would need to be significantly more complex:

- The public outreach effort would need to clearly inform the public which facilities support VT, which do not, and what to do in every case. Outreach rollout would need to be specific to the customer base of each bridge, and would have to be phased across the implementation of all seven bridges.

- Facility-specific changes, including signing and toll collector training, would need to be handled for one facility at a time. Adjustments to the program could be made moving forward, with the following deployments benefiting.

- Customer service impacts could be more severe, with both increased customer confusion regarding the participating facilities and a longer, more complicated period of implementation.

- As a result, procedural and training impacts to customer service and back office processing staff would also be protracted. Back office staff (e.g., customer service, back office processing) would need to be updated prior to every new deployment.

One additional area of focus necessary for this approach is the order of implementation. It will be necessary to decide whether the best approach would implement the bridges by geographic location, by size, by volume of traffic, or by some other factor. Although current information indicates that this is not the case, the order could be driven by the VES implementation schedule, as well.

It should be noted that BATA implemented a series of ETC improvements (e.g., new dedicated ETC booths, dedicated ETC approach lanes, new signage, new lane configurations, etc.) during Summer 2007. These improvements were rolled out one bridge at a time over the course of three months. While that project required a significant amount of coordination between the construction and public information schedules, there were no major issues.

5.3 Approach Recommendation

Based on the realities of BATA's current environment, the Iterative Conversion approach is recommended. This recommendation is based in particular on two key points:

- At the time of this writing, the demonstration project has not been deployed or evaluated. As a result, it is not yet clear whether any issues will exist that might indicate a need for facility-specific testing or require deployment reversal.

- Concerns with regard to systems and communications capacity lead toward an iterative approach. It will not be possible to fully test capacities prior to complete cutover, and the Big Bang approach would load the entire system with data at once.

This recommendation should be re-visited during the evaluation phase of the demonstration project, to assess whether these factors have changed.

6.0 Full Implementation

Once BATA has made the decision to go forward with full implementation of video tolling and selected an implementation approach, the Full Implementation phase can begin. This phase includes three stages, as well, as illustrated earlier in Figure 1. The following sections describe each stage.

This section assumes that the recommended implementation approach, Iterative Conversion, is used.

6.1 Full Implementation Development

As noted earlier in this document, some amount of development not required for the demo project may remain in each of the areas illustrated in Figure 9 below.

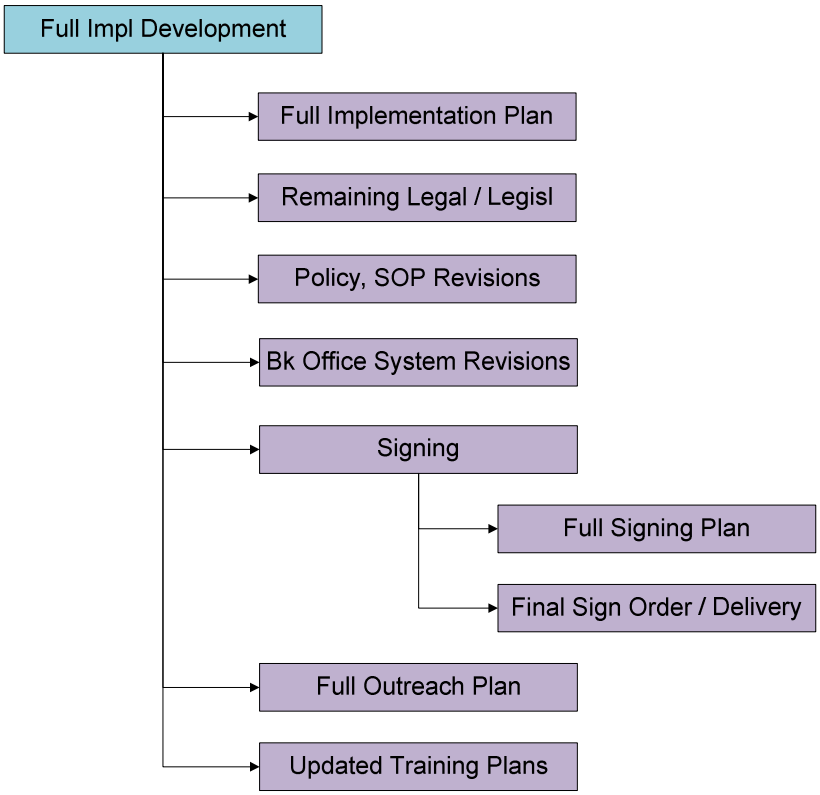


Figure 9: Full Implementation Development

- Full Implementation Plan: Before implementation can begin, it is necessary to ensure that all impacted areas are completely addressed. The implementation plan will need to include all pre-deployment activities, including testing prior to cutover of each new plaza and increased monitoring of each bridge's activities and data for a specified period following deployment. It is especially critical that the selected implementation approach is laid out in detail at this point.

- Remaining Legal / Legislative: Depending on the timing of legislative and/or legal modifications necessary for VT, full incorporation of the legal requirements may not have been enacted prior to the demo project. If that is the case, completion of the remaining legal work will be required in advance of full deployment.

- Policy, SOP Revisions: Once policies, business rules, and SOPs have been enacted as part of the demo project, their effectiveness can be assessed during the evaluation period. If issues are discovered, any of the above may require revision prior to full implementation.

- Back Office System: If Vector system modifications were prioritized and only partially developed for the demo, additional modifications may still be pending. The systems vendor might have been able to complete and test additional modifications during the evaluation phase. However, those modifications could not be deployed until the evaluation period was complete, in preparation for full implementation.

- Signing: Since signing modifications for the demo project were based on only the deployment of Bridge 1, two areas must be addressed for the remaining bridges:

    - Full Signing Plan: The demo project signing plan was an initial, partial plan, focusing on demo signing modifications for Bridge 1. At this point, a plan for full implementation signing modifications, which will support ongoing VT operation, must be developed. Caltrans involvement will be necessary to complete this plan.

    - Final Sign Order and Delivery: Based on the full signing plan, signs for the remaining bridges must be ordered. Adequate lead time for sign manufacture and delivery must be incorporated into the schedule wherever signing requirements cannot be addressed through the use of CMS.

- Full Outreach Plan: Like the signing plan, the plan for demo project public outreach/ education was limited in scope to the Bridge 1 customer base. In support of full implementation, a full-scale plan for public outreach and education regarding VT for the remainder of the bridges is required. Also, if the Iterative approach is used for implementation, this plan should address the phasing of public education across the various customer bases associated with each bridge.

- Updated Training Plans: The initial training plans completed for the Demo Project should have addressed everything that was put in place at the time. However, features that were lower priority, added only for full implementation, or adjusted based on demo project results will require updated training to be provided to back office and toll operations personnel and management.

  In addition, the use of the Iterative approach will require bridge-by-bridge training for the Toll Operations staff associated with the next bridge to be cutover. Back office personnel, particularly customer service, will need to be kept completely up-to-speed as

each new bridge is rolled out, to ensure that they can respond correctly to customer inquiries and adapt as needed.

6.2 Full Implementation

Full implementation should not begin on Bridge 2 until all of the above plans and revisions have been completed. Once that is the case, activities shown in Figure 10 below must be carried out for each bridge. Note that this diagram is based on the use of the Iterative Conversion approach, as described and recommended in the Implementation Approach section.

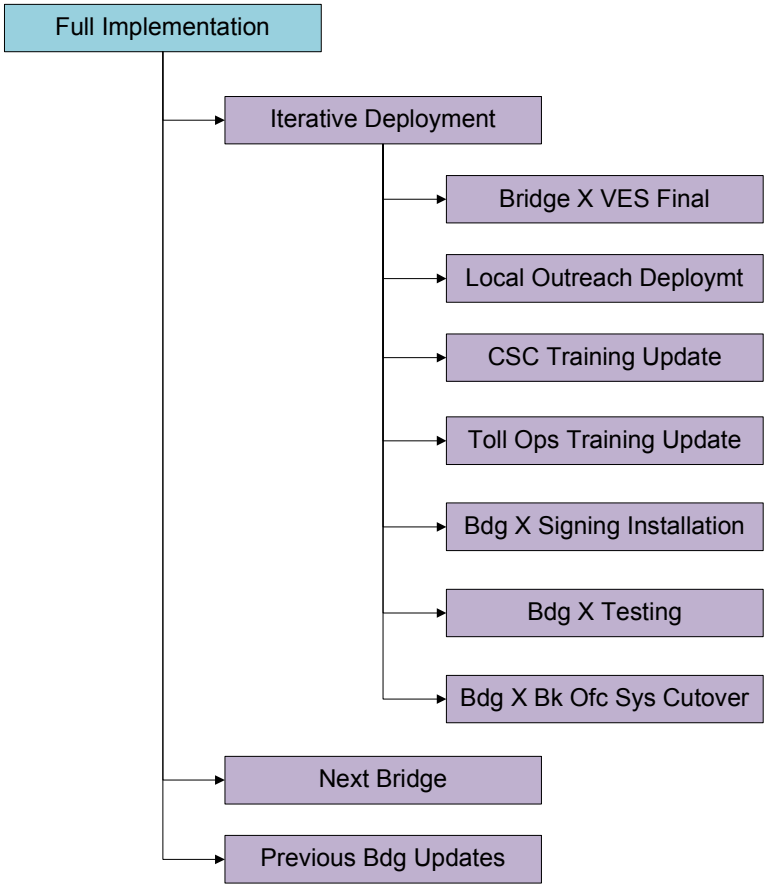


Figure 10: Full Implementation

6.2.1 Bridge X Pre-Deployment Activities

Prior to the cutover of each bridge to live VT processing, facility-specific work required will include the following:

- Bridge X VES Final: The new VES will need to be installed, tested, and operating reliably on each bridge prior to deployment of VT functionality.

- Local Outreach Deployment: The public outreach/ education campaign for each bridge will need to be deployed prior to the beginning of VT on that bridge. Because the bridges have overlapping customer bases, this may or may not mean six different phases of public outreach deployment. The full outreach plan developed in the previous stage will document the phases of deployment, as identified by BATA's marketing consultant and approved by BATA.

- CSC Training Update: Based on the training plan updates developed in the previous stage, updated training for customer service and back office staff will be deployed prior to the implementation of VT on each bridge.

- Toll Operations Training Update: Updated training for the toll operations staff and management assigned to each bridge must be provided prior to the implementation of VT on that bridge, in accordance with BATA's updated VT SOPs and training plans.

- Bridge X Signing Installation: Signing changes on each bridge, including CMS, canopy, and approach signing, must be installed prior to deployment of VT on that bridge, based on BATA's full VT signing plans.

- Bridge X Testing: Systems and operational testing must be performed on each bridge prior to VT deployment. This may not include full-scale testing through the back office, but must include at a minimum enough testing to ensure that any plaza-specific changes are properly installed and operational, and data transmission to the back office is occurring correctly.

6.2.2 Bridge X Deployment

Once all program-level and facility-specific work has been done for Bridge X, cutover to VT for that facility will be done by switching the back office system to route Bridge X transactions down the VT processing path. This may seem anti-climactic, but if adequate planning and preparation has been done, deployment of VT on each bridge should come down to no more than this.

Increased monitoring and adjustment should be undertaken along with the addition of each new facility to the VT program, in accordance with the Full Implementation Plan described earlier.

6.2.3 Deployment of Remaining Bridges

Each of the remaining bridges would be deployed iteratively, following the same process used for the previous bridge, plus any adjustments made in reaction to issues noted. As noted in the Iterative Conversion approach, pre-deployment activities for each bridge may have been developing in parallel, establishing the base for deployment of VT on each bridge immediately following.

6.2.4 Bridge 1 Updates

In parallel with the iterative deployments of Bridges 2 through 7, Bridge 1 (the demo project facility) should also be updated to match any modifications made to BATA's standards for video

tolling as a result of the evaluation period and/or subsequent bridge deployments. As long as Bridge 1 is functioning well, these updates would not be critical or urgent, but they should not be dropped or BATA's VT program will continue to function in a non-standard manner on that facility. Bridge 1 updates may be deployed earlier in the phased deployment of the remaining bridges if they are urgent, but if possible, should be left until late in the cycle to ensure that all issues noted are addressed at one time. As noted earlier, this may also require training updates for CSC and Toll Ops staff, as well as public outreach, to ensure that everyone is aware of changes to the demo VT approach on Bridge 1.

6.3 Ongoing Operations and Maintenance

As VT is deployed on each bridge, it should then move into a fairly standard operational approach, as illustrated in Figure 11 below. This model is typical, including monitoring, operations, and maintenance, but includes a few activities highlighted in green that may be impacted for some time by the VT implementation.

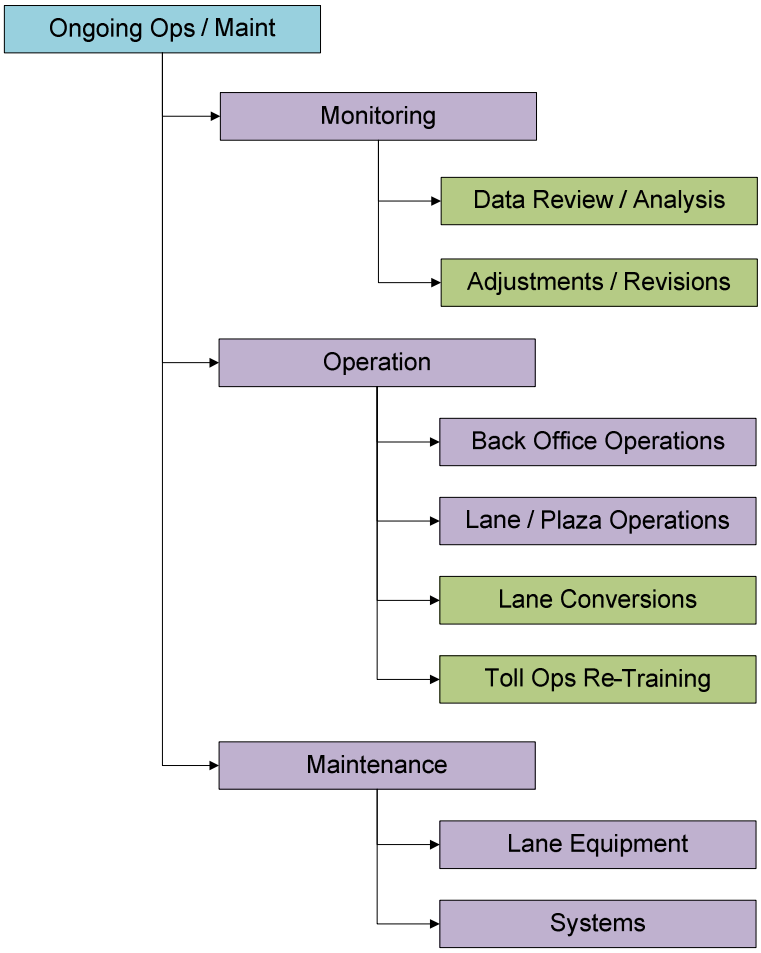


Figure 11: Ongoing Operations and Maintenance

- Data Review / Analysis and Adjustments / Revisions: With the deployment of each new facility, data monitoring / review / analysis requirements will increase, peaking within

several months, and then settling back into a recognizable pattern. Because the Iterative Conversion approach will stretch the implementation of VT across months, a peak should be expected after the implementation of each new facility.

In particular, data transmission, processing, and storage volumes must be monitored with increasing vigilance as new facilities are added. General patterns observed will include the following:

- Because many new VT transactions will be created by customers who were previously treated as violators, image volumes will be static at first. Once traffic volumes increase, image volumes will also increase gradually, and could rise into dangerous territory unobserved if server storage, communications network, and operational processing capacities are not monitored vigilantly for some time.

- The establishment of VT accounts will be very high at first, leveling out over time. As a result, if Option 3 (Post-Paid Invoicing) is implemented, increased Department of Motor Vehicles (DMV) inquiries for vehicle owner name and address information and invoicing volumes will also peak early after each deployment.

- As repeat VT customers pass through the system, account establishment requirements and DMV inquiries will drop off, but invoicing volumes will continue to increase (assuming Option 3 is implemented) as long as the VT program is growing. Once established as a VT customer, it is important to promote conversion to ETC as much as possible, at least partly in order to reduce invoicing requirements over time.

All of these fluctuations will impact the BATA technical infrastructure, including interfaces between ATCAS and Vector and interfaces to the DMV. Telecommunications and storage technologies should be monitored closely.

Customer support requirements will also peak after the deployment of VT on each new bridge, leveling off over time as functionality begins to be understood. In addition, once customers of a newly-deployed bridge receive their first invoices, customer support requirements will peak again. Data related to customer service volumes will also require close monitoring, with staffing, website, and phone system adjustments deployed as needed to better serve customers.

- Lane Conversions: Through the monitoring of traffic and transaction data for each newly-deployed VT plaza, opportunities may be identified to convert current cash lanes to ETC + VT lanes. This is a desirable situation, as it increases the lane's throughput capability, improving plaza traffic operations and reducing congestion.

  Because VT deployment has not been observed in this type of scenario before, it is still to be determined exactly what thresholds should be reached before lane conversion is considered. Demo project evaluation results will assist BATA in identifying the necessary

parameters. Evaluation of the percentage of continued cash payments after VT stabilizes will provide a good indication of the number of cash lanes that need to be retained within a specific plaza, but does not necessarily indicate that lanes should be converted above that threshold. Impacts on congestion should be evaluated during the demo and early deployments, to determine whether, and how much, congestion can be impacted by VT. This may include experimental conversion of lanes, to assist BATA in establishing thresholds.

- Toll Operations Re-Training: As cash collection is reduced in a given plaza, re-purposing of the impacted toll collection staff should be considered.

  In many cases, agencies reducing or eliminating cash collection typically transition toll operations employees into back office functions (e.g., image review, invoice processing, mail processing, payment processing, and customer support). The requirements in these back office areas increase with the implementation of VT, so additional resources are typically required.

  However, in this case Toll Ops personnel are Caltrans employees, and CSC personnel are ACS (CSC contract operations vendor) employees. As a result, staff cannot be moved from the lanes into the back office in this case. They would have to be moved into other Caltrans positions, if any were available. These positions might not be related to tolling, since cash collection demand should not be increasing at other BATA bridges.

  As part of their re-purposing, each person would require discussion regarding, and agreement to, their new role, followed by training for the new function and incorporation into the new environment.

7.0 Full Implementation Schedule

In order to fully assess the feasibility of video tolling, it is important to consider the potential schedule. As noted earlier in this document, the actual scheduled may be impacted by a variety of dependencies, including BATA decisions, potential legislative actions, the BATA VES project implementation schedule, and the CSC vendor's schedule for modification of Vector.

Figure 12 below is a depiction of the summary level schedule for full implementation of VT across all facilities. The following should be considered during schedule review:

- Initial dates for full implementation are dependent upon completion dates for the demo project, evaluation period, and BATA decisions to proceed. Estimated dates for these points are included.

- The schedule for system modifications is based upon high-level estimates for the completion of a single option (i.e., VT1 or VT2 or VT3), provided by the systems vendor. The vendor's estimates also indicate that selection of multiple options (i.e., VT1 + VT3, or VT2 + VT3) would extend the schedule several months.

- The impact of legislative actions on this schedule was assumed to be none, since preparation for the demo project would carry BATA past the end of the 2009 session. However, if VT fee legislation is not addressed during this session, other impacts may exist.

- Based on the current VES implementation schedule, it was assumed that no delay to the VT demo project will occur as a result of VES deployment in any plaza.

- The Demo Project schedule may vary widely depending on which VT option is selected. This is especially true with regard to system modifications. The timeframes included in Figure 12 below, and in Appendix A, should be considered high-level preliminary estimates.

Further detail regarding the potential schedule can be found in Appendix A: Video Tolling Implementation Schedule.

ID		Task Name	Duration	Start	Finish
1		BATA Demo Decisions	22 days	Thu 1/29/09	Fri 2/27/09
6		BATA Decisions Final	0 days	Fri 2/27/09	Fri 2/27/09
7		Task 10.0: Implementation of Demo Project	219 days	Mon 3/2/09	Thu 12/31/09
8		Demo Development	207 days	Mon 3/2/09	Tue 12/15/09
22		Demo Implementation	67 days	Wed 9/30/09	Thu 12/31/09
30		Demo Project Go Live	1 day	Fri 1/1/10	Fri 1/1/10
31		Task 11.0: Evaluation of Demo Project	129 days	Mon 1/4/10	Thu 7/1/10
35		Demo Project Eval Complete	0 days	Thu 7/1/10	Thu 7/1/10
36		BATA Full Impl Decisions	21 days	Fri 7/2/10	Fri 7/30/10
41		BATA Decisions Final	0 days	Fri 7/30/10	Fri 7/30/10
42		Full Implementation	218 days	Mon 8/2/10	Wed 6/1/11
43		Full Implementation Development	65 days	Mon 8/2/10	Fri 10/29/10
53		Full Implementation Deployment	153 days	Mon 11/1/10	Wed 6/1/11
107		Full Implementation Complete	0 days	Wed 6/1/11	Wed 6/1/11
108		Ongoing Operations / Maintenance	389 days	Mon 1/4/10	Thu 6/30/11

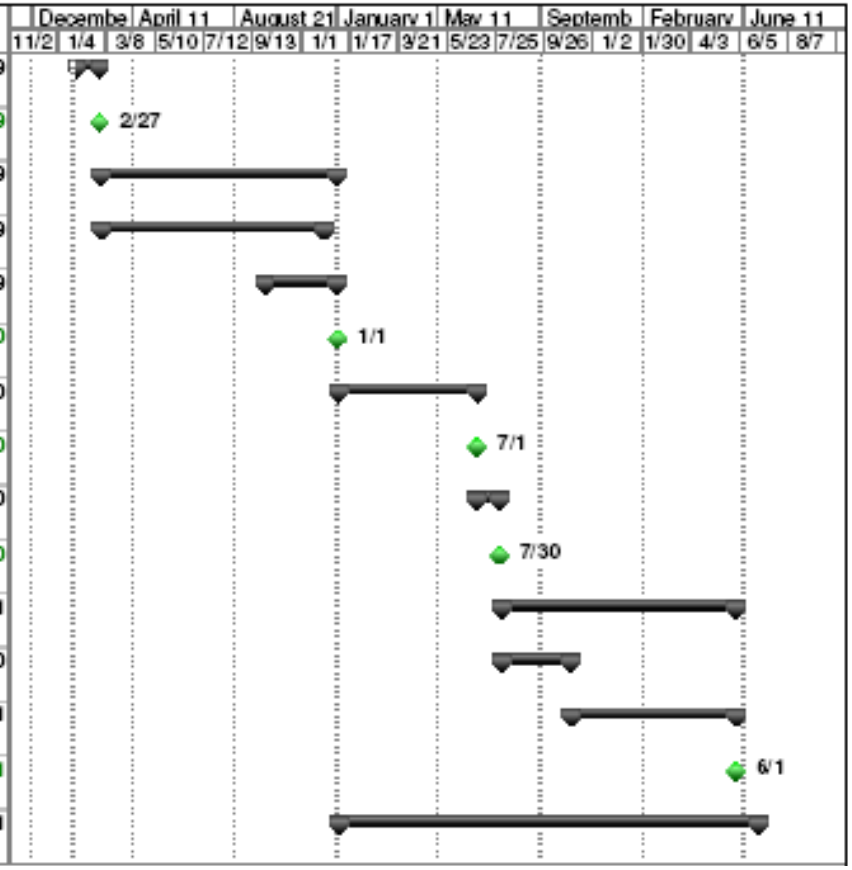
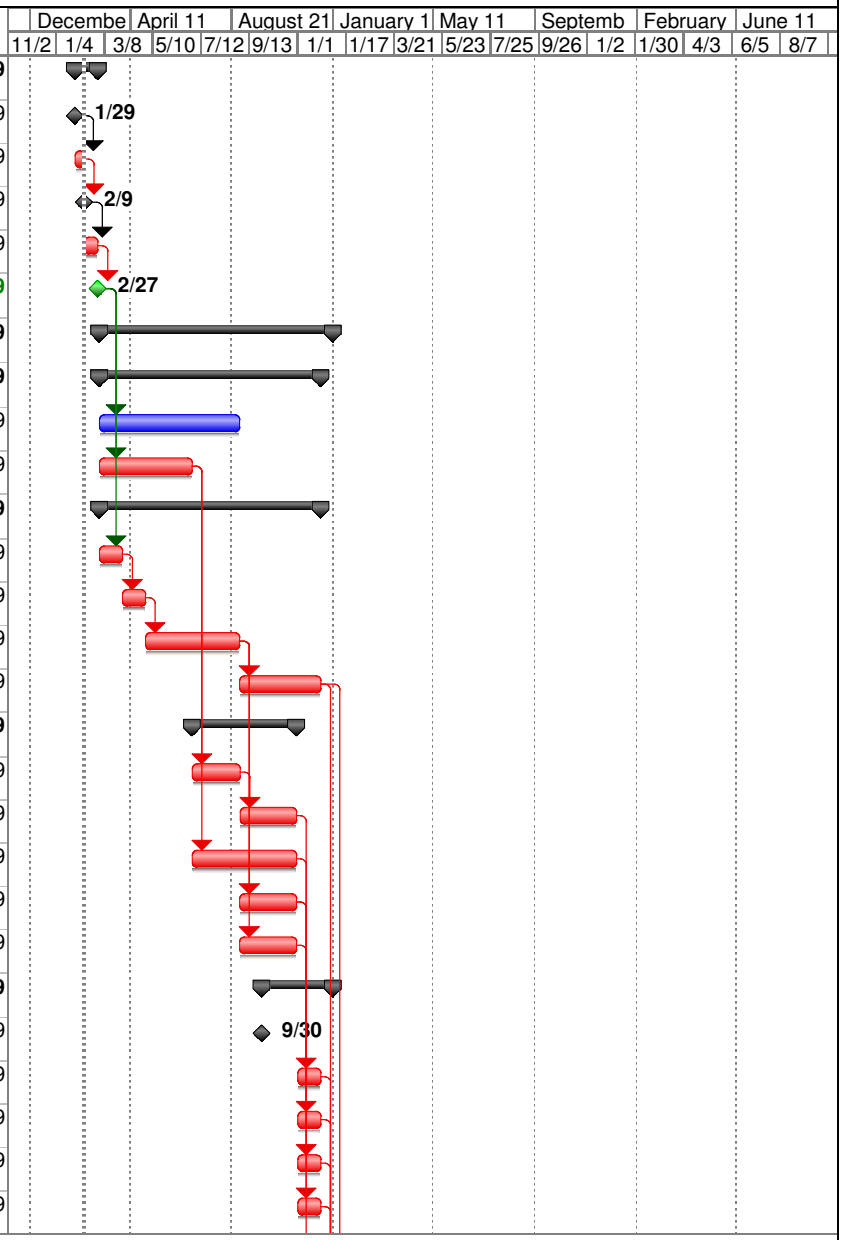


Figure 12: Full Implementation Schedule, Summary Level

BATA Video Tolling Project
Task 7.0: Conversion Plan Concept

Appendix A: Video Tolling Implementation Schedule

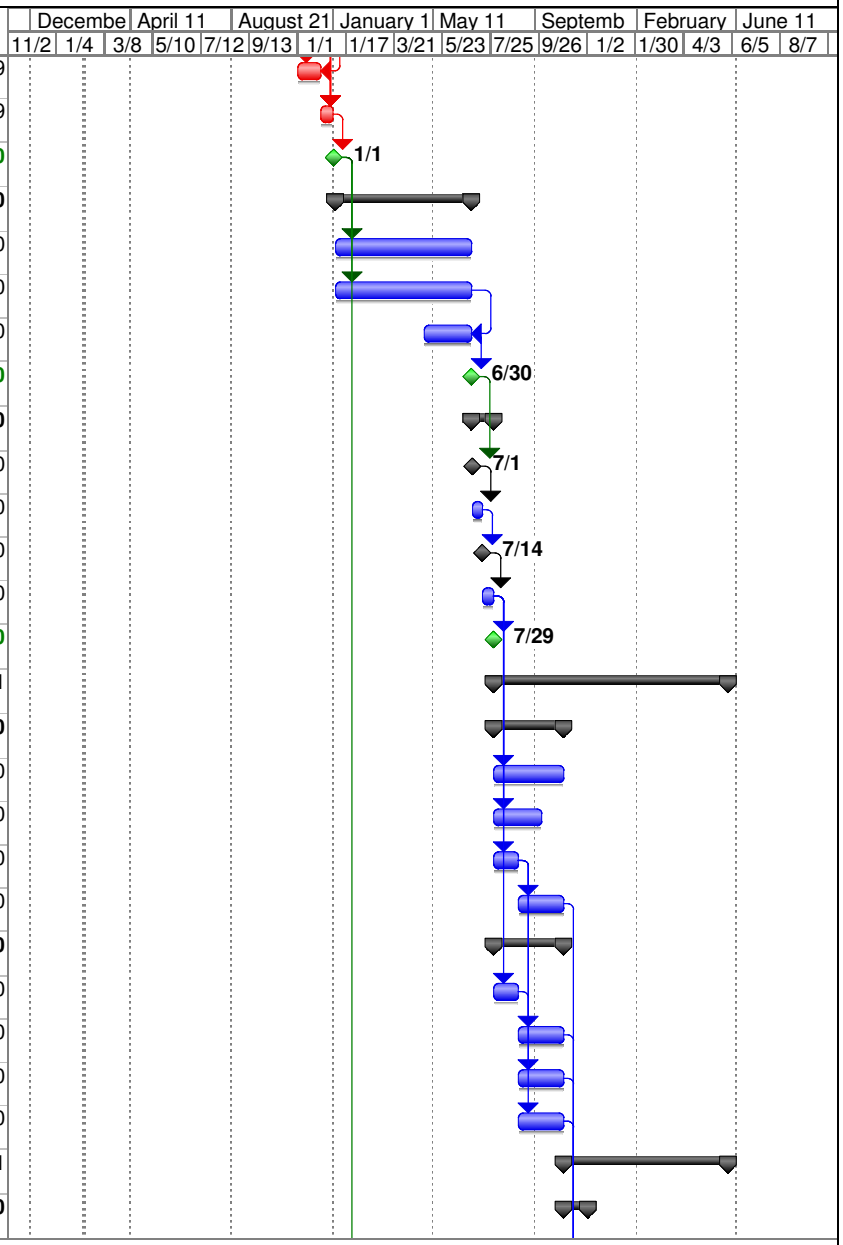
ID		Task Name	Duration	Start	Finish
1		**BATA Demo Decisions**	**22 days**	**Thu 1/29/09**	**Fri 2/27/09**
2		BATA Meeting	0 days	Thu 1/29/09	Thu 1/29/09
3		BATA Consideration / Discussion	8 days	Thu 1/29/09	Mon 2/9/09
4		BATA Decisions	0 days	Mon 2/9/09	Mon 2/9/09
5		Update / Approve Demo Impl Plan (9.0)	14 days	Tue 2/10/09	Fri 2/27/09
6		**BATA Decisions Final**	**0 days**	**Fri 2/27/09**	**Fri 2/27/09**
7		**Task 10.0: Implementation of Demo Project**	**219 days**	**Mon 3/2/09**	**Thu 12/31/09**
8		**Demo Development**	**207 days**	**Mon 3/2/09**	**Tue 12/15/09**
9		Legal / Legislative	131 days	Mon 3/2/09	Mon 8/31/09
10		Policies, Rules, SOPs	87 days	Mon 3/2/09	Tue 6/30/09
11		**Back Office System Mods**	**207 days**	**Mon 3/2/09**	**Tue 12/15/09**
12		Contract Negotiations	22 days	Mon 3/2/09	Tue 3/31/09
13		Requirements & Design	22 days	Wed 4/1/09	Thu 4/30/09
14		Development / Unit Test	87 days	Fri 5/1/09	Mon 8/31/09
15		Test, QA, Signoff	76 days	Tue 9/1/09	Tue 12/15/09
16		**Demo Signing**	**98 days**	**Wed 7/1/09**	**Fri 11/13/09**
17		Demo Signing Plan	45 days	Wed 7/1/09	Tue 9/1/09
18		Sign Design / Order / Delivery	53 days	Wed 9/2/09	Fri 11/13/09
19		Demo Outreach Plan	98 days	Wed 7/1/09	Fri 11/13/09
20		Demo Training Plans	54 days	Tue 9/1/09	Fri 11/13/09
21		Demo Test / Eval Plan	54 days	Tue 9/1/09	Fri 11/13/09
22		**Demo Implementation**	**67 days**	**Wed 9/30/09**	**Thu 12/31/09**
23		Bdg 1 VES Final (All VES Final)	0 days	Wed 9/30/09	Wed 9/30/09
24		Demo Outreach Deployment	22 days	Mon 11/16/09	Tue 12/15/09
25		CSC Demo Training	22 days	Mon 11/16/09	Tue 12/15/09
26		Toll Operations Demo Training	22 days	Mon 11/16/09	Tue 12/15/09
27		Bdg 1 Signing Installation	22 days	Mon 11/16/09	Tue 12/15/09



BATA Video Tolling Project
Task 7.0: Conversion Plan Concept

Appendix A: Video Tolling Implementation Schedule

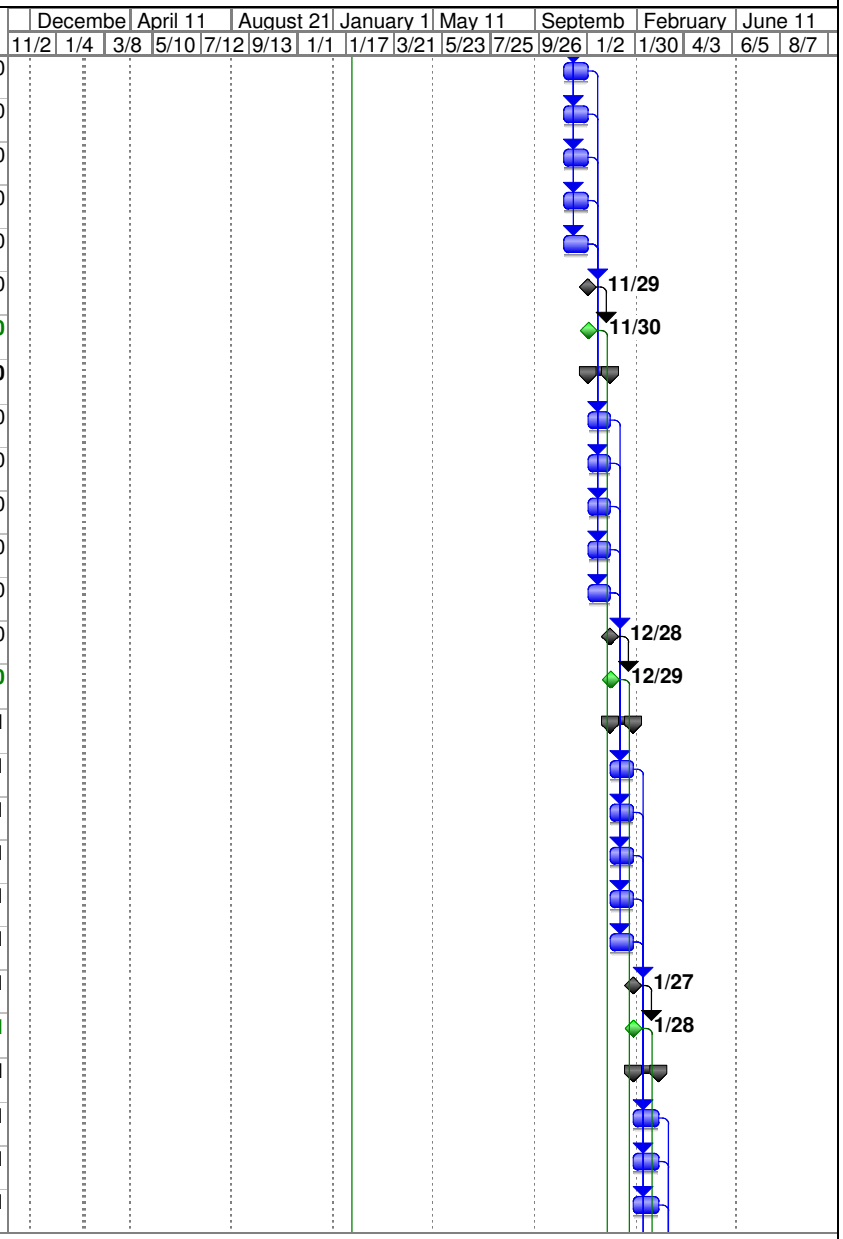
ID		Task Name	Duration	Start	Finish
28		Bdg 1 Testing	22 days	Mon 11/16/09	Tue 12/15/09
29		Bdg 1 Back Office System Cutover	12 days	Wed 12/16/09	Thu 12/31/09
30		**Demo Project Go Live**	**1 day**	**Fri 1/1/10**	**Fri 1/1/10**
31		**Task 11.0: Evaluation of Demo Project**	**128 days**	**Mon 1/4/10**	**Wed 6/30/10**
32		Operate Demo Project	128 days	Mon 1/4/10	Wed 6/30/10
33		Evaluate Demo Project	128 days	Mon 1/4/10	Wed 6/30/10
34		Prepare Final Report	44 days	Fri 4/30/10	Wed 6/30/10
35		**Demo Project Eval Complete**	**0 days**	**Wed 6/30/10**	**Wed 6/30/10**
36		**BATA Full Impl Decisions**	**21 days**	**Thu 7/1/10**	**Thu 7/29/10**
37		BATA Meeting	1 day	Thu 7/1/10	Thu 7/1/10
38		BATA Consideration / Discussion	9 days	Fri 7/2/10	Wed 7/14/10
39		BATA Decisions	0 days	Wed 7/14/10	Wed 7/14/10
40		Update / Approve Plans	11 days	Thu 7/15/10	Thu 7/29/10
41		**BATA Decisions Final**	**0 days**	**Thu 7/29/10**	**Thu 7/29/10**
42		**Full Implementation**	**218 days**	**Fri 7/30/10**	**Tue 5/31/11**
43		**Full Implementation Development**	**65 days**	**Fri 7/30/10**	**Thu 10/28/10**
44		Remaining Legal / Legislative	65 days	Fri 7/30/10	Thu 10/28/10
45		Full Impl Plan	44 days	Fri 7/30/10	Wed 9/29/10
46		Policy, SOP Revisions	22 days	Fri 7/30/10	Mon 8/30/10
47		Back Office System Revisions	43 days	Tue 8/31/10	Thu 10/28/10
48		**Signing**	**65 days**	**Fri 7/30/10**	**Thu 10/28/10**
49		Full Signing Plan	22 days	Fri 7/30/10	Mon 8/30/10
50		Sign Design / Order / Delivery	43 days	Tue 8/31/10	Thu 10/28/10
51		Full Outreach Plan	43 days	Tue 8/31/10	Thu 10/28/10
52		Updated Training Plans	43 days	Tue 8/31/10	Thu 10/28/10
53		**Full Implementation Deployment**	**153 days**	**Fri 10/29/10**	**Tue 5/31/11**
54		**Bridge 2**	**22 days**	**Fri 10/29/10**	**Mon 11/29/10**



BATA Video Tolling Project
Task 7.0: Conversion Plan Concept

Appendix A: Video Tolling Implementation Schedule

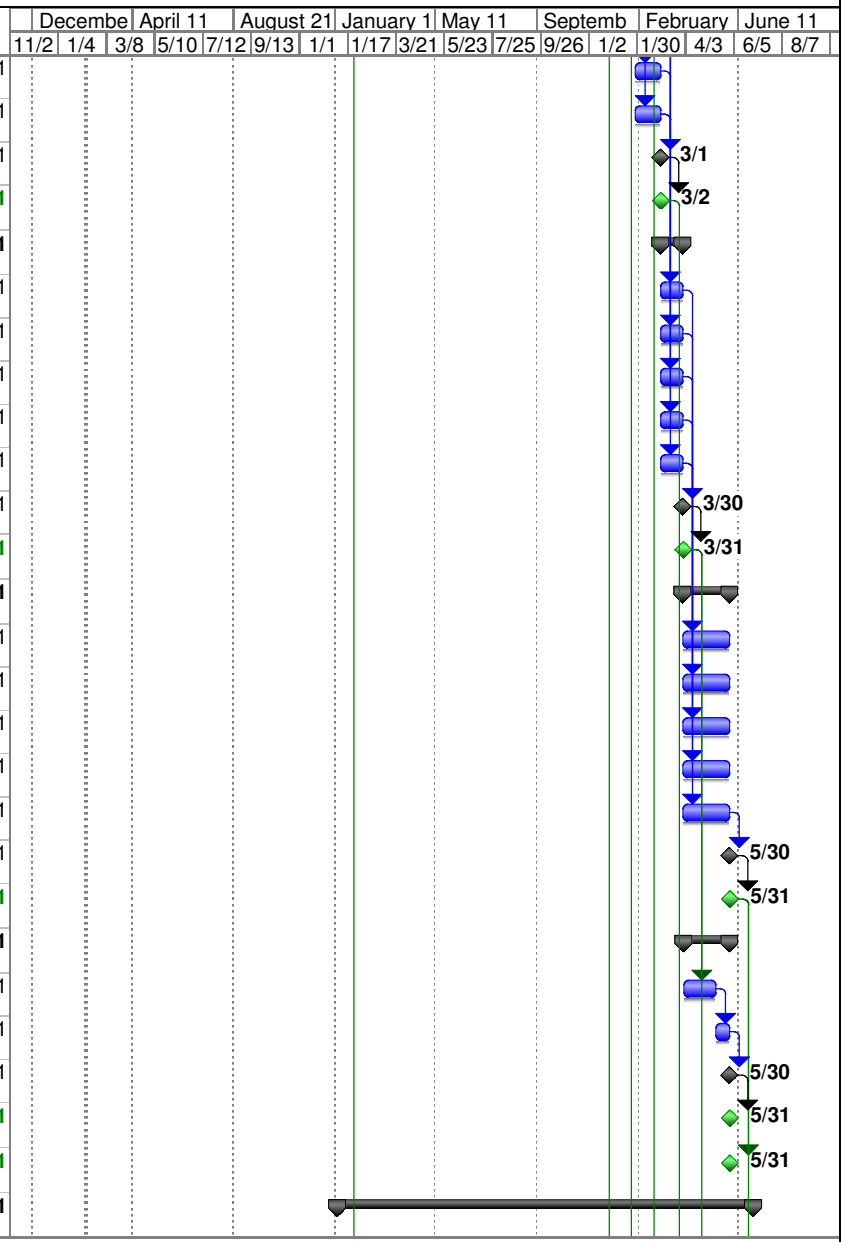
ID	Task Name	Duration	Start	Finish
55	Local Outreach Deployment	22 days	Fri 10/29/10	Mon 11/29/10
56	CSC Training Update	22 days	Fri 10/29/10	Mon 11/29/10
57	Toll Ops Training Update	22 days	Fri 10/29/10	Mon 11/29/10
58	Signing Installation	22 days	Fri 10/29/10	Mon 11/29/10
59	Testing	22 days	Fri 10/29/10	Mon 11/29/10
60	Back Office System Cutover	0 days	Mon 11/29/10	Mon 11/29/10
61	**Bridge 2 VT Go Live**	**1 day**	**Tue 11/30/10**	**Tue 11/30/10**
62	**Bridge 3**	**21 days**	**Tue 11/30/10**	**Tue 12/28/10**
63	Local Outreach Deployment	21 days	Tue 11/30/10	Tue 12/28/10
64	CSC Training Update	21 days	Tue 11/30/10	Tue 12/28/10
65	Toll Ops Training Update	21 days	Tue 11/30/10	Tue 12/28/10
66	Signing Installation	21 days	Tue 11/30/10	Tue 12/28/10
67	Testing	21 days	Tue 11/30/10	Tue 12/28/10
68	Back Office System Cutover	0 days	Tue 12/28/10	Tue 12/28/10
69	**Bridge 3 VT Go Live**	**1 day**	**Wed 12/29/10**	**Wed 12/29/10**
70	**Bridge 4**	**22 days**	**Wed 12/29/10**	**Thu 1/27/11**
71	Local Outreach Deployment	22 days	Wed 12/29/10	Thu 1/27/11
72	CSC Training Update	22 days	Wed 12/29/10	Thu 1/27/11
73	Toll Ops Training Update	22 days	Wed 12/29/10	Thu 1/27/11
74	Signing Installation	22 days	Wed 12/29/10	Thu 1/27/11
75	Testing	22 days	Wed 12/29/10	Thu 1/27/11
76	Back Office System Cutover	0 days	Thu 1/27/11	Thu 1/27/11
77	**Bridge 4 VT Go Live**	**1 day**	**Fri 1/28/11**	**Fri 1/28/11**
78	**Bridge 5**	**23 days**	**Fri 1/28/11**	**Tue 3/1/11**
79	Local Outreach Deployment	23 days	Fri 1/28/11	Tue 3/1/11
80	CSC Training Update	23 days	Fri 1/28/11	Tue 3/1/11
81	Toll Ops Training Update	23 days	Fri 1/28/11	Tue 3/1/11



BATA Video Tolling Project
Task 7.0: Conversion Plan Concept

Appendix A: Video Tolling Implementation Schedule

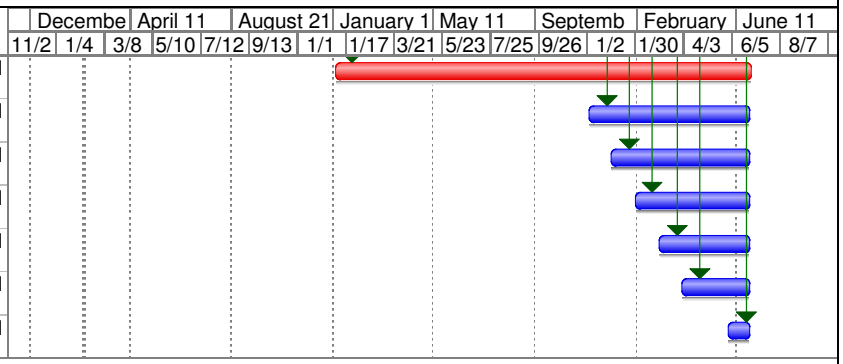
ID	Task Name	Duration	Start	Finish
82	Signing Installation	23 days	Fri 1/28/11	Tue 3/1/11
83	Testing	23 days	Fri 1/28/11	Tue 3/1/11
84	Back Office System Cutover	0 days	Tue 3/1/11	Tue 3/1/11
85	**Bridge 5 VT Go Live**	**1 day**	**Wed 3/2/11**	**Wed 3/2/11**
86	**Bridge 6**	**21 days**	**Wed 3/2/11**	**Wed 3/30/11**
87	Local Outreach Deployment	21 days	Wed 3/2/11	Wed 3/30/11
88	CSC Training Update	21 days	Wed 3/2/11	Wed 3/30/11
89	Toll Ops Training Update	21 days	Wed 3/2/11	Wed 3/30/11
90	Signing Installation	21 days	Wed 3/2/11	Wed 3/30/11
91	Testing	21 days	Wed 3/2/11	Wed 3/30/11
92	Back Office System Cutover	0 days	Wed 3/30/11	Wed 3/30/11
93	**Bridge 6 VT Go Live**	**1 day**	**Thu 3/31/11**	**Thu 3/31/11**
94	**Bridge 7 (SFOBB)**	**43 days**	**Thu 3/31/11**	**Mon 5/30/11**
95	Local Outreach Deployment	43 days	Thu 3/31/11	Mon 5/30/11
96	CSC Training Update	43 days	Thu 3/31/11	Mon 5/30/11
97	Toll Ops Training Update	43 days	Thu 3/31/11	Mon 5/30/11
98	Signing Installation	43 days	Thu 3/31/11	Mon 5/30/11
99	Testing	43 days	Thu 3/31/11	Mon 5/30/11
100	Back Office System Cutover	0 days	Mon 5/30/11	Mon 5/30/11
101	**Bridge 7 VT Go Live**	**1 day**	**Tue 5/31/11**	**Tue 5/31/11**
102	**Bridge 1 Updates**	**42 days**	**Fri 4/1/11**	**Mon 5/30/11**
103	Design / Development	30 days	Fri 4/1/11	Thu 5/12/11
104	Testing	12 days	Fri 5/13/11	Mon 5/30/11
105	Cutover	0 days	Mon 5/30/11	Mon 5/30/11
106	**Bridge 1 VT Updates Go Live**	**1 day**	**Tue 5/31/11**	**Tue 5/31/11**
107	**Full Implementation Complete**	**0 days**	**Tue 5/31/11**	**Tue 5/31/11**
108	**Ongoing Operations / Maintenance**	**389 days**	**Mon 1/4/10**	**Thu 6/30/11**



BATA Video Tolling Project
Task 7.0: Conversion Plan Concept

Appendix A: Video Tolling Implementation Schedule

ID		Task Name	Duration	Start	Finish
109		Bridge 1	389 days	Mon 1/4/10	Thu 6/30/11
110		Bridge 2	150 days	Wed 12/1/10	Tue 6/28/11
111		Bridge 3	129 days	Thu 12/30/10	Tue 6/28/11
112		Bridge 4	107 days	Mon 1/31/11	Tue 6/28/11
113		Bridge 5	84 days	Thu 3/3/11	Tue 6/28/11
114		Bridge 6	63 days	Fri 4/1/11	Tue 6/28/11
115		Bridge 7	20 days	Wed 6/1/11	Tue 6/28/11



ATTACHMENT H:

Task 8.0 Facility Selection for Demonstration

Technical Memorandum – Final Report

BATA Video Tolling Demonstration Project

Task 8.0: Facility Selection for Demonstration

February 9, 2009

Prepared for:
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Prepared by:

DOCUMENT CONTROL PANEL		
File Name:	*Technical Memorandum – Facility Selection for Demonstration*	
File Location:		
Deliverable Number:	8.1	
Version Number:	08	
	Name	**Date**
Created By:	Johns, Zofka	8/11/08
Reviewed By:	Bausher, Bonds, Dillard	8/18/08
	Rushmore	8/26/08
	L Lee (BATA)	9/17/08
	Dillard	10/16/08
Modified By:	Johns, Zofka	8/25/08
	Zofka, Johns	9/30/08
	Dillard	10/23/08
	Erwin	1/09/09
	Erwin	1/26/09
	Dillard	2/9/09
Completed By:	Dillard	2/9/09

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1.0 Introduction

1.1 Purpose of Memorandum

The primary objective of this memorandum is to recommend a plaza where BATA could best demonstrate and evaluate video tolling. This task is a culmination of previous tasks completed, from reviews of legal issues to consideration of technical, physical and operational changes that may be required. This memorandum will describe the processes and approach used to evaluate potential video tolling demonstration plaza candidates and then summarize the resulting findings with a final recommendation.

1.2 Context within Project and Toll Industry

As discussed in previous tasks and memorandums under this project, the toll industry has seen a significant increase in interest in Open Road Tolling (ORT). In more recent years the U.S. toll industry has also seen deployments to all-ORT systems, including new facility implementations and migration efforts from existing cash/ETC systems to video tolling (VT).

For newly-built facilities such as S.H. 121 and Tyler Loop 49 in Texas and the 407 ETR in Toronto, the obstacles in deploying cashless systems were minimal, as original planning was completed with all-electronic tolling in mind. As all-electronic tolling has been established across the industry and participation rates have begun to level off, the next movement is supplementation of ETC with video tolling to address other issues, including conversion to cashless toll collection and mitigation of continuously increasing congestion.

In September 2007 the California Transportation Commission (CTC) awarded funding to BATA under the Traffic Congestion Relief Program (TCRP) to undertake evaluation of the potential benefits of VT. As a primary objective of this study, BATA must demonstrate the potential benefits of VT. To that end, BATA will first deploy a demonstration program for analysis and evaluation at one of its toll facilities. This memorandum is intended to take BATA to the next step by recommending a toll plaza for implementation of the demonstration.

1.3 Document Overview

The remainder of this memorandum has been divided into three sections. The first section will discuss the overall approach used to evaluate and assess the various facilities. The second section will expand on the approach in greater detail, specifically discussing the various factors considered during the selection and their application to the BATA facilities. The final section will provide a summary of findings, a ranking of potential candidates, and a resultant recommended plaza for the demonstration of video tolling.

2.0 Plaza Selection Approach

In order to determine the most suitable plaza for the video tolling demonstration, a general factor-based approach was used to better quantify the findings. These factors are discussed in more detail in section 3.0, Selection Criteria.

Overall, the selection approach is straightforward as many, if not all, of the previous tasks and memorandum prior to this task included analysis of the relevant factors. These findings were used as a basis for the selection factors applied here.

Although discussed as part of the findings from Task 4.0, Facilities Review, efforts from the facilities review will have the greatest impact on the selection process, as it was one objective of that effort to be used for determination of a demonstration plaza. The summary of other tasks performed but not influencing this particular decision, and thus not included in the selection factors, is presented below.

2.1 Summary of Other Tasks

In addition to Task 4.0, Facilities Review, the other tasks already performed as part of this project were evaluated to determine whether they included criteria that would influence a facility selection for the video tolling (VT) demonstration. These tasks included:

- Task 1.0 – Video Tolling Concepts Review: A general baseline of industry-wide VT practices was developed to provide a framework of industry practices for BATA's video tolling efforts. Although this overview included all facets of video tolling, none of the noted characteristics appear to influence the selection of a facility for BATA's video tolling demonstration.

- Task 2.0 – Legal and Legislative Review: An evaluation of current statutes and legal interpretations that might affect video tolling. None of the items identified have any impact on the selection of a VT demonstration facility, as all legal and legislative issues apply to the overall program.

- Task 3.0 – Concept of Operations: Potential business processes, operating guidelines, and considerations for BATA's deployment of VT. Several customer types were identified as they related to the methods in which payment or revenue would be collected from the patron. However, none of this was specific to any facility.

- Task 5.0, Technology Review: An overview of BATA's existing systems, including the Advanced Toll Collection and Accounting System (ATCAS) system, and the new TRMI Violation Enforcement System (VES), to identify potential issues that might impact the implementation of VT. This review did not identify any issues with the existing lane and plaza level systems that would impact the ability of any facility to accommodate video tolling, with the possible exception of the VES implementation schedule. This issue is addressed later in this deliverable.

- Task 6.0 – Financial Impact Analysis: Described the potential financial impacts of VT implementation, including the analysis of operational costs compared to potential cost savings. None of the noted impacts were specific to any particular facility.

3.0 Selection Criteria

This section focuses primarily on information provided as part of Task 4.0, Facilities Review, which provided an analysis of each facility. The facility-specific attributes influence the final selection of a facility for the video tolling demonstration.

The objective of Task 4.0 was to document existing conditions and identify potential physical limitations, constraints, and restrictions that could affect the implementation of video tolling (VT) at any one of the seven facilities listed below and illustrated in Figure 1, below:

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

Key elements reviewed include plaza geometrics, lane equipment, traffic data, and other VT-related observations noted during the site visits. Based on this information, the following consideration criteria for implementation of a VT demonstration will be evaluated:

- Traffic analysis including travel time, travel speed, peak period plaza and approach usage, and peak period plaza reserve capacities

- Plaza complexity including geometrics (approach, departure, mini-plazas), number of ETC versus cash lanes, and signing.

- System Technology, in particular the potential implementation schedule for the new Violation Enforcement System (VES).

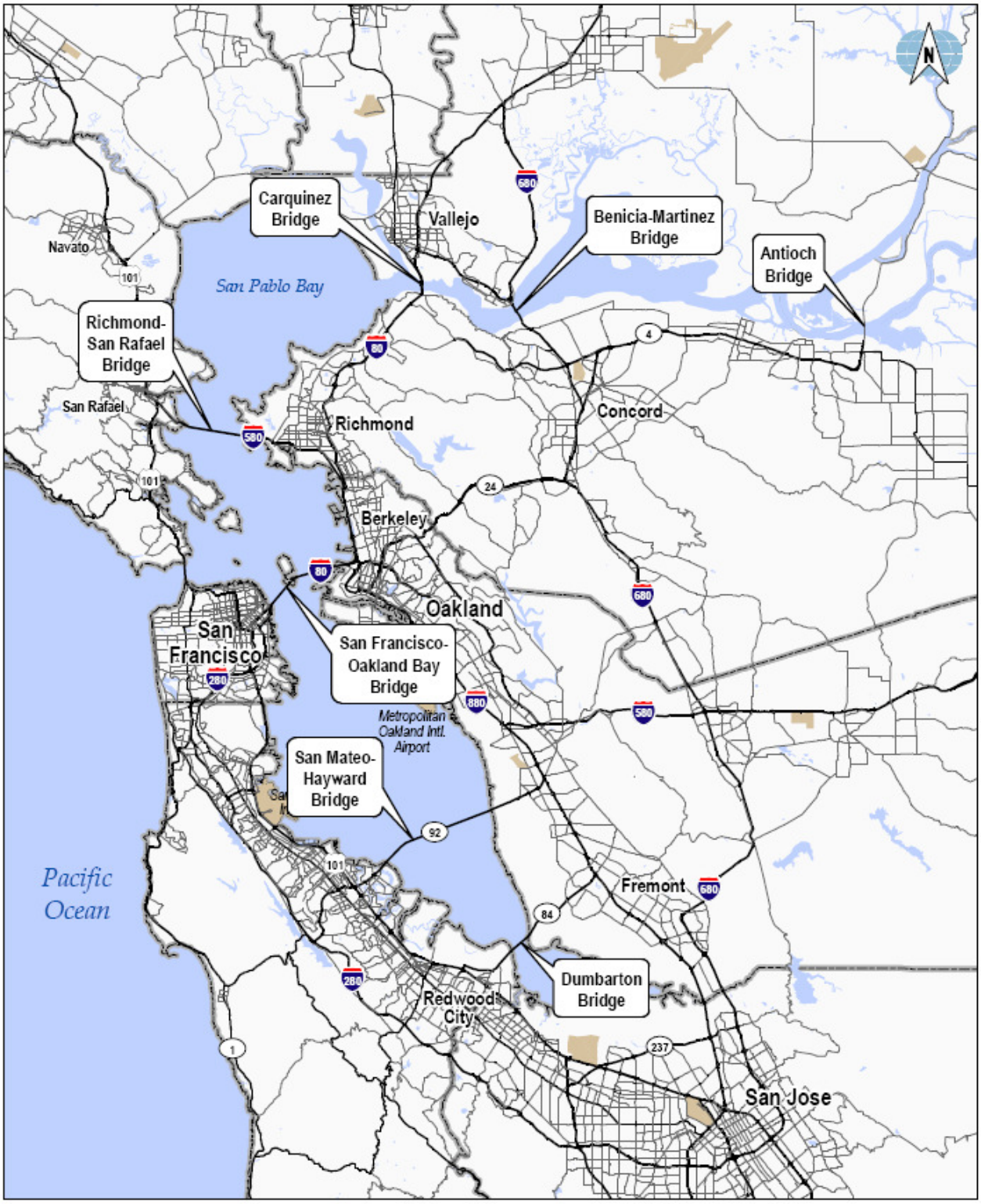


Figure 1: Facility Location Map

3.1 Traffic Analysis

Traffic analysis will enable a rough estimation of the potential benefits of video tolling in any given location, based on actual traffic measurements for each of the plazas. As a project objective, congestion relief is one of the most critical measurements that will indicate the potential success of video tolling. As such, a primary objective of this project will be to demonstrate congestion relief at the selected plaza.

Some of the data used for this analysis comes from the final Task 4.0, Facilities Review document. However, initial research for Task 4.0 used data from earlier in the year, some of which is also used to illustrate key points for this analysis.

- Travel time data provided by BATA was collected between May 2007 and June 2008 for all bridges except Carquinez and Dumbarton. This data was not reflected in the final Task 4.0 document. Graphs illustrating peak period travel times are provided as Appendix A, Travel Time Data, for reference.

- Travel time data provided by BATA for Carquinez and Dumbarton was collected during July 2008, as reflected in the final Task 4.0 document. This data was collected following completion of BATA lane configuration improvements, and as such, more accurately reflects current travel patterns.

- Travel speed data was calculated based on distances used to capture travel times.

- Peak period usage percentage data is based on April 2008 data provided by BATA, which was included in the final Task 4.0 deliverable as Table 1. A copy of that table has been included as Table 1 in the appropriate following section for reference.

- Toll plaza capacity and lane configuration data is based on April 2008 data provided by BATA, but not used in the final Task 4.0 deliverable. This data is provided as Appendix B, Toll Plaza Capacity Analysis, for reference.

- Lane geometry data was reflected in Task 4.0 as Table 4, and signage information was included in the Task 4.0 descriptions of each plaza.

In all cases, relevant data from the sources above has been included in Table 2, Traffic Data Summary and Table 3, Summary of Evaluation Criteria, later in this document.

3.1.1 Peak Period Travel Time

Peak period travel times through each plaza approach have been used to evaluate the potential for each toll facility to benefit from video tolling. Travel times were measured for the distance traveled through each toll plaza. They reflect the maximum times required to travel through a cash lane and a FasTrak lane.

Plazas with high travel times in cash lanes and relatively lower travel times in FasTrak lanes would be likely candidates to demonstrate VT benefits, as this indicates backups in the cash

lanes and potential excess capacity in FasTrak lanes. Video tolling may contribute to relieving congestion at the booths by moving cash customers to the FasTrak lanes. As FasTrak lanes reach capacity, BATA plans to convert existing cash lanes to FasTrak. This step will increase overall toll plaza throughput capacity.

Analysis of peak period travel time data provided the following conclusions for this selection:

- Both Benicia-Martinez and San Mateo-Hayward reflect similar potential for improvement, with 6 minute cash and 4 minute ETC travel times on Benicia-Martinez and 3 minute cash and 2 minute on San Mateo-Hayward.

- Video tolling would not be expected to have a significant impact on the San-Francisco-Oakland Bay Bridge (SFOBB), even though the highest cash lane travel time (from I-580 in the AM period) is about 26 minutes. Because AM traffic volumes exceed bridge capacity, traffic metering is used to mitigate the congestion. Because the congestion results from other factors in addition to the toll plaza, travel times through the toll plaza do not accurately or purely reflect throughput performance of the toll lanes, and therefore should not be used to illustrate potential benefits of the demonstration.

- Travel time data was not collected for the Antioch Bridge during this period, due at least in part to the much lower traffic volumes and nearly non-existent congestion at that facility. As a result, Antioch could not be used to demonstrate VT objectives related to reductions in travel time.

3.1.2 Peak Period Travel Speed

Peak hour travel speeds were calculated based on the distances used to capture travel times and the resulting travel time data. Low average speed is typically a result of higher congestion, although it may also result from plaza complexity (e.g., weaving and merge issues). For the purposes of this study, it is assumed that travel speeds of 40 MPH or higher indicate "free-flow" traffic conditions.

In general, plazas with higher travel speeds in FasTrak lanes and relatively lower travel speeds in cash lanes would best demonstrate the benefits of VT, because low speeds in cash lanes may indicate plaza congestion. This congestion can be mitigated by moving customers to the higher speed FasTrak lanes.

As a result of the correlation between travel times and speed, analysis and recommendations related to speed mirror those above, to some extent.

- The impact of congestion is clearly illustrated in the peak hour travel speeds of several bridges, including Richmond-San Rafael – 19 mph cash, 26 mph ETC.

- The presence of Express / Open Road Tolling FasTrak lanes on the Benicia-Martinez Bridge results in higher travel speeds in the ETC lanes, at 57 mph. However, there is still room for improvement from the 38 mph cash lane speeds.

- SFOBB has the most noticeably low travel speeds during the AM peak – 8 mph cash and 10 mph ETC – but since traffic metering must be used to control bridge load, these numbers would not be improved by VT.

3.1.3 Peak Period Lane Usage

For the purposes of the VT demonstration, the potential of all lanes to shift cash customers to VT must be considered. It is important, however, to ensure that this shift will not create congestion in dedicated FasTrak lanes. Facilities with a high usage of cash lanes and low to moderate usage of FasTrak lanes could potentially reflect more noticeable benefits during the demonstration.

Toll Plaza	Time Period	Date	Percent Cash Transactions	Percent FasTrak Transactions	Percent Violations
Antioch	Weekday (PM Peak Period*)	4/15/2008	55.6%	35.1%	9.3%
Benicia - Martinez	Weekday (PM Peak Period*)	4/15/2008	38.7%	48.6%	12.6%
Carquinez	Weekday (PM Peak Period*)	4/15/2008	47.9%	42.5%	9.6%
Dumbarton	Weekday (AM Peak Period*)	4/15/2008	35.4%	55.4%	9.2%
Richmond - San Rafael	Weekday (AM Peak Period*)	4/15/2008	39.8%	49.7%	10.5%
San Francisco-Oakland Bay	Weekday (AM Peak Period*)	4/15/2008	35.4%	55.6%	9.1%
San Francisco-Oakland Bay	Weekday (PM Peak Period*)	4/15/2008	39.6%	50.2%	10.2%
San Mateo - Hayward	Weekday (AM Peak Period*)	4/15/2008	33.7%	53.7%	12.5%
Weekday Averages			**40.9%**	**48.7%**	**10.4%**

* AM Peak Period based on hours of 5:00 - 10:00 AM, and PM Peak Period based on hours of 3:00 - 7:00 PM.

Note: Data does not include HOV traffic.

Table 1: Transaction Type Distribution (Peak Period)

Table 1 above was also included as Table 1 in the Task 4.0 Facilities Review. As illustrated in this figure:

- The Antioch and Carquinez facilities reflect considerably higher cash usage than the others, at 55.6% and 47.9%, respectively. As a result, they both have correspondingly lower FasTrak percentages, and show high potential for benefit from VT.

- The remaining facilities are upside-down with regard to this factor, as they all have higher percentages of FasTrak usage. This is not to imply that they couldn't benefit from VT, but the ability to illustrate those benefits is less in this area.

3.1.4 Peak Hour Reserve Capacity

As noted in the previous section, it is important that the implementation of VT not increase congestion through existing facilities. Reserve capacity is one factor that will help to identify situations where more traffic might result in congestion.

VT implementation should be more successful in plazas with moderate to high levels of reserve capacity in both plaza lanes and the associated approach lanes. As such, for this study, facilities with reserve capacity level of 15% or greater will be considered viable candidates. Reserve capacities shown in Table 2, below, illustrate the following points:

- Reserve capacities on the Antioch Bridge are very high – 79% plaza lane and 89% approach during peak hour – indicating plenty of room to shift cash customers into the FasTrak lanes.

- Of the remaining plazas, only Carquinez and Benicia-Martinez have reserve capacities high enough to ensure adequate room for potential shifts. Benicia-Martinez is at 28% in both plaza and approach lanes, and Carquinez has 27% reserve on approach and 39% in the plaza lanes.

- Since approach reserve capacity on Dumbarton is at -26%, it would not be an ideal candidate from this perspective.

- Richmond-San Rafael (36% plaza, 11% approach) and San Mateo-Hayward (1% plaza, 36% approach) indicate potential or actual constraints in one area or the other, with their 1% and 11% reserves. Since it isn't clear at this point how much traffic might shift with VT, neither of these bridges would be considered top candidates.

Plaza	Start	End	Distance (miles) *(Note 1)*	Peak Period *(Note 2)*	Peak Hour Travel Time *(Note 3)*		Peak Hour Travel Speed *(Notes 4&5)*		Peak Period Lane Usage		Peak Hour ETC Reserve Capacity	
					Cash	FasTrak	Cash	FasTrak	Cash	FasTrak	Plaza Lane	Approach
Antioch	Brentwood / Stockton exit sign	Toll plaza	0.9	PM	n/a	n/a	n/a	n/a	56%	35%	79%	89%
Benicia-Martinez	Arthur Blvd. on-ramp	I-780 on-ramp merge to I-680	3.8	PM	6 min.	4 min.	38 mph	57 mph (FF)	39%	49%	28%	28%
Carquinez	Cummings Skyway on-ramp	Toll plaza	1.7	PM	2.5 min.	2 min.	41 mph (FF)	51 mph (FF)	48%	43%	39%	27%
Dumbarton	Paseo Padre Pkwy/Thornton exit sign	Toll plaza	1.4	AM	2 min.	1.5 min.	42 mph (FF)	56 mph (FF)	35%	55%	3%	-26%
Richmond-San Rafael	Cutting Blvd. on-ramp	Toll plaza	2.2	AM	7 min.	5 min.	19 mph	26 mph	40%	50%	19%	11%
SFOBB	University Ave on-ramp (I-80)	Metering lights	3.8	AM	26 min.	14 min.	9 mph	12 mph	AM - 35%; PM - 40%	AM - 56%; PM - 50%	AM - No Reserve Capacity; PM 12% - 43%	AM - No Reserve Capacity; PM 22% - 42%
	I-980/Hwy 24 interchange (I-580)	Metering lights	3	AM	26 min.	25 min.	7 mph	7 mph				
	Union Street on-ramp (I-880)	Metering lights	2.8	AM	24 min.	15 min.	7 mph	11 mph				
San Mateo-Hayward	Industrial Blvd. on-ramp	Toll plaza	2.3	AM	3 min.	2 min.	46 mph (FF)	69 mph (FF)	34%	54%	1%	36%

Table 2: Traffic Data Summary

NOTES:
1. Distance is a measured value and reflects the distance to approach and pass through the toll plaza.
2. Peak Period: AM – typically 5:00 AM – 10:00 AM; PM – typically 3:00 PM to 7:00 PM.
3. Peak Hour Travel Time: A measured value representing the maximum time observed for a vehicle to approach and clear a cash toll lane or FasTrak lane.
4. Peak Hour Travel Speed: A calculated value representing the minimum speed observed for a vehicle to approach and clear a cash or FasTrak lane.
5 FF: Assumed “Free-Flow” traffic conditions if travel speed is greater than or equal to 40 mph.

3.2 Plaza Complexity

Plaza complexity will influence the decision as to which facility has the best capabilities for providing conclusive VT demonstration results. The following factors should be considered in determining which plaza would best facilitate the demonstration.

3.2.1 Geometry (Approach / Departure)

Plaza geometry is an important factor influencing the success of the VT demonstration, as well as traffic safety in general. Straightforward lane configuration with good sight distance, clear lane divisions, and no ramps immediately before or after the plaza are desirable attributes of a successful VT candidate facility.

Key plaza geometry observations were made during the Task 4.0 Facility Review and recording in Task 4.0 Table 4. The relevant observations to this discussion have been included in Table 3, Summary of Evaluation Criteria, for consideration. Those observations included the following:

- Benicia-Martinez and Dumbarton are the only facilities with no apparent approach or departure issues.

- San Mateo-Hayward include a mini-plaza upstream of the main toll plaza. While this fact alone would not prevent effective demonstration, it is less ideal than a facility with no geometric issues.

- Antioch and SFOBB have geometric issues immediately before and after the plaza. In the case of Antioch, an on-ramp just before the plaza and an off-ramp just may cause weaving issues on both approach and departure. With SFOBB, the approach is very complex, with multiple freeway approaches, and the departure is constrained by metering and by the narrowing down to 5 lanes for the bridge crossing. Neither bridge is a good candidate, from this perspective.

- The San Francisco-Oakland Bay Bridge plaza has major geometry issues such as extreme weaving movements, presence of the mini-plaza on the approach, and metering downstream of the toll plaza.

3.2.2 Number of ETC and Cash Lanes

Facilities with a moderate to high number of cash lanes relative to FasTrak only lanes can potentially better demonstrate the benefits of VT. Although a higher number of cash lanes may indicate current or past congestion at a facility, it also provides more potential lanes that may be converted to higher speed lanes, increasing throughput using ETC and VT. Customers may then be effectively shifted from the cash lanes to ETC / VT lanes to mitigate cash lane backups.

The following observations may be made in this area, using data from Table 3 Summary of Evaluation Criteria:

- Benicia-Martinez (9 cash, 2 FT), Carquinez (8 cash, 3 FT), and Richmond-San Rafael (5 cash, 2 FT) have the highest ratios of cash-to-ETC lanes.

- San Mateo-Hayward includes 5 cash, 2 FT, and 1 Closed lane during peak periods. The closed lane could also be converted, if necessary.

- Antioch has only 2 cash and 1 FT lanes. As a result, only 1 lane could be converted to FT only as long as cash is still collected.

3.2.3 Signage

Signage is an important component of plaza complexity. Existing CMS (Changeable Message Signs), where available, may be revised to include VT messages or inform the public if lanes are converted.

The following should be taken into considerations with regard to plaza signing:

- Carquinez, Dumbarton, and San Mateo-Hayward have CMS already in place over some of their available lanes. These are currently used to reflect Cash, Cash/FasTrak, HOV, and Closed lane statuses. In some places, they are supplemented by fixed signing.

- SFOBB and Richmond-San Rafael have CMS installed over available lanes, but both have visibility issues that make their signage situations non-ideal.

- Antioch and Benicia-Martinez have no CMS in place, so signing for VT would require fixed sign modifications.

3.3 System Technology

Even though BATA's systems are generally the same across all facilities, a few technology-related issues should be kept in mind during facility selection:

- The Benicia-Martinez plaza is new, and was constructed with dedicated Express or Open Road Tolling (ORT) lanes. While this would not typically be an issue, the Express lanes in this plaza are using a separate ORT lane system and VES, independent of the ATCAS system used in all other BATA toll lanes across the remaining bridges. This could introduce additional complexities to the demonstration analysis, making it more difficult to ensure that changes were due to the implementation of VT. However, this is not an insurmountable issue.

- The Antioch plaza is being used as the initial installation and test location for BATA's VES system upgrade. As a result, installing VT in this location would make it difficult for both the VES and VT to be monitored and evaluated. It is possible, however, that the VES installation and testing will be completed considerably earlier than the VT deployment, so this might no longer be an issue.

- The VT facility selection must be coordinated with the VES installation schedule, to ensure that the VES will be installed and stable prior to VT evaluation.

4.0 Analysis

With the above criteria recognized, this final section will quantify their relevance as part of demonstration facility selection. Table 3 below will provide a comparative representation of the evaluation criteria for each toll facility. The table is organized by evaluation factors, and lists criteria to be considered in identifying a good candidate facility. Lastly, the criteria objectives met by a facility will be totaled for each plaza, and the plaza or plazas meeting with the highest number of criteria will be recommended for the video tolling demonstration.

4.1 Recommendation

As presented in Table 3, Summary of Evaluation Criteria, four bridges tied for the highest number of evaluation factor criteria. Each bridge has its own unique factors that make it acceptable for use as a demonstration facility. Correspondingly, none of the four are perfect candidates. They are as follows:

- **Benicia-Martinez** is strong with regard to potential travel time and speed improvements, as well as reserve capacities and plaza geometry. It is weaker with regard to peak period lane usage and signage, and has a complicating technical issue due to the presence of the ORT lanes and their independent lane system.

- **Carquinez** is stronger in terms of lane usage and reserve capacities, as well as approach geometry and signage. It presents less potential travel time and speed improvement, and has a departure geometry issue.

- **Dumbarton** reflects good potential for travel time and speed improvement, and has straightforward geometry and good signage. It does not, however, reflect optimal lane usage, and appears to have significant approach reserve capacity issues.

- **San Mateo-Hayward** shows good potential in all areas with the exception of lane usage, reserve capacities, and the geometry complication caused by an upstream mini-plaza.

As a result of this analysis, **any of the four bridges above** could be recommended for use as the Video Tolling demonstration project facility.

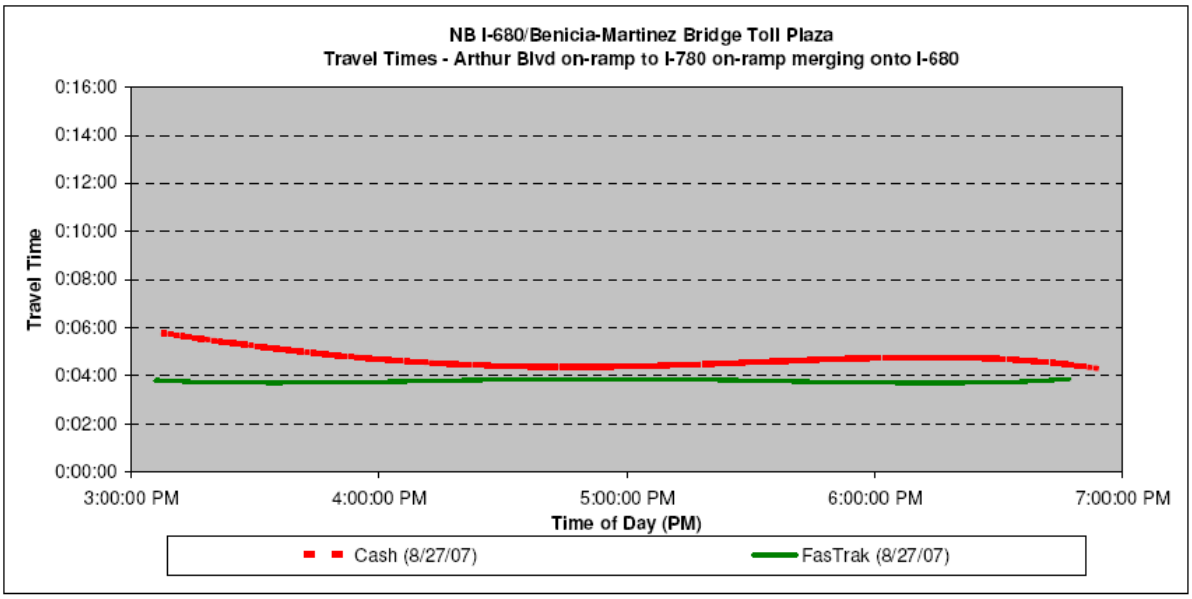
Evaluation Factor	Criteria	Antioch	Benicia-Martinez	Carquinez	Dumbarton	Richmond-San Rafael	San Francisco-Oakland Bay	San Mateo-Hayward
Peak Period Travel Time	- Lower travel time for FasTrak vehicles - Higher travel time for cash vehicles	FT - n/a Cash - n/a	FT - 4 min. Cash - 6 min.	FT - 2 min. Cash - 2.5 min.	FT - 1.5 min. Cash - 2 min.	FT - 5 min. Cash - 7 min.	FT - 20 min. Cash - 25 min.	FT - 2 min. Cash - 3 min.
	Difference between FT and Cash	n/a	2 min.	0.5 min.	0.5 min.	2 min.	5 min.	1 min.
Peak Period Travel Speed	- Higher speed for FasTrak vehicles - Lower speed for cash vehicles	FT - n/a Cash - n/a	FT - 57 mph (FF) Cash - 38 mph	FT - 51 mph Cash - 41 mph	FT - 56 mph (FF) Cash - 42 mph	FT - 26 mph Cash - 19 mph	FT - 10 mph Cash - 8 mph	FT - 69 mph (FF) Cash - 46 mph (FF)
	Difference between FT and Cash	n/a	19 mph	10 mph	14 mph	7 mph	2 mph	23 mph
Peak Period Lane Usage	- Moderate FasTrak usage - Higher cash usage	FT - 35% Cash - 56%	FT - 49% Cash - 39%	FT - 43% Cash - 48%	FT - 55% Cash - 35%	FT - 50% Cash - 40%	FT - 53% Cash - 37%	FT - 54% Cash - 34%
ETC Reserve Capacities (Peak Period)	- Moderate to high reserve booth lane capacity - Moderate to high reserve approach lane capacity	Booth: 79% Approach: 89% Lane	Booth: 28% Approach: 28%	Booth: 39% Approach: 27%	Booth: 3% Approach: -26%	Booth: 19% Approach: 11%	Booth: 12% - 43% (PM) Approach: 22% - 42% (PM)	Booth: 1% Approach: 36%
Approach Geometry	- No complications immediately before plaza - Good sight distance	- Wilbur Ave on-ramp	- No issues	- No issues	- No issues	- Approach curvature	- Multiple freeway entry points and extreme weaving movements	- Upstream mini-plaza
Departure Geometry	- No complications immediately following toll plaza	- Bridgehead Ave off-ramp	- No issues	- Sonoma Blvd / SR 29 off-ramp	- No issues	- Short merge	- Metering lights - Downstream mini-plaza	- No issues
Ratio of Cash to ETC Lanes (during Peak Period)	- Moderate to high number of cash lanes relative to FasTrak lanes	FT - 1 Cash - 2	FT - 2 Cash - 9	FT - 3 Cash - 8	FT - 2 Cash - 4	FT - 2 Cash - 5	From I-80/I-580 • FT - 5 • Cash - 8 From I-880 • FT - 3 • Cash - 2	FT - 2 Cash - 5 Closed - 1
Signage	- Existing CMS to be used for VT messaging - Good visibility on approach	- No existing CMS - Visibility good	- No existing CMS - Visibility good	- 5 lanes have existing CMS - Visibility good	- 3 lanes have existing CMS - Visibility good	- 3 lanes have existing CMS - Visibility issues due to curvature	- 7 lanes have existing CMS - Visibility difficult due to approach complexity	- 5 lanes have existing CMS - Visibility good
Technology Issues	- Facility system stable and testable	- VES installation test location	- Independent ORT / VES system	- No issues	- No issues	- No issues	- No issues	- No issues
	Total Criteria Met:	**2**	**6**	**6**	**6**	**2**	**1**	**6**

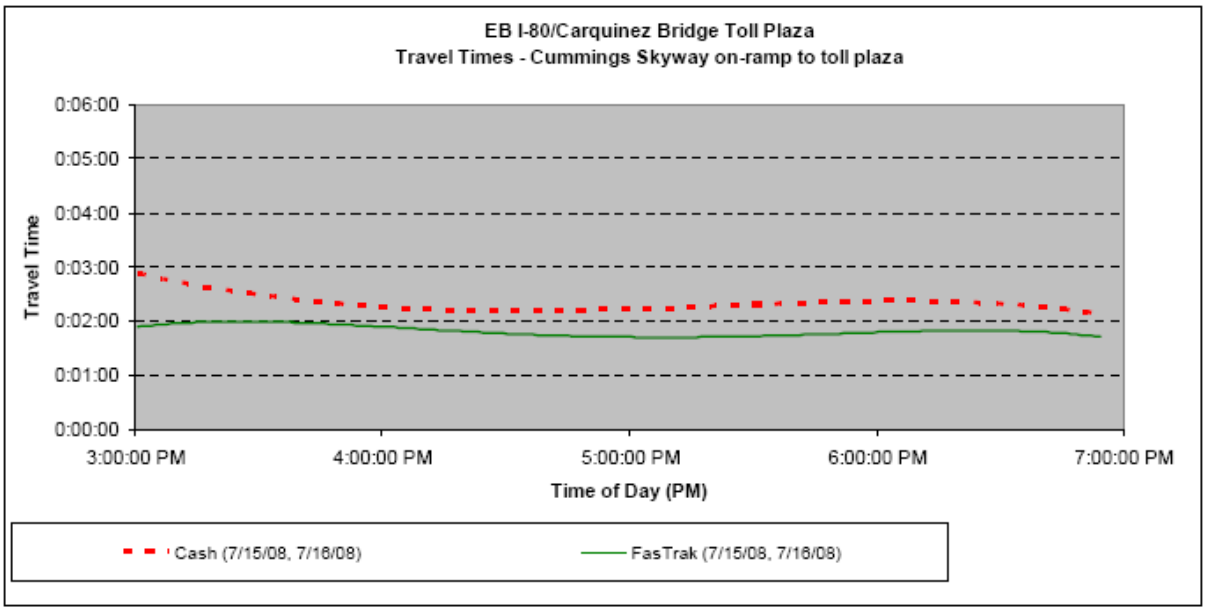
Meets Objective of Criteria	Indicates Preferred Facility

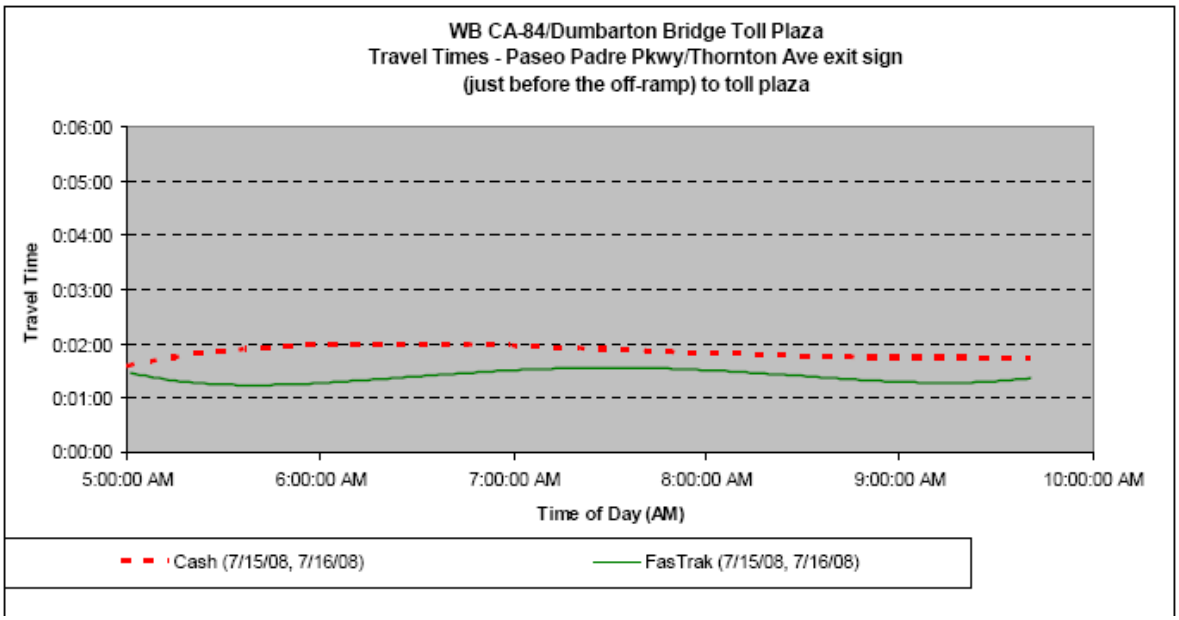
NOTES:
1. Peak Period: AM – typically 5:00 AM – 10:00 AM; PM – typically 3:00 PM to 7:00 PM.
2. Peak Hour Travel Time: A measured value representing the maximum time observed for a vehicle to approach and clear a cash toll lane or FasTrak lane.
3. Peak Hour Travel Speed: A calculated value representing the minimum speed observed for a vehicle to approach and clear a cash or FasTrak lane.
4. FF: Assumed "Free-Flow" traffic conditions if travel speed greater than or equal to 40 mph.

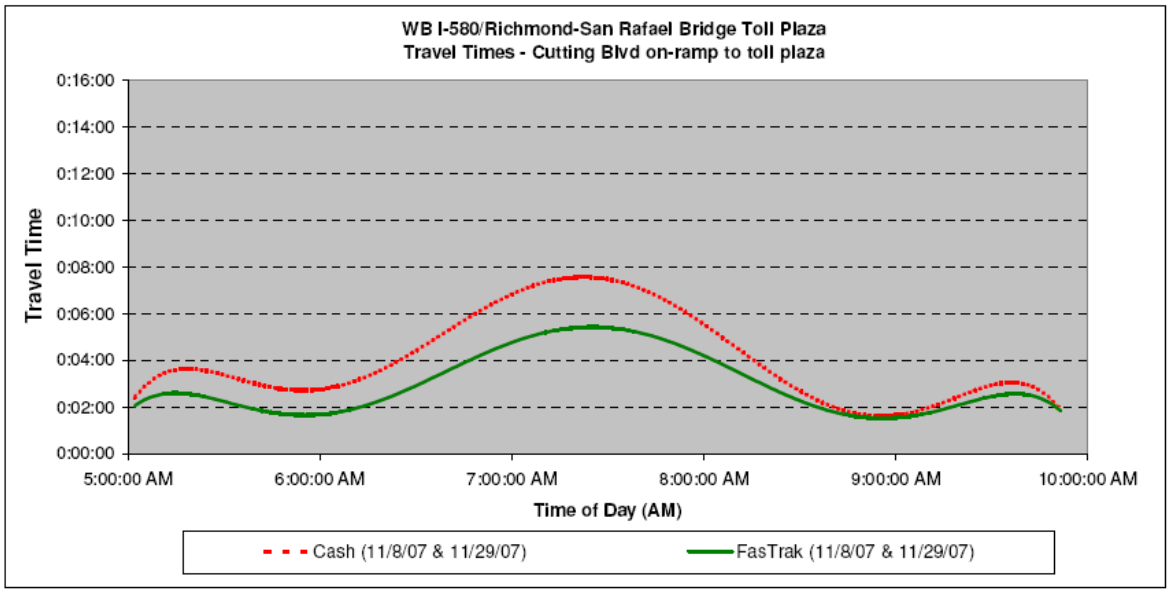
Table 3: Summary of Evaluation Criteria

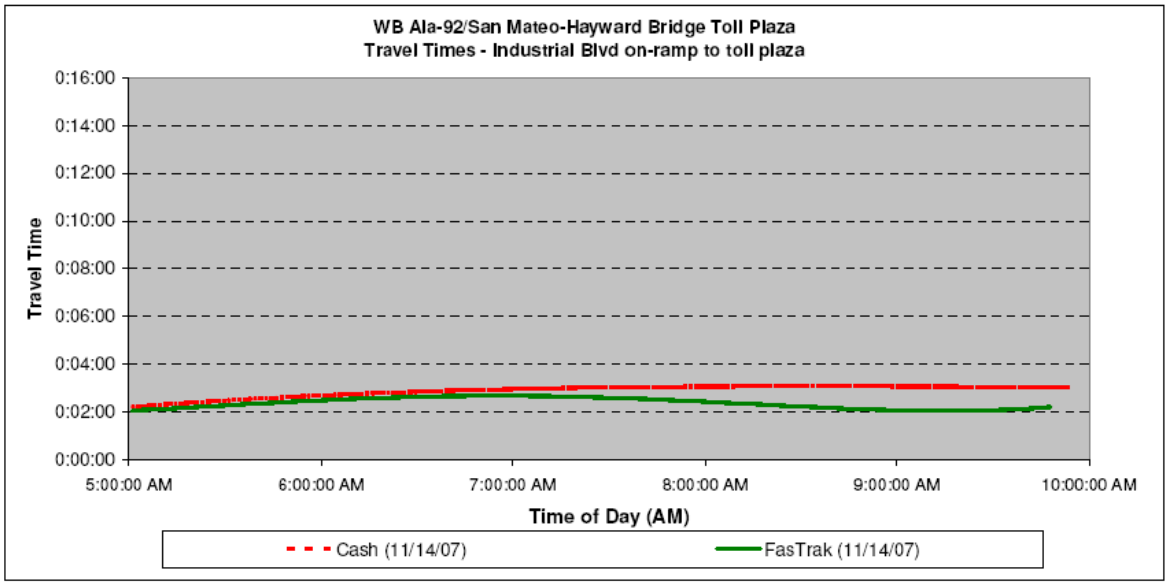
Appendix A: Travel Time Data






WB CA-84/Dumbarton Bridge Toll Plaza
Travel Times - Paseo Padre Pkwy/Thornton Ave exit sign
(just before the off-ramp) to toll plaza
Travel Time
0:06:00
0:05:00
0:04:00
0:03:00
0:02:00
0:01:00
0:00:00
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
Time of Day (AM)
Cash (7/15/08, 7/16/08)
FasTrak (7/15/08, 7/16/08)


WB I-580/Richmond-San Rafael Bridge Toll Plaza
Travel Times - Cutting Blvd on-ramp to toll plaza
Travel Time
0:16:00
0:14:00
0:12:00
0:10:00
0:08:00
0:06:00
0:04:00
0:02:00
0:00:00
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
Time of Day (AM)
Cash (11/8/07 & 11/29/07)
FasTrak (11/8/07 & 11/29/07)


WB Ala-92/San Mateo-Hayward Bridge Toll Plaza
Travel Times - Industrial Blvd on-ramp to toll plaza
Travel Time
0:16:00
0:14:00
0:12:00
0:10:00
0:08:00
0:06:00
0:04:00
0:02:00
0:00:00
5:00:00 AM
6:00:00 AM
7:00:00 AM
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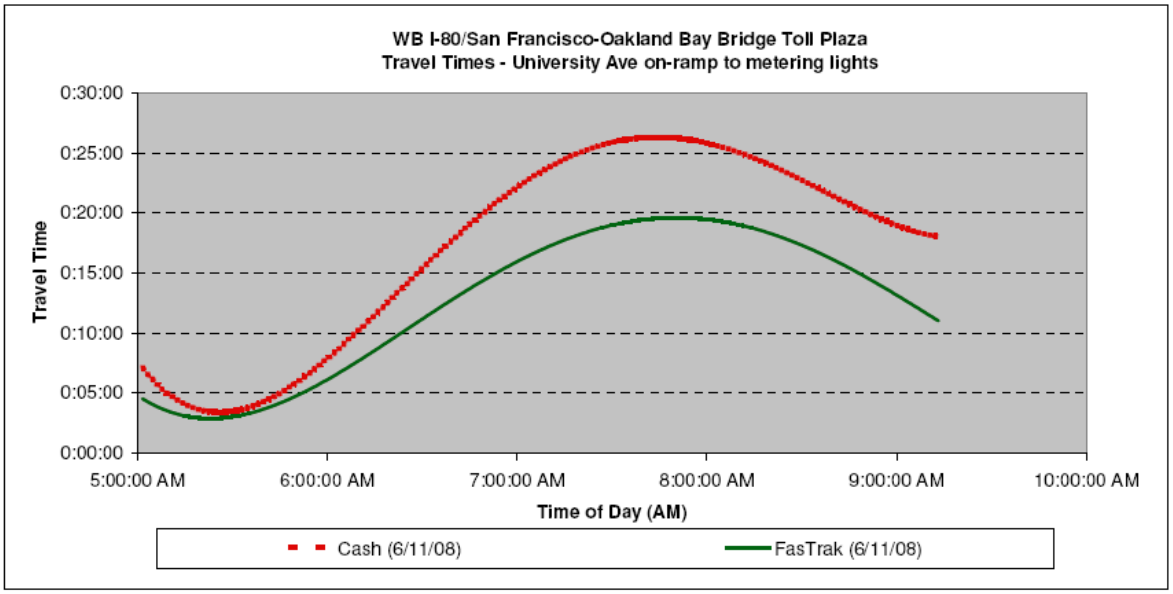
Time of Day (AM)
Cash (11/14/07)
FasTrak (11/14/07)


WB I-80/San Francisco-Oakland Bay Bridge Toll Plaza
Travel Times - University Ave on-ramp to metering lights
Travel Time
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0:25:00
0:20:00
0:15:00
0:10:00
0:05:00
0:00:00
5:00:00 AM
6:00:00 AM
7:00:00 AM
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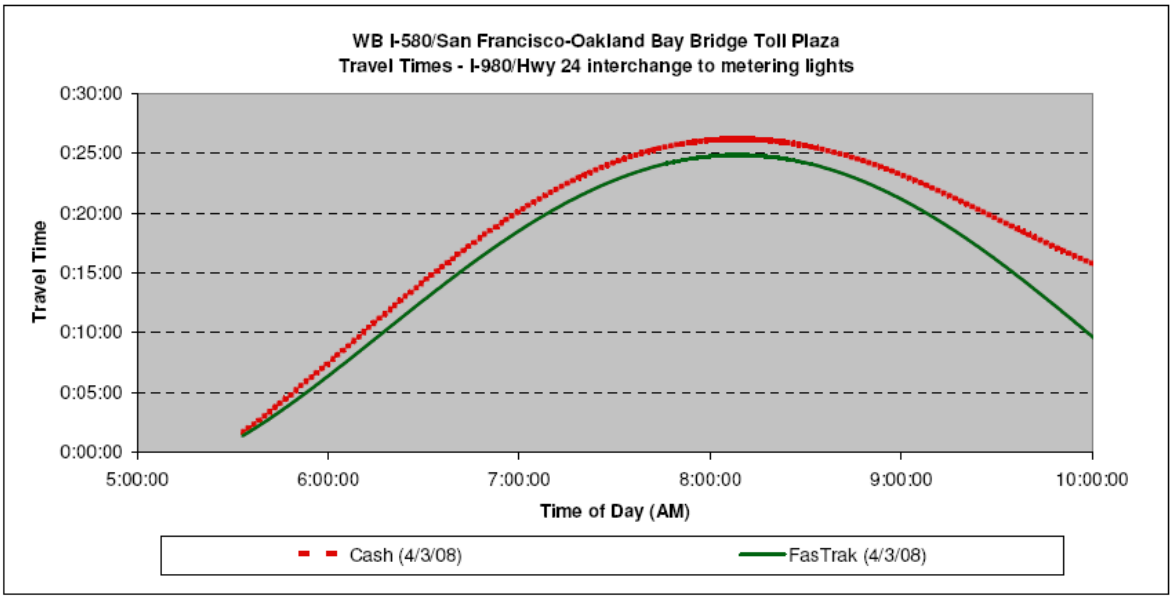
Time of Day (AM)
Cash (6/11/08)
FasTrak (6/11/08)


WB I-580/San Francisco-Oakland Bay Bridge Toll Plaza
Travel Times - I-980/Hwy 24 interchange to metering lights
Travel Time
0:30:00
0:25:00
0:20:00
0:15:00
0:10:00
0:05:00
0:00:00
5:00:00
6:00:00
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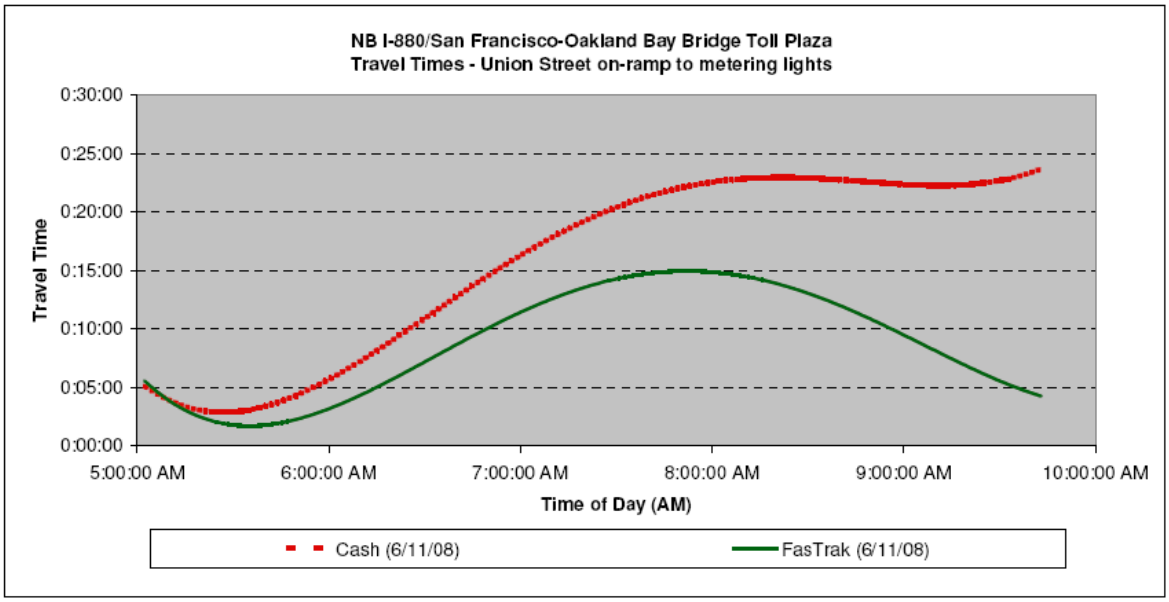
FasTrak (4/3/08)


NB I-880/San Francisco-Oakland Bay Bridge Toll Plaza
Travel Times - Union Street on-ramp to metering lights
Travel Time
0:30:00
0:25:00
0:20:00
0:15:00
0:10:00
0:05:00
0:00:00
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
Time of Day (AM)
Cash (6/11/08)
FasTrak (6/11/08)

BATA Video Tolling
Appendix B: Capacity Analysis

Bridge	Peak Period	Peak Hour	Peak Hour ETC Reserve Capacity	Peak Hour Approach Reserve Capacity
Antioch	3pm - 7pm	5:00 PM	79.24%	88.58%
Benicia-Martinez	3pm - 7pm	5:00 PM	27.80%	27.80%
Carquinez	3pm - 7pm	5:00 PM	38.51%	26.59%
Dumbarton	5am - 10am	8:00 AM	2.60%	-26.62%
Richmond-San Rafael	5am - 10am	8:00 AM	18.89%	10.78%
SFOBB (from I-80/I-580)	5am - 10am	10:00 AM	45.27%	24.75%
	3pm - 7pm	5:00 PM	43.43%	22.22%
SFOBB (from I-880)	5am - 10am	9:00 AM	67.85%	46.95%
	3pm - 7pm	5:00 PM	11.46%	41.90%
San Mateo-Hayward	5am - 10am	8:00 AM	0.82%	35.53%

Peak Period FasTrak Booths

Bridge	Peak Period	Nos. of FT Booths during Peak Period	Max Peak Period ETC booth capacity [b][c][d]
Antioch	3pm - 7pm	1	1,100
Benicia-Martinez (ORT)	3pm - 7pm	2	4,000
Carquinez	3pm - 7pm	3	3,300
Dumbarton [c]	5am - 10am	2	2,600
Richmond-San Rafael	5am - 10am	2	2,200
SFOBB (from I-80/I-580) [a]	5am - 10am	5	5,500
	3pm - 7pm	5	5,500
SFOBB (from I-880) [a]	5am - 10am	3	3,300
	3pm - 7pm	3	3,300
San Mateo-Hayward [c]	5am - 10am	2	2,600

Notes:
[a] For SFOBB, we typically report both AM & PM peak periods; however, the AM period is the true peak. There are 5 FT booths serving I-80/I-580, and 3 FT booths serving I-880. As such, each group of FT lar should be analyzed separately. See lane diagram.
http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf

[b] Max. ETC (Dedicated) toll booth capacity = 1100 vph typical
[c] Max. ETC (Dedicated) toll booth capacity = 1300 vph atypical
[d] Max. ETC (ORT) toll booth capacity = 2000 vph

Antioch Bridge						**Source of Info**
Toll Plaza Lanes						
Peak Period	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm		Peak Period FT Booths.xls (BATA)
Peak Lane Config	2 Cash, 1 ETC	2 Cash, 1 ETC	2 Cash, 1 ETC	2 Cash, 1 ETC		http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
ETC Lane Number(s)	Lane 3	Lane 3	Lane 3	Lane 3	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
Peak Period Rate per ETC Lane	883	883	883	883	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	4	4	4	4	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	2,145	2,145	2,145	2,145	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**3:00 PM**	**4:00 PM**	**5:00 PM**	**6:00 PM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	197	234	230	154	Tu, 4/1/08	mode_pay_ant_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	196	180	234	227	W, 4/2/08	mode_pay_ant_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	238	230	221	230	Th, 4/3/08	mode_pay_ant_hour….xls (BATA)
Average	**210**	**215**	**228**	**204**	Average	
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,100	1,100	veh/hr	
Number of ETC Lanes	1	1	1	1		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**1,100**	**1,100**	**1,100**	**1,100**		
Peak Hour ETC Capacity in Use	19.12%	19.52%	20.76%	18.52%		
Peak Hour ETC Reserve Capacity	**80.88%**	**80.48%**	**79.24%**	**81.48%**		
Peak Period ETC Capacity in Use	20.07%	20.07%	20.07%	20.07%		
Peak Period ETC Reserve Capacity	**79.93%**	**79.93%**	**79.93%**	**79.93%**		
Approach Roadway Lanes						
Approach Lane Config	1 Cash/HOV, 1 ETC	1 Cash/HOV, 1 ETC	1 Cash/HOV, 1 ETC	1 Cash/HOV, 1 ETC		http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	1	1	1	1	ETC approach lanes only	http://www.bayareafastrak.org/static/facilities/LaneDiagAntioch-final.pdf
Approach Capacity	2,000	2,000	2,000	2,000	veh/hr	
Peak Hour Approach Capacity in Use	10.52%	10.73%	11.42%	10.18%		
Peak Hour Approach Reserve Capacity	**89.48%**	**89.27%**	**88.58%**	**89.82%**		

Benicia-Martinez Bridge						Source of Info
Toll Plaza Lanes						
Peak Period	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm		Peak Period FT Booths.xls (BATA)
Peak Lane Config	9 Cash, 2 ETC, 1 HOV	9 Cash, 2 ETC, 1 HOV	9 Cash, 2 ETC, 1 HOV	9 Cash, 2 ETC, 1 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
ETC Lane Number(s)	Lanes 12 & 13	Lanes 12 & 13	Lanes 12 & 13	Lanes 12 & 13	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
Peak Period Rate per ETC Lane	9,815	9,815	9,815	9,815	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	4	4	4	4	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	17,575	17,575	17,575	17,575	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**3:00 PM**	**4:00 PM**	**5:00 PM**	**6:00 PM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,224	2,414	2,849	1,993	Tu, 4/1/08	mode_pay_ben_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,195	2,660	2,948	2,108	W, 4/2/08	mode_pay_ben_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,250	2,448	2,867	2,087	Th, 4/3/08	mode_pay_ben_hour….xls (BATA)
Average	**2,223**	**2,507**	**2,888**	**2,063**	Average	
Max Capacity Per ETC Lane (ORT)	2,000	2,000	2,000	2,000	veh/hr	
Number of ETC Lanes	2	2	2	2		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**4,000**	**4,000**	**4,000**	**4,000**		
Peak Hour ETC Capacity in Use	55.58%	62.68%	72.20%	51.57%		
Peak Hour ETC Reserve Capacity	**44.43%**	**37.32%**	**27.80%**	**48.43%**		
Peak Period ETC Capacity in Use	61.34%	61.34%	61.34%	61.34%		
Peak Period ETC Reserve Capacity	**38.66%**	**38.66%**	**38.66%**	**38.66%**		
Approach Roadway Lanes						
Approach Lane Config	2 Cash, 2 ETC/HOV	2 Cash, 2 ETC/HOV	2 Cash, 2 ETC/HOV	2 Cash, 2 ETC/HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	2	2	2	2		http://www.bayareafastrak.org/static/facilities/LaneDiagBenicia-Martin-final.pdf
Approach Capacity	4,000	4,000	4,000	4,000	veh/hr	
Peak Hour Approach Capacity in Use	55.58%	62.68%	72.20%	51.57%		
Peak Hour Approach Reserve Capacity	**44.43%**	**37.32%**	**27.80%**	**48.43%**		

Carquinez Bridge						**Source of Info**
Toll Plaza Lanes						
Peak Period	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm		Peak Period FT Booths.xls (BATA)
Peak Lane Config	7 Cash, 3 ETC, 1 HOV	7 Cash, 3 ETC, 1 HOV	7 Cash, 3 ETC, 1 HOV	7 Cash, 3 ETC, 1 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
ETC Lane Number(s)	Lanes 2, 3, & 4	Lanes 2, 3, & 4	Lanes 2, 3, & 4	Lanes 2, 3, & 4	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
Peak Period Rate per ETC Lane	7,439	7,439	7,439	7,439	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	4	4	4	4	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	17,995	17,995	17,995	17,995	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**3:00 PM**	**4:00 PM**	**5:00 PM**	**6:00 PM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,694	1,930	1,949	1,707	Tu, 4/1/08	mode_pay_car_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,982	1,968	2,053	1,642	W, 4/2/08	mode_pay_car_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,001	2,016	2,086	1,733	Th, 4/3/08	mode_pay_car_hour….xls (BATA)
Average	**1,892**	**1,971**	**2,029**	**1,694**	Average	
Peak Hourly HOV traffic	907	907	907	907		
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,100	1,100	veh/hr	
Number of ETC Lanes	3	3	3	3		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**3,300**	**3,300**	**3,300**	**3,300**		
Peak Hour ETC Capacity in Use	57.34%	59.74%	61.49%	51.33%		
Peak Hour ETC Reserve Capacity	**42.66%**	**40.26%**	**38.51%**	**48.67%**		
Peak Period ETC Capacity in Use	56.36%	56.36%	56.36%	56.36%		
Peak Period ETC Reserve Capacity	**43.64%**	**43.64%**	**43.64%**	**43.64%**		
Approach Roadway Lanes						
Approach Lane Config	2 Cash, 2 ETC/HOV	2 Cash, 2 ETC/HOV	2 Cash, 2 ETC/HOV	2 Cash, 2 ETC/HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	2	2	2	2		http://www.bayareafastrak.org/static/facilities/LaneDiagCarqBridg-final.pdf
Approach Capacity	4,000	4,000	4,000	4,000	veh/hr	
Peak Hour Approach Capacity in Use	69.98%	71.96%	73.41%	65.03%		
Peak Hour Approach Reserve Capacity	**30.02%**	**28.04%**	**26.59%**	**34.98%**		

Dumbarton Bridge							**Source of Info**
Toll Plaza Lanes							
Peak Period	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am		Peak Period FT Booths.xls (BATA)
Peak Lane Config	4 Cash, 2 ETC, 1 HOV	4 Cash, 2 ETC, 1 HOV	4 Cash, 2 ETC, 1 HOV	4 Cash, 2 ETC, 1 HOV	4 Cash, 2 ETC, 1 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
ETC Lane Number(s)	Lanes 5 & 6	Lanes 5 & 6	Lanes 5 & 6	Lanes 5 & 6	Lanes 5 & 6	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
Peak Period Rate per ETC Lane	9,520	9,520	9,520	9,520	9,520	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	5	5	5	5	5	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	19,104	19,104	19,104	19,104	19,104	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**6:00 AM**	**7:00 AM**	**8:00 AM**	**9:00 AM**	**10:00 AM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,606	2,529	2,625	1,885	949	Tu, 4/1/08	mode_pay_dum_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,495	2,374	2,610	1,903	930	W, 4/2/08	mode_pay_dum_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,500	2,464	2,362	1,823	1,016	Th, 4/3/08	mode_pay_dum_hour….xls (BATA)
Average	**1,534**	**2,456**	**2,532**	**1,870**	**965**	Average	
Max Capacity Per ETC Lane (Dedicated lanes)	1,300	1,300	1,300	1,300	1,300	veh/hr	
Number of ETC Lanes	2	2	2	2	2		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**2,600**	**2,600**	**2,600**	**2,600**	**2600**		
Peak Hour ETC Capacity in Use	58.99%	94.45%	97.40%	71.94%	37.12%		
Peak Hour ETC Reserve Capacity	**41.01%**	**5.55%**	**2.60%**	**28.06%**	**62.88%**		
Peak Period ETC Capacity in Use	73.23%	73.23%	73.23%	73.23%	73.23%		
Peak Period ETC Reserve Capacity	**26.77%**	**26.77%**	**26.77%**	**26.77%**	**26.77%**		
Approach Roadway Lanes							
Approach Lane Config	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV	2 Cash, 1 ETC, 1 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	1	1	1	1	1		http://www.bayareafastrak.org/static/facilities/LaneDiagDumbarton-final.pdf
Approach Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Peak Hour Approach Capacity in Use	76.68%	122.78%	126.62%	93.52%	48.25%		
Peak Hour Approach Reserve Capacity	**23.32%**	**-22.78%**	**-26.62%**	**6.48%**	**51.75%**		

Richmond-San Rafael Bridge							**Source of Info**
Toll Plaza Lanes							
Peak Period	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am		Peak Period FT Booths.xls (BATA)
Peak Lane Config	sh/HOV, 2 ETC, 1 closed	sh/HOV, 2 ETC, 1 closed	sh/HOV, 2 ETC, 1 closed	sh/HOV, 2 ETC, 1 closed	sh/HOV, 2 ETC, 1 closed		http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
ETC Lane Number(s)	Lanes 1 & 2	Lanes 1 & 2	Lanes 1 & 2	Lanes 1 & 2	Lanes 1 & 2	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
Peak Period Rate per ETC Lane	6,880	6,880	6,880	6,880	6,880	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	5	5	5	5	5	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	12,706	12,706	12,706	12,706	12,706	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**6:00 AM**	**7:00 AM**	**8:00 AM**	**9:00 AM**	**10:00 AM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,310	1,775	1,698	1,302	883	Tu, 4/1/08	mode_pay_rich_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,317	1,738	1,815	1,617	926	W, 4/2/08	mode_pay_rich_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,291	1,805	1,840	1,362	858	Th, 4/3/08	mode_pay_rich_hour….xls (BATA)
Average	**1,306**	**1,773**	**1,784**	**1,427**	**889**	Average	mode_pay_rich_hour….xls (BATA)
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,100	1,100	1,100	veh/hr	
Number of ETC Lanes	2	2	2	2	2		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**2,200**	**2,200**	**2,200**	**2,200**	**2,200**		
Peak Hour ETC Capacity in Use	59.36%	80.58%	81.11%	64.86%	40.41%		
Peak Hour ETC Reserve Capacity	**40.64%**	**19.42%**	**18.89%**	**35.14%**	**59.59%**		
Peak Period ETC Capacity in Use	62.55%	62.55%	62.55%	62.55%	62.55%		
Peak Period ETC Reserve Capacity	**37.45%**	**37.45%**	**37.45%**	**37.45%**	**37.45%**		
Approach Roadway Lanes							
Approach Lane Config	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC	2 Cash/HOV, 1 ETC		http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	1	1	1	1	1		http://www.bayareafastrak.org/static/facilities/LaneDiagRichmondSR-final.pdf
Approach Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Peak Hour Approach Capacity in Use	65.30%	88.63%	89.22%	71.35%	44.45%		
Peak Hour Approach Reserve Capacity	**34.70%**	**11.37%**	**10.78%**	**28.65%**	**55.55%**		

San Francisco-Oakland Bay Bridge							Source of Info
Toll Plaza Lanes							
	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am		Peak Period FT Booths.xls (BATA)
Peak Lane Config	10 Cash, 5 ETC, 2 HOV	10 Cash, 5 ETC, 2 HOV	10 Cash, 5 ETC, 2 HOV	10 Cash, 5 ETC, 2 HOV	10 Cash, 5 ETC, 2 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 7, 8, 9, 10 & 11	Lanes 7, 8, 9, 10 & 11	Lanes 7, 8, 9, 10 & 11	Lanes 7, 8, 9, 10 & 11	Lanes 7, 8, 9, 10 & 11	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Period Rate per ETC Lane	18,699	18,699	18,699	18,699	18,699	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	5	5	5	5	5	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	43,101	43,101	43,101	43,101	43,101	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**6:00 AM**	**7:00 AM**	**8:00 AM**	**9:00 AM**	**10:00 AM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	3,002	2,183	2,477	2,738	2,908	Tu, 4/1/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,635	2,452	2,636	2,810	2,854	W, 4/2/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,744	1,895	2,452	2,778	3,268	Th, 4/3/08	mode_pay_sfo_hour....xls (BATA)
Average	**2,794**	**2,177**	**2,522**	**2,775**	**3,010**	Average	
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,100	1,100	1,100	veh/hr	
Number of ETC Lanes	5	5	5	5	5		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**5,500**	**5,500**	**5,500**	**5,500**	**5,500**		
Peak Hour ETC Capacity in Use	50.79%	39.58%	45.85%	50.46%	54.73%		
Peak Hour ETC Reserve Capacity	**49.21%**	**60.42%**	**54.15%**	**49.54%**	**45.27%**		
Peak Period ETC Capacity in Use	68.00%	68.00%	68.00%	68.00%	68.00%		
Peak Period ETC Reserve Capacity	**32.00%**	**32.00%**	**32.00%**	**32.00%**	**32.00%**		
Approach Roadway Lanes							
Approach Lane Config	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	2	2	2	2	2		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Approach Capacity	4,000	4,000	4,000	4,000	4,000	veh/hr	
Peak Hour Approach Capacity in Use	69.84%	54.42%	63.04%	69.38%	75.25%		
Peak Hour Approach Reserve Capacity	**30.16%**	**45.58%**	**36.96%**	**30.62%**	**24.75%**		

San Francisco-Oakland Bay Bridge							Source of Info
Toll Plaza Lanes							
	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am		Peak Period FT Booths.xls (BATA)
Peak Lane Config	3 ETC & 2 HOV	3 ETC & 2 HOV	3 ETC & 2 HOV	3 ETC & 2 HOV	3 ETC & 2 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 18, 19 & 20	Lanes 18, 19 & 20	Lanes 18, 19 & 20	Lanes 18, 19 & 20	Lanes 18, 19 & 20	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Period Rate per ETC Lane	18,699	18,699	18,699	18,699	18,699	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	5	5	5	5	5	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	43,101	43,101	43,101	43,101	43,101	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**6:00 AM**	**7:00 AM**	**8:00 AM**	**9:00 AM**	**10:00 AM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,037	859	981	1,050	872	Tu, 4/1/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	993	984	985	1,024	823	W, 4/2/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	980	768	962	1,109	923	Th, 4/3/08	mode_pay_sfo_hour....xls (BATA)
Average	**1,003**	**870**	**976**	**1,061**	**873**	Average	
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,100	1,100	1,100	veh/hr	
Number of ETC Lanes	3	3	3	3	3		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**3,300**	**3,300**	**3,300**	**3,300**	**3,300**		
Peak Hour ETC Capacity in Use	30.40%	26.37%	29.58%	32.15%	26.44%		
Peak Hour ETC Reserve Capacity	**69.60%**	**73.63%**	**70.42%**	**67.85%**	**73.56%**		
Peak Period ETC Capacity in Use	113.33%	113.33%	113.33%	113.33%	113.33%		
Peak Period ETC Reserve Capacity	**-13.33%**	**-13.33%**	**-13.33%**	**-13.33%**	**-13.33%**		
Approach Roadway Lanes							
Approach Lane Config	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	1	1	1	1	1		http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Approach Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Peak Hour Approach Capacity in Use	50.17%	43.52%	48.80%	53.05%	43.63%		
Peak Hour Approach Reserve Capacity	**49.83%**	**56.48%**	**51.20%**	**46.95%**	**56.37%**		

San Francisco-Oakland Bay Bridge							Source of Info
Toll Plaza Lanes							
	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm			Peak Period FT Booths.xls (BATA)
Peak Lane Config	10 Cash, 5 ETC, 2 HOV	10 Cash, 5 ETC, 2 HOV	10 Cash, 5 ETC, 2 HOV	10 Cash, 5 ETC, 2 HOV			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 7, 8, 9, 10 & 11	Lanes 7, 8, 9, 10 & 11	Lanes 7, 8, 9, 10 & 11	Lanes 7, 8, 9, 10 & 11		<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Period Rate per ETC Lane	14,972	14,972	14,972	14,972		veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	4	4	4	4		hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	27,986	27,986	27,986	27,986		veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**3:00 PM**	**4:00 PM**	**5:00 PM**	**6:00 PM**			
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,355	2,627	3,026	2,635		Tu, 4/1/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,439	2,796	3,143	2,611		W, 4/2/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	2,406	2,823	3,165	2,582		Th, 4/3/08	mode_pay_sfo_hour....xls (BATA)
Average	**2,400**	**2,749**	**3,111**	**2,609**		Average	
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,100	1,100		veh/hr	
Number of ETC Lanes	5	5	5	5			Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**5,500**	**5,500**	**5,500**	**5,500**			
Peak Hour ETC Capacity in Use	43.64%	49.98%	56.57%	47.44%			
Peak Hour ETC Reserve Capacity	**56.36%**	**50.02%**	**43.43%**	**52.56%**			
Peak Period ETC Capacity in Use	42.53%	42.53%	42.53%	42.53%			
Peak Period ETC Reserve Capacity	**57.47%**	**57.47%**	**57.47%**	**57.47%**			
Approach Roadway Lanes							
Approach Lane Config	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000		veh/hr	
Number of Approach ETC Lanes	2	2	2	2			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Approach Capacity	4,000	4,000	4,000	4,000		veh/hr	
Peak Hour Approach Capacity in Use	60.00%	68.72%	77.78%	65.23%			
Peak Hour Approach Reserve Capacity	**40.00%**	**31.28%**	**22.22%**	**34.77%**			

San Francisco-Oakland Bay Bridge							Source of Info
Toll Plaza Lanes							
	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm	3 pm - 7 pm			Peak Period FT Booths.xls (BATA)
Peak Lane Config	3 ETC & 2 HOV	3 ETC & 2 HOV	3 ETC & 2 HOV	3 ETC & 2 HOV			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
ETC Lane Number(s)	Lanes 18, 19 & 20	Lanes 18, 19 & 20	Lanes 18, 19 & 20	Lanes 18, 19 & 20		<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Peak Period Rate per ETC Lane	18,699	18,699	18,699	18,699		veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	4	4	4	4		hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	43,101	43,101	43,101	43,101		veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**3:00 PM**	**4:00 PM**	**5:00 PM**	**6:00 PM**			
Peak Hourly Rate per ETC Lane (ETC+Viol)	835	1,059	1,220	933		Tu, 4/1/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	924	1,160	1,304	959		W, 4/2/08	mode_pay_sfo_hour....xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	884	1,143	962	979		Th, 4/3/08	mode_pay_sfo_hour....xls (BATA)
Average	**881**	**1,121**	**1,162**	**957**		Average	
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,100	1,100		veh/hr	
Number of ETC Lanes	3	3	3	3			Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**3,300**	**3,300**	**3,300**	**3,300**			
Peak Hour ETC Capacity in Use	26.70%	33.96%	35.21%	29.00%			
Peak Hour ETC Reserve Capacity	**73.30%**	**66.04%**	**64.79%**	**71.00%**			
Peak Period ETC Capacity in Use	88.54%	88.54%	88.54%	88.54%			
Peak Period ETC Reserve Capacity	**11.46%**	**11.46%**	**11.46%**	**11.46%**			
Approach Roadway Lanes							
Approach Lane Config	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000		veh/hr	
Number of Approach ETC Lanes	1	1	1	1			http://www.bayareafastrak.org/static/facilities/LaneDiagSF-Oak-final.pdf
Approach Capacity	2,000	2,000	2,000	2,000		veh/hr	
Peak Hour Approach Capacity in Use	44.05%	56.03%	58.10%	47.85%			
Peak Hour Approach Reserve Capacity	**55.95%**	**43.97%**	**41.90%**	**52.15%**			

San Mateo-Hayward Bridge							**Source of Info**
Toll Plaza Lanes							
Peak Period	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am	5 am - 10 am		Peak Period FT Booths.xls (BATA)
Peak Lane Config	5 Cash, 3 ETC, 2 HOV	5 Cash, 3 ETC, 2 HOV	5 Cash, 3 ETC, 2 HOV	5 Cash, 3 ETC, 2 HOV	5 Cash, 3 ETC, 2 HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
ETC Lane Number(s)	Lanes 3 & 4	Lanes 3 & 4	Lanes 3 & 4	Lanes 3 & 4	Lanes 3 & 4	<pic + peak hr data>	http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
Peak Period Rate per ETC Lane	9,611	9,611	9,611	9,611	9,611	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Period Duration	5	5	5	5	5	hrs	Peak Period FT Booths.xls (BATA)
Peak Period Total Traffic	19,413	19,413	19,413	19,413	19,413	veh/pp, Tu 4/1/2008	Weekly ETC Usage.xls (BATA)
Peak Hour	**6:00 AM**	**7:00 AM**	**8:00 AM**	**9:00 AM**	**10:00 AM**		
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,535	2,494	2,483	1,909	792	Tu, 4/1/08	mode_pay_smo_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,857	2,400	2,605	2,050	718	W, 4/2/08	mode_pay_smo_hour….xls (BATA)
Peak Hourly Rate per ETC Lane (ETC+Viol)	1,903	2,458	2,648	2,074	780	Th, 4/3/08	mode_pay_smo_hour….xls (BATA)
Average	**1,765**	**2,451**	**2,579**	**2,011**	**763**	Average	
Max Capacity Per ETC Lane (Dedicated lanes)	1,100	1,100	1,300	1,100	1,100	veh/hr	
Number of ETC Lanes	2	2	2	2	2		Peak Period FT Booths.xls (BATA)
Total ETC Capacity	**2,200**	**2,200**	**2,600**	**2,200**	**2,200**		
Peak Hour ETC Capacity in Use	80.23%	111.39%	99.18%	91.41%	34.70%		
Peak Hour ETC Reserve Capacity	**19.77%**	**-11.39%**	**0.82%**	**8.59%**	**65.30%**		
Peak Period ETC Capacity in Use	87.37%	87.37%	73.93%	87.37%	87.37%		
Peak Period ETC Reserve Capacity	**12.63%**	**12.63%**	**26.07%**	**12.63%**	**12.63%**		
Approach Roadway Lanes							
Approach Lane Config	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV	2 Cash, 3 ETC/HOV		http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
Std Lane Capacity	2,000	2,000	2,000	2,000	2,000	veh/hr	
Number of Approach ETC Lanes	2	2	2	2	2		http://www.bayareafastrak.org/static/facilities/LaneDiagSanMat-Hayw-final.pdf
Approach Capacity	4,000	4,000	4,000	4,000	4,000	veh/hr	
Peak Hour Approach Capacity in Use	44.13%	61.27%	64.47%	50.28%	19.08%		
Peak Hour Approach Reserve Capacity	**55.88%**	**38.73%**	**35.53%**	**49.73%**	**80.92%**		

ATTACHMENT I:

Implementation Plan

IMPLEMENTATION PLAN

BATA/GGB Video Tolling Demonstration Project

Final DRAFT

January 21, 2011

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1. Introduction

The Bay Area Toll Authority (BATA) and the Golden Gate Bridge District (GGB), along with their Regional Customer Service Center (RCSC) systems and operations provider, ACS, and consultants PBS&J and Traffic Technologies, Inc. (TTI), are currently working together to complete a Video Tolling (VT) Demonstration project. This effort was initiated by BATA as part of a Traffic Congestion Relief Program (TCRP) project, and will soon be implemented as a short-term (3-month) demonstration on the Golden Gate Bridge.

Key project team members with involvement in the Demo implementation include:

- Linda Lee, BATA Project Manager
- Beth Zelinski, BATA
- David Dick, GGB
- Karen Caruso, ACS
- Tim Morrison, ACS
- Regina Briseno, ACS
- Mayur Jain, ACS
- Mei-Lin Demaree, ACS
- Julie Dillard, PBS&J
- Jessica Handcock, TTI
- Cristina Dos Santos, PBS&J
- Samantha Soules, PBS&J

This Implementation Plan for the BATA / GGB VT demonstration project has been developed as a tool for reaching consensus and documenting decisions and agreements reached by the project team. The Implementation Plan will be updated as the project progresses, and will be followed throughout preparation, deployment, and monitoring efforts.

1.1. Demonstration Objectives

The objective of the project is to study the feasibility of implementing video tolling, which includes charging tolls by reading license plates, and collecting post-payments by credit cards or billing motorists by mail, rather than the current system of payment at a toll plaza. Implementation of such a system could alleviate congestion and traffic delays at bridge toll plazas. To measure the objective, project criteria will be analyzed to determine impacts of video tolling on traffic operations, toll systems, customer service center operations and customer acceptance. Evaluation criteria are further detailed in **Appendix A**.

1.2. Implementation Schedule

Key activities, milestones and dates are shown on the project schedule in **Appendix B**. It illustrates the general activities necessary to deploy the Video Tolling Demo. Although this schedule will be used within the context of this document to reach consensus, it will also be maintained and updated throughout project implementation as circumstances change. As shown in the schedule, the demonstration is set to Go Live on February 1, 2011.

2. Demo Participant Requirements

This section details the requirements for the selection and preparation of participants to be involved in the Video Tolling (VT) Demonstration project.

2.1. Participant Screening

GGB will develop a list of potential participants and enlist participation according to frequency of southbound travel on the Golden Gate Bridge. GGB will aim to recruit approximately 100 participants meeting the following criteria:

- GGB, BATA, TTI, PBS&J, or ACS employee.
- Willing to comply with all terms of the demo (e.g. allow ACS to remove license plate from FasTrak account as necessary, complete a bi-weekly survey).
- Able to specify one vehicle to be used for the demonstration.
- Preferred participants would be the only person who drives the specified vehicle. Friends and family members driving the vehicle during the demo period must either use a FasTrak transponder or stop to pay cash, as usual, when crossing either the GGB or any BATA bridge.

The majority of the participants will be GGB personnel, but the group will likely include some BATA, TTI, PBS&J, or ACS employees. GGB began screening participants in October 2010 and will provide ACS with a final list of selected participants, as well as participant group assignments, by January 25, 2011.

2.2. Participant Groups & Scenarios

In order to demonstrate new account scenarios, the demo participants will be divided into 7 groups, as described below. Each participant will receive his or her instructions via email in the last week of January. Additionally, email reminders will be sent to those participants asked to convert an account at certain times during the demo. As the exact number of participants is not yet known, the size of each group is indicated as a percentage of all participants.

Group 1 (20%): This group will be instructed to go online and create a Pay-by-Plate (VT) account on Monday, January 31st, or BEFORE crossing the bridge for the first time in the demo period. These participants will use the GGB credit card information provided by the GGB Coordinator and maintain the Pay-by-Plate account (no additional action should be required) throughout the demo period.

Group 2 (10%): This group will be instructed to go online and create a Pay-by-Plate account by the second full calendar day AFTER crossing the bridge for the first time in the demo period. These participants will use the GGB credit card information provided by the GGB Coordinator and maintain the Pay-by-Plate account (no additional action should be required) throughout the demo period.

Group 3 (10%): This group will be instructed to go online and create a Pay-by-Plate account ON the third full calendar day AFTER crossing the bridge for the first time in the demo period. These participants will use the GGB credit card information provided by the GGB Coordinator and

maintain the Pay-by-Plate account (no additional action should be required) throughout the demo period.

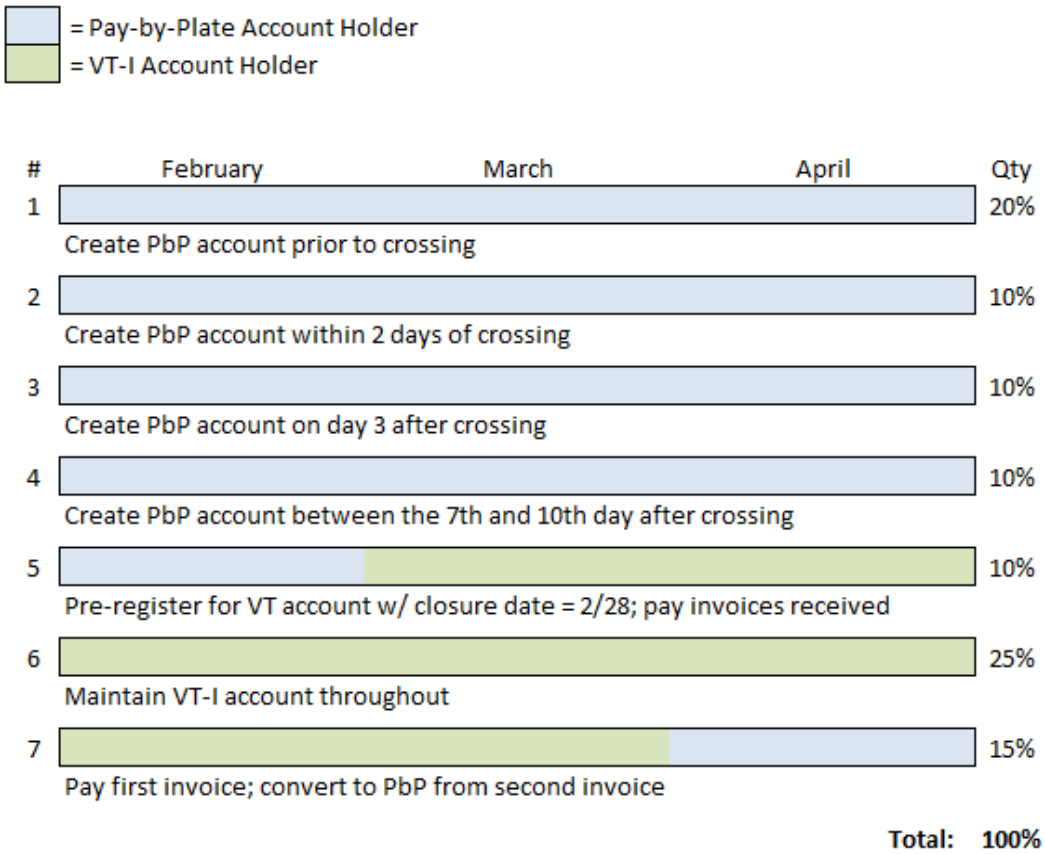
Group 4 (10%): This group will be instructed to go online and create a Pay-by-Plate account between the 7th and 10th full calendar day AFTER crossing the bridge for the first time in the demo period. These participants will use the GGB credit card information provided by the GGB Coordinator and maintain the Pay-by-Plate account throughout the demo period. It is expected that this group will receive an invoice for the first toll, as well as any other tolls accumulated prior to creation of the Pay-by-Plate account. They should pay this invoice using the same GGB credit card.

Group 5 (10%): This group will be instructed to go online and create a Pay-by-Plate account on Monday, January 31st, or BEFORE crossing the bridge for the first time in the demo period. These participants will use the GGB credit card information provided by the GGB Coordinator and indicate 2/28/2011 as the 'Account Closure Date' upon registration. This group should receive invoices for any tolls incurred after 2/28/2011; and they should pay them using the same GGB credit card.

Group 6 (25%): This group (VT-I) will be instructed to take NO action other than crossing the bridge without presenting an employee ID throughout the demo period. These participants will use the GGB credit card information provided by the GGB Coordinator to pay all invoices received prior to each invoice due date.

Group 7 (15%): This group will be instructed to cross the bridge without presenting an employee ID. These participants will use the GGB credit card information provided by the GGB Coordinator to pay the first invoice received prior to its due date. When a second invoice is received, each participant in this group should go online and convert their account to a Pay-by-Plate account, using the same GGB credit card.

All conversions should follow the rules laid out in the *VT & VT-I Acct Conversion Business Rules* document. The illustration below shows the account status for each group throughout the demonstration timeline. Note that participants will cross the bridge for the first time on different dates, so it is expected that there will be some variation in the specific account stages for different members of any group.



2.3. Method of Payment / Credit Card

GGB will use one District credit card for all GGB participant toll payments. The GGB Coordinator is coordinating with GGB Accounting to acquire a credit card and set transaction limits. Accounting will ensure that both the credit card processor and the provider will support this payment scheme without flagging or disabling the card due to any fraud protection trigger. All non-GGB participants must provide their own method of payment for tolls.

2.4. Special Scenarios

Some members of the project team will be instructed to test additional, special scenarios. For example, the cases in which a Pay-by-Plate account holder's credit card either is about to expire or declines on processing should be tested to ensure that the appropriate correspondence is initiated. Additionally, it will be necessary to test that multiple vehicles can be associated to a single Pay-by-Plate account—and that when this account is converted to FasTrak, all associated vehicles carry over to the new account. The complete list of additional scenarios is included in a separate document. The GGB Coordinator will work on an individual basis with those participants selected to test these scenarios.

In addition, one demo participant will have a credit card on his account that will expire. The credit card is going to expire in February 2011. For a credit card expiration letter to be mailed/picked up in the process, the account will need to be opened before February 4, 2011. The expiration letters are generated on the 5th of each month.

2.5. Participant License Plate List

GGB will provide a final list of all participant license plates, as well as email and vehicle registration addresses (for mass communications), to ACS by January 14, 2011. The intention is to determine which participants' indicated mailing addresses match those returned by the DMV lookup process to be performed by ACS. GGB will include participants who do not have a current vehicle registration address on file with the DMV in participant groups that will not receive any invoices during the demonstration.

ACS will also check the participant license plate numbers against existing FasTrak accounts. ACS will remove the license plate number to be used from each demo participant's FasTrak account prior to the demo period; ACS will add these back to the participant accounts at the conclusion of the demo.

ACS has confirmed that they can perform a DMV lookup for a list of plates, using the standard process, prior to the demonstration. The results of this lookup will be returned to GGB by January 21, 2011.

2.6. Current FasTrak Customers Participating in Demo

Those demo participants who are FasTrak account holders will be required to remove their transponder from their vehicle or put it in a Mylar bag when crossing the Golden Gate Bridge and must allow ACS to remove the license plates to be used during the demonstration from each participant's FasTrak account.

Participants with FasTrak accounts will be reminded that they must either un-bag their transponders or pay cash any time they travel across a BATA bridge. And friends or family members driving the demo vehicle must either use a FasTrak transponder or stop to pay cash when crossing either the GGB or any BATA bridge. Since participants' license plates have been removed from their FasTrak accounts, failure to follow these guidelines may result in participants receiving violation notices. Any participant receiving a violation notice for this reason should give the notice to the GGB Coordinator for handling. GGB will ensure that violation penalties are waived and that toll payments are either paid by the participant (if on a BATA bridge) or dismissed (if on GGB).

2.7. Video Toll Rate

The rate schedule to be used for the demonstration period includes the current cash rate and violation penalty, as indicated below:

VT: $6.00 toll

VT-I: $6.00 toll + $1 invoice fee

Violation* (unpaid VT-I invoice): $6.00 toll (per transaction) + $25.00 violation penalty (per transaction) + $1 invoice fee

*Note that GGB will work with participants and the FasTrak CSC to waive all violation penalties assessed as part of this demonstration project. If the violation was received by a GGB employee on the Golden Gate Bridge, the toll will also be dismissed. Otherwise, GGB will ensure that the toll is paid by the participant (for example, if the violation was on a BATA bridge or was received on any bridge by a non-GGB employee).

3. Pre-Demo Testing

3.1. Internal Testing

Test scripts have been developed for both VT and VT-I testing. Each scenario will be tested to validate the functionality of the module. The test scripts were based on the business rules of the program.

The ACS internal testing will be completed through the ACS Quality Assurance team in the ACS test environment. Test results will be distributed to BATA/GGB when they are finalized for each module. The testing schedule has been developed and distributed.

3.2. Test Environment

3.2.1. Networking/Communications

All testing is done in the test environment located in the software development center. There is a connection from the RCSC to the test environment. No outside connections will be allowed due to security provisions.

3.2.2. Isolation from Production

The Vector test environment is a standalone machine located in the development team's office in Germantown, Maryland. There is no connection to the production environment located in the San Francisco RCSC. The current version of Vector with the VT programming is on this machine along with a test web host. The only access to this machine is within the ACS RCSC.

3.3. VT Testing

The initial VT test scripts were sent to BATA after an ACS internal review on 9/1/2010 divided into the following categories: VT Violation, Account Maintenance, Find Account, Account History and Transactions. Comments for the initial test scripts were then sent from BATA to ACS on 10/21/2010, and the final responses were sent from ACS to BATA on 11/8/2010.

The complete VT test scripts and test results were sent to BATA after an ACS internal review on 11/10/2010. BATA reviewed the following test result categories: Convert from VT to FT, Rebill Post Processor, Close Inactive Account, Customer Statements, Transaction Reconciliation, Web Account Establishment, Web Account Maintenance, Web Account Establishment CSR, Account Maintenance, Account History and Reports. Final VT Test Results with ACS comments were sent 1/14/2011.

BATA and GGB completed an initial hands-on web testing after an ACS internal review at the RCSC using the test system connection on 11/16/2010, and was available for testing from 11/15/2010 through 11/25/2010. The following functionality was available for web testing: registration, conversion to FasTrak, adding and removing a license plate, reviewing static and dynamic web pages. Final web testing by BATA was completed on 1/14/2011.

3.4. VT-I Testing

The VT-I test scripts were sent to BATA after an ACS internal review on 11/19/2010 divided into the following categories: VT-I Close Inactive Account, Violations – View Notice Invoices , Invoice – View Invoices, Invoice Disputes, Invoices – Transfer of Responsibility, Invoices – Find Transaction, Notice/Invoice Dismissal, Invoice TOR, Notice/Invoice Batch Check Payment, Violation Insertion and LICA Processing, VT-I LICA, VT-I DMV Response, Invoices Generation, Notice Escalation, Notice Escalation – DMV Hold – Collection, VT-I Web Violation Testing, and Partial Payments. BATA and GGB completed the hands-on web testing after an ACS internal review at the RCSC using the test system connection on 12/9/2010, and was available for testing from 12/6/2010 through 12/10/2010. The following functionality was available for web testing: Payments, Disputes Conversion from VT-I to VT and VT-I to FasTrak, Partial Payments, and adding a plate to a VT or FasTrak account. Final VT-I Test Results with ACS comments were sent 1/10/2011. Final VT-I web testing by BATA was completed on 1/14/2011.

3.5. System Changes

All changes will be evaluated on an as-needed basis and prioritized in accordance with the ongoing schedule and time available. Any required fixes / updates will be applied and re-tested once testing is complete. However, all testing must be completed and approved by BATA by January 10, 2011 to meet the February 1, 2011 go-live date (7 to 10 business day staging / migration required before 2/1/2011). Any post go-live testing will be completed on the production system and may affect the active accounts. Any changes requested during post-production implementation will need to go through the SDLC process subject to negotiation of contractual terms between BATA and ACS.

4. Demo Deployment

4.1. Preparation

Other activities necessary to prepare for demo deployment will proceed in parallel with pre-demonstration testing activities.

4.2. Demo Participant Communication

Once demo participants have been selected, project objectives, planned activities, and expectations will need to be communicated to them. This will occur through a series of planned efforts prior to and during the demo.

Since the majority of demo participants are expected to be GGB employees, the GGB Coordinator will serve as the primary point of contact for participant communication. GGB or TTI personnel reporting to the GGB Coordinator will lead efforts to inform and coordinate participants, take calls and respond to issues raised by participants, and ensure that pertinent information is documented and shared for demo evaluation.

Those participants not employed by GGB will be project team members or others closely associated and well-informed about the project. As a result, they will generally be informed about project direction and have an opportunity to discuss any issues they see during team discussions.

Participant communication activities will include:

- Demo Participant Kickoff Meetings – These will be held one month prior to Demo Go Live, and will serve as a forum to:
    - Introduce the project team and the points of contact they should use during the demo
    - Inform participants about project objectives, benefits, activities, and expectations
    - Document full participant and vehicle information for communication and filtering purposes
    - Solicit current participant trip information and opinions for use in establishing a baseline

- Written (email) and verbal communications with participants
    - Instruction
    - As needed to:
        - Complete demo preparation
        - Remind participants about Go Live and other project key dates and activities
    - Mass email communications may be issued by ACS, particularly with regard to systems
    - Individual or small group communications will be done by GGB / TTI staff

- Participant Wrap-up Activities, possibly including:
    - A Wrap-Up Meeting
    - A demo participant survey, either online or via a form

In addition to the above, participants will be asked to communicate the following in support of the project:

- Issues and questions to their GGB / TTI points of contact, either via email or verbally
    - GGB / TTI points of contact will ensure that participant communications are documented and shared

- Bi-weekly surveys
    - Conducted through a web tool; hardcopy surveys will be made available to participants without internet access
    - Record activities of customers, including confirmation that instructions have been followed
    - Identify and record issues with systems, website, bills or demo communications
    - Gather feedback on the customer experience

- Focus Groups at the end of Demo

4.3. Customer Service Center (CSC) Coordination

4.3.1. Customer Service Rep Awareness

The current web and IVR will operate as normal for all regular FasTrak account holders and violators. CSRs will be trained on the overall video tolling demo/process and training information will be developed before January 2011. This will essentially include a training memorandum that contains summary-level information about the demonstration and provide instructions to CSRs. It is not

anticipated that the CSRs will be handling any calls related to the demonstration project, since demo participants will be given strict instructions to not call the FasTrak Customer Service Center for any reason during the demonstration period.

All customer calls will be routed to the points of contact identified within the CSC. There will be communication between GGB and RCSC as to any issues that may arise during the Demo.

4.3.2. CSC Systems

The Video Toll Demo will be conducted on the production system. BATA will have to approve all test results for the software code to be staged to go into production.

Two weeks prior to the Demo go-live, the software code will be released to production. The release will be as normal operating procedures:

1. The date will be identified;
2. The code is staged; and
3. On the date of the release, ACS performs an operational regression testing that consists of gathering production work batches for the testing team to process after the code has been released. This step is taken to ensure normal Vector functionality is in place and operational.

The general public will not have access to the Demo systems from the FasTrak website. All access will be through an unpublished URL that will be provided to Demo participants only, along with a username and password for exclusive access.

4.4. "Go Live" Day

Moving from testing into actual Demo operation will involve a cutover from the current production BATA / GGB FasTrak operation to the inclusion of the Video Tolling Demo functionality. This cutover will need to take place within a short timeframe, to avoid impacting current FasTrak customers. This section describes the effort necessary to make that cutover, including any systems access modifications, and a contingency plan for use in the event of an unexpected issue.

4.5. Cutover and Contingency Plan

The system code is expected to go into production on February 1, 2011. There will be two decision points for a go/no go decision. Below reviews these points in time:

Cutover night:
Normal preparation will be conducted to ensure that Vector has existing functionality the night of the turn-over. There will be a designated team in place to process all functionality to ensure there are no issues with Vector's performance. If there are issues with Vector, they will be reported and escalated as necessary. If Vector is not functioning and the issues are severe, then a decision will be made to roll back the code.

First Week of Production:

During the first week of production, the system will be monitored closely. Any and all issues will be reported and escalated as necessary. If the issues result in Vector functioning improperly, then a decision will need to be made to either disable or resolve the issue based on the severity.

The escalation:

1. Internal Notification – this will be used to assess the issue and determine the severity.
    a. Points of Contact:
        i. Development – Mayur Jain
        ii. RCSC – Timothy Morrison, Regina Briseno & Mei-lin Demaree
2. External Notification – If the problem is being reported to BATA, the issue will be defined and explained. The course of action to take will depend on the actual issue.
    a. Points of Contact:
        i. BATA – Linda Lee or Beth Zelinski
        ii. GGB – David Dick

4.6. Systems Access

In order to use actual toll bridge transaction data for the VT demo, the project has to run on the current production environment already supporting the FasTrak program. As a result, it is necessary to secure demo components and functions and isolate them from the FasTrak components already in use by the public, or by the RCSC in support of the public.

As described in the VT Demo design documents created by ACS, a separate set of web pages for use by demo participants will be deployed. Because they will be accessible from the public internet, these pages will be secured, and a demo-specific URL, login, and username/password will be provided to participants. This username/password may be reset periodically to ensure a controlled demonstration, with new passwords provided to participants via mass email.

The Demo website security will need to be accessible to:

- Demo Participants only, as “customers”
- Project team members, as customers and/or read only for reporting / monitoring purposes (where applicable)
- GGB / TTI support points of contact, for participant support
- CSR’s and RCSC management, if determined to be needed by ACS
- ACS Systems administrators

In addition, Vector Online will be modified for the VT Demo. As a result, security modifications may also be needed.

- Vector is already fully accessible by CSR’s, RCSC management, and systems administrators. No changes will be needed unless new features are added that are needed by ACS and are not accessible within the existing security framework.
- Some Vector features are also accessible in read only mode to key BATA and GGB staff. Changes

will only be needed if new VT features or reports are not accessible within the existing security framework.

Systems security modifications will be set by ACS as part of systems preparation activities, and last-minute changes to activate the secured access will be enabled by ACS just prior to Go Live.

5. Demo Operation / Monitoring

Immediately upon activation of the system on Go Live day, activities necessary to operate, monitor, and support the VT Demo will need to commence.

5.1. RCSC / Back Office

Within the RCSC / back office, ACS personnel will have several key roles in support of the VT Demo. These roles will not include significant interactions with demo participants, but will be necessary to ensure that VT-related systems are operating correctly.

ACS' primary role once Demo functionality is successfully deployed will be systems monitoring and administration. It will be important initially, and periodically throughout the demo, to watch both the new VT and existing FasTrak functionality, ensuring that neither is experiencing any negative or unexpected impacts.

ACS will also provide data to the Demo project team as specified in the Evaluation Criteria (Appendix A). Because Demo participant support will be performed and reported on by GGB, ACS will not provide significant customer-related information, with the exception of website usage. However, access to participant account information may be needed by BATA/GGB staff in order to track and report on Demo trends. This data/information will be provided to PBS&J, who will monitor and analyze the outputs of the demonstration and provide feedback to ACS as necessary.

5.2. Demo Agency/Facility Support

This section outlines the participant support procedures to be followed by GGB during the demonstration.

5.2.1. Participant Coordination

After all participants have been identified, GGB will create an email distribution list, including all participants, for mass communications. The GGB Coordinator will place each participant in a group, as outlined in the Demo Participant Requirements section of this document. A participant database will be created to track and monitor the participants, their respective group assignments, contact information, and other relevant information. The database will be managed by the GGB Coordinator.

Prior to the demonstration period, the GGB Coordinator will develop group-specific instructions which will be sent via email in the last week of January. The GGB Coordinator will follow up with email communications as necessary to ensure participants follow instructions, such as converting accounts, within the specified period of time. Conversions will only be done via the web.

5.2.2. Participant Feedback

Demo participants will be asked to complete a short survey on a biweekly basis. The survey will gather feedback throughout the demo period on the participant's experience, actions, and reactions to the program. The survey is intended to supplement data in the RCSC system (dates of invoices and payments, transaction history, etc.) and the survey questions will be brief and direct. Additionally, the survey format will allow participants to supplement their responses with specific comments and concerns. The GGB Coordinator will send an email reminding participants to complete the biweekly survey. Links to the interactive survey will be distributed every other week, beginning on February 14th, and participants will be asked to complete the survey by close of business on the following Monday.

Within the biweekly survey, participants will be asked to indicate any issues encountered. Email and/or phone communication with GGB should capture all relevant issues that participants encounter during the demonstration.

The Demo Project Team will have shared access to the online survey results in real-time to track which participants are not completing survey.

Participants will be instructed to turn over any violation notices received to the GGB Coordinator for processing. The GGB Coordinator will work with the CSC to ensure that violation penalties are waived and that toll payments are either paid by the participant (if on a BATA bridge) or dismissed (if on GGB).

The GGB Coordinator will monitor survey responses and issues, as well as document and share all associated feedback information for analysis. Routine monitoring is required to determine whether the system is behaving as expected and whether all business processes are functioning correctly.

5.2.3. Questions/Support

Participants are encouraged to contact the GGB Coordinator via email with any questions, concerns, or other feedback at any time during the demo. Participants will be instructed NOT to contact the FasTrak Customer Service Center directly with any questions or concerns during this period.

The GGB Coordinator will respond to participant communications within 48 hours—and as soon as possible for urgent issues. The GGB Coordinator will maintain a log of all participant communication, issues, and resolutions; and this feedback will inform both the demo evaluation process and the final report.

5.2.4. Account Conversion

Conversion planning will be developed further as the demonstration approaches. The GGB Coordinator will work with the CSC on any problems that arise should a demo participant encounter any problems during the account conversion processes. Participants will be instructed NOT to contact the Customer Service Center directly with any issues related to account conversion. Participants will be instructed to contact the GGB Coordinator right away if they are unable to create or convert an account during the period in which they are instructed to do so.

6. Oversight / Monitoring / Reporting

6.1.1. Demonstration Monitoring & Oversight

Upon the Go Live date, the Demo project team will utilize system access and reports provided by ACS to monitor the systems and operations of the demonstration. General systems and operations monitoring will be performed in three (3) categories identified below:

Validation & Verification
This category includes items that were successfully tested. For systems, test scenarios are revisited in the production environment for validation, operational processes are reviewed for concurrence with the implementation plan (participant communications, call center activity), and participation standards are verified.

Exception
This category includes items that fall outside the parameters dictated in the initial demo preparation and testing. Not necessarily an indication of the demonstration metrics not being met, an exception identifies additional parameters that may be considered in a full deployment or elements that are recommended for further thought and discussion.

Issue Identification
This category captures the areas in which the demonstration was unsuccessful. Any component identified will require analysis for resolution. Resolution may take place during the demonstration, giving this category priority during the 90-day demonstration. Each issue will be measured to determine its priority using the following criteria:

- Impact to demonstration project
- Impact to full deployment
- Impact to demonstration criteria
- Impact to participants

Inputs to these categories will come from all aspects of the demonstration project. To streamline future analysis, a log may be developed to quantify and qualify each item monitored throughout the demonstration. Below is an example of how items will be tracked through the project, although the actual log will be modified to accommodate for information that is potential input for the Final Report.

Validation/ Verification (V) Exception (E) Issue Identification (I)
System (S) Call Center (C) Participant (P)

#	Description	V / E / I	S / C /P	Priority	Disposition	Notes/Resolution	Open/Closed

PBS&J will be responsible for creating and maintaining the log. On a monthly basis, this living document will be reviewed for recommendations on how to proceed for the rest of the project duration and thereafter. During the demonstration, the log will serve to capture action items and outstanding issues, as well as validation against the pre-determined success factors. In addition to monitoring the general

operation of system functionality, the data produced and/or collected will also be monitored and analyzed for reporting purposes.

6.1.2. Data Reporting & Analysis

In order to produce the Demo results necessary for monthly and final reporting, data will be collected from a variety of sources, as shown in Appendix A, Evaluation Criteria. Categories of data will include:

- Traffic operations
- RCSC operations
- Financial performance
- Customer support, interaction and behavior

Prior to the beginning of the Demo, PBS&J will compile baseline data collected from the current lane and back office operations. This data will be provided by the noted sources prior to the beginning of the Demo, and then compared to data collected during the Demo to establish and extrapolate trends and impacts for the monthly and final reports.

Throughout the Demo, similar data will be collected, compiled, and analyzed against the initial baseline. This will be done on a monthly basis, to ensure that trends are captured throughout the duration of the Demo. As noted in the Evaluation Criteria, the majority of the data will come from GGB as part of their support of Demo participants, including participant logs, call / issue logs, and survey results. ACS will provide data related to use of the website and BATA has arranged with an on-call contractor to collect travel time data. Due to the relatively limited scope of the Demo, PBS&J will use traffic information to extrapolate the potential traffic impacts, based on assumptions to be stated within the resulting reports.

As noted in the Implementation Schedule (Appendix B), data will be collected bi-monthly and delivered to PBS&J, who will compile a report at the end of each Demo month for distribution to the team. Additionally, Appendix C provides the specific reporting requirements for financial settlement and reconciliation to be done during and after the demonstration period,

6.1.3. Evaluation & Final Report

Upon completion of the demo, all data collected will be used by PBS&J to develop an overall project / Demo report. The primary purpose of this report will be to fulfill the requirements of BATA's Traffic Congestion Relief Program (TCRP) grant, but it will also be shared with and include input from the Demo team. The Final Report will be a high-level document to compile and document an overview of the project, the data analyzed to evaluate the project, a specification of each criterion and the accompanying analysis, recommendations, and considerations.

To ensure that activities come to a close with enough time allowed for final reporting, participants will be instructed to stop creating Demo transactions after April 15th. ACS will continue processing Demo data through May 6th, to ensure that all transactions are processed and final details are cleaned up, and final data will be made accessible to the team at that point.

The recommendations that will accompany the Final Report will use the evaluation criteria as baselines to provide considerations and observations for future video tolling projects. This will allow the project team to assess the demonstration project within its scale, and leverage the evaluation for future projects/deployments.

7. Post-Demo Activities

7.1.1. Demo Deactivation

After the demo is completed, the system code will be deactivated. The code will still be in place on Vector, however, it will not be active on the system. This task will be performed when BATA sends ACS the final notification to deactivate the code after the analysis/data gathering is completed.

In addition, there will be several other functions/tasks performed after the Demo. The test accounts will be closed after the demo. The vehicles will be removed from the accounts and if the person had a FasTrak account before, ACS will ensure that the vehicle will be placed back onto the account. All transaction data from the demo will be available on the account. This will help for the evaluation period and analysis of data. Also, the Web Demo URL will be disabled and the process parameters will be reset.

APPENDIX A: Evaluation Criteria

BATA / GGB VT Demo - Evaluation Criteria

Category	Criteria	Description	Desired Result	Data	Source of Data	Comment
Traffic Operations	Transaction Type Shift	Movement of customers from one type of toll payment to another as a result of the additional options provided	Trend showing increased movement of customers to different options	Baseline Transaction Volumes - Cash, FasTrak, Violations	Current Data - GGB	Use Feb/Mar/Apr 2010, possibly addtl data from Oct 2010 available from AET study LP survey
				Demo Transaction Volumes - Cash, FasTrak, VT, VT-I, Violations	None	Won't have relevant results due to reduction in demo scope
				Full Transaction Volumes - Cash, FasTrak, VT, VT-I, Violations	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
	Transaction Handling Rate	Comparison of time spent handling individual transactions in toll lanes with relation to various types of transactions	Reduction of transaction handling rates in toll lanes	Baseline Lane Time to Process - Cash, FasTrak, Violation	Current Transaction Handling Data - GGB	Measure during Jan 2011 on the following dates: Jan 20, 7 - 11 am and 3 - 7 pm, and Jan 22, 3 - 7 pm
				Demo Lane Time to Process - Cash, FasTrak, VT, VT-I, Violation	None	Individual transaction handling rate will not change
				Full Lane Time to Process - Cash, FasTrak, VT, VT-I, Violation	None	Individual transaction handling rate will not change. Use shift data to extrapolate time savings.
	Vehicle Throughput (Vehicle Demand)	Comparison of volume of vehicles traveling through plaza during peak period	Increased volume of vehicles traveling through toll lanes during peak periods	Baseline Plaza Throughput - All Lanes	Current Data - GGB	(ie: vehicles per hour, vph) Use txn volumes from Txn Type Shift (above) - total for vehicle throughput.
				Demo Plaza Throughput - All Lanes	None	Won't have relevant results due to reduction in demo scope
				Full Plaza Throughput - All Lanes	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
	Booth Capacity (Maximum Capacity)	Comparison of average booth capacity	Increase in booth capacity in mixed-flow lanes due to	Baseline Booth Capacity - Mixed-Flow Lane vs. FasTrak-only Lane	Current Data - GGB	(ie: vehicles per hour, vph) Use Feb/Mar/Apr 2010 data

BATA / GGB VT Demo - Evaluation Criteria

Category	Criteria	Description	Desired Result	Data	Source of Data	Comment
			shift to dedicated lanes	Demo Booth Capacity - Mixed-Flow Lane vs. FasTrak / VT / VT-I Lane	None	Won't have relevant results due to reduction in demo scope
				Full Booth Capacity - Mixed-Flow Lane vs. FasTrak / VT / VT-I Lane	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
	Travel Time	Comparison of overall bridge / corridor travel times	Reduction of bridge / corridor average travel times as a result of increased booth capacity	Baseline Bridge / Corridor Average Travel Times	Current Data - GGB	Collect during Jan 2011. BATA's contractor will collect as follows: Thursday, Jan 20, 2011: 7-11am and 3-7pm, cash and FT, 1 driver per pay type. Tuesday, Jan 25, 2011: 7-11am and 3-7pm, cash and FT, 1 driver per pay type. Saturday, Jan 22, 2011: 3-7pm, cash and FT, 2 drivers per pay type. Saturday, Jan 29, 2011: 3-7pm, cash and FT, 2 drivers per pay type.
				Demo Bridge / Corridor Average Travel Times	None	Won't have relevant results due to reduction in demo scope
				Full Bridge / Corridor Average Travel Times	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
	Plaza Accident Rate	Comparison of change in plaza accident rate as a result of traffic changes	Reduction of plaza accident rate as a result of traffic type shifts	Baseline Plaza Accident Rate	Current Data - GGB	Use Feb/Mar/Apr 2010 data from sergeant's office data. Need average, typical stats.
				Demo Plaza Accident Rate	Demo Data - GGB	Collect same data from sergeant's office during demo.
				Full Plaza Accident Rate	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
	Air Quality	Forecast of change in impacts to air quality as a result of traffic changes	Reduction of emissions and improvement of air quality due to congestion	Baseline Emissions / Air Quality Numbers?	Current Data doesn't exist	BATA / PBSJ will look for available AQ model to use. Use Jan 2011 traffic data to reach general

BATA / GGB VT Demo - Evaluation Criteria

Category	Criteria	Description	Desired Result	Data	Source of Data	Comment
			reduction			conclusions.
				Demo Emissions / Air Quality Numbers?	None	Won't have relevant results due to reduction in demo scope
				Full Emissions / Air Quality Numbers?	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
RCSC Operations	Customer Support Requirements	Impact on all customer support duties and potential staffing	Reduction in the number of customer contacts / issues	Baseline RCSC Customer Support statistics	Current Data - ACS	CSR Calls - current call volumes per type and account; Image Review - current image review volumes, split by OCR and manual; Mailhouse - current mail item volumes, with avg quantity of toll posted
				Demo RCSC Customer Support statistics - Customer contact Volume	Capture during Demo - GGB (logs) and ACS (system)	CSR Calls - addtl calls generated, based on GGB participant support logs; Image Review - addtl image reviews, both OCR and manual (ACS); Mailhouse - addtl mail items created, with avg quantity of toll posted (ACS)
				Full RCSC Customer Support statistics	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
Financial	Gross Revenue	Impact to gross revenue (from tolls and admin fees), as it relates to customer shift in transaction types	Increase in gross revenue collected from tolls and admin fees	Baseline Gross Revenue - Cash, FasTrak, Violation	Current Data - GGB	Use Feb/Mar/Apr 2010 revenue data
				Demo Gross Revenue - Cash, FasTrak, VT, VT-I, Violation	Measure during Demo - GGB	

BATA / GGB VT Demo - Evaluation Criteria

Category	Criteria	Description	Desired Result	Data	Source of Data	Comment
				Full Gross Revenue - Cash, FasTrak, VT, VT-I, Violation	Project for Final Report - PBSJ	Extrapolate, incorporate info from Task 6 forecast, other agencies
	Transaction Processing Cost	Comparison of cost to process a specified quantity of transactions with relation to shifts in transaction types	Reduction of overall cost of processing transactions	Baseline RCSC Cost to Process - Cash, FasTrak, Violation	Current Data - GGB	Based on contractual payments for GGB transaction processing. Use Feb/Mar/Apr 2010 data
				Demo RCSC Cost to Process - Cash, FasTrak, VT, VT-I, Violation	Measure during Demo - GGB	
				Full RCSC Cost to Process - Cash, FasTrak, VT, VT-I, Violation	Project for Final Report - PBSJ	Extrapolate, incorporate info from Task 6 forecast, other agencies
	Revenue Leakage	Comparison of current revenue leakage rates vs modified functionality leakage rates	Reduction in overall leakage rates as standalone figures, or overall increase in revenue despite increased leakage	Baseline Revenue Leakage Data - Cash, FasTrak, Violation	Current Data - GGB	Revenue leakage = rejected images, unpaid violations, unsuccessful data transfers, disputed/never resolved, out of state plates, DMV rejects, employee cash leakage (where cash allowed). GGB will provide current GGB leakage amounts and assumptions, see if can be extrapolated from.
				Demo Revenue Leakage Data - Cash, FasTrak, VT, VT-I, Violation	Measure during Demo - GGB	Won't have relevant results due to reduction in demo scope
				Full Revenue Leakage Data - Cash, FasTrak, VT, VT-I, Violation	Project for Final Report - PBSJ	Extrapolate, incorporate info from Task 6 forecast, other agencies
	Net Revenue	Impact to net revenue, as it relates to customer shift in transaction types minus processing costs and leakage	Increase in net revenue collected	Baseline Net Revenue - Cash, FasTrak, Violation	Calculated from the above data	Calculate based on above - gross minus cost minus leakage = net
				Demo Net Revenue - Cash, FasTrak, VT, VT-I, Violation	Calculated from the above data	Won't have relevant results due to reduction in demo scope
				Full Net Revenue - Cash, FasTrak, VT, VT-I, Violation	Project for Final Report - PBSJ	Extrapolate, incorporate info from Task 6 forecast, other agencies

BATA / GGB VT Demo - Evaluation Criteria

Category	Criteria	Description	Desired Result	Data	Source of Data	Comment
Customer	Customer Correspondence	Relevancy of the information provided	Adequate information and instruction is provided	Monthly and/or Post-demo surveys	Surveys - GGB	
		Clarity of verbiage	Text is readable and easily understood	Log of customer questions and comments during demo	Call/Email logs - GGB	Need to identify that customer interaction is a result of correspondence
	Invoice Design	Relevancy of the information provided	Adequate information is provided for the understanding on why an invoice is being received	Monthly and/or Post-demo surveys	Surveys - GGB	
				Log of customer questions and comments during demo	Call/Email logs - GGB	Need to identify that customer interaction is a result of an invoice being received
		Clarity of instructional verbiage	Text is readable and easily understood; customer know what action to take in response	Monthly and/or Post-demo surveys	Surveys - GGB	
				Log of customer questions and comments during demo	Call/Email logs - GGB	Need to identify that customer interaction is a result of an invoice being received
		FAQ relevancy	Questions and answers are validated to properly address customer concerns	Monthly and/or Post-demo surveys	Surveys - GGB	
				Log of customer questions and comments during demo	Call/Email logs - GGB	Need to identify that customer interaction is a result of an invoice being received
	Web Design	Ease of navigation	Customers able to navigate website for information, account maintenance and payments	Monthly and/or Post-demo surveys	Surveys - GGB	

BATA / GGB VT Demo - Evaluation Criteria

Category	Criteria	Description	Desired Result	Data	Source of Data	Comment
				Web activity reports - WebTrends	ACS	
		Functionality	Customer expectations of website functionality are met (versus items/issues that require a call); successful functionality	Monthly and/or Post-demo surveys	Surveys - GGB	Logs may help to ensure participants remember if they tried to use the website but eventually had to call to get their issue resolved.
				Web activity reports - WebTrends	ACS	
	Customer Preferences	Preferred method of paying a toll: FT, VT, VT-I, Cash (Adoption rate)	Reduction in preference for cash payment	Baseline numbers of current mixed mode collection types (as percent of total traffic)	Current Data - GGB	Assume this based on traffic operations data above - no additional data to collect.
				Monthly and/or Post-demo surveys	Surveys - GGB	
				Forecast numbers of collection modes with introduction of VT/VT-I with and without cash	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats
		Preferred method of contact	Low preference for call center contact	Baseline numbers (percentage/volume) of existing contact methods (phone/IVR/web/email/mail) for RCSC	ACS	
				Monthly and/or Post-demo surveys	Surveys - GGB	
				Forecast preferred contact methods	Project for Final Report - PBSJ	Extrapolate, incorporate info from other agencies, federal stats

BATA / GGB VT Demo - Evaluation Criteria

Category	Criteria	Description	Desired Result	Data	Source of Data	Comment
	Customer Concerns/Issues	Privacy concerns	No concerns for privacy of customer data /information	Monthly and/or Post-demo surveys	Surveys - GGB	
		Toll rate/fee structure (justification)	Understanding of rates/fees	Monthly and/or Post-demo surveys	Surveys - GGB	

APPENDIX B: Implementation Schedule

#	Activity	Start	Finish
	Core Project Elements		
1	Transaction Flow Chart	8/1/2010	10/15/2010
2	Customer Correspondence	8/1/2010	11/22/2010
3	Invoice Design	8/1/2010	11/15/2010
4	Web Design	8/1/2010	12/19/2010
5	Demonstration Go-Live / Cutoff	2/1/2011	5/6/2011
	Project Planning		
10	Implementation Plan – Draft	11/1/2010	12/15/2010
11	Implementation Plan – Final	11/15/2010	12/30/2010
12	Evaluation Criteria	11/1/2010	12/30/2010
13	Monthly Meeting – November	11/10/2010	_____
14	Monthly Meeting – December (Telecon)	None	_____
15	Monthly Meeting – January	1/10/2011	_____
	Systems		
20	Systems Prep & Documentation		
21	VT RD/SDD	10/18/2010	12/3/2010
22	VT Test Scripts/Results	10/18/2010	1/7/2011
23	VT-I RD/SDD	10/18/2010	12/29/2010
24	VT-I Test Scripts/Results	10/18/2010	2/1/2011
27	Internal Testing Complete	10/18/2010	12/8/2010
28	Client Testing	1/6/2011	1/7/2011
29	Client Testing – Error/Issue Resolution	1/7/2011	1/14/2011

30	System Acceptance	1/14/2011	1/24/2011
31	System Baseline, Migration and Cutover	1/17/2011	1/29/2011
Operations			
40	Call Center Memo	1/15/2011	1/28/2011
41	System Training	1/15/2011	1/28/2011
Participant Outreach & Communications			
50	Participant Selection	10/1/2010	12/10/2010
51	Receive DMV lookup information from ACS	1/14/2010	1/21/2011
52	Participant Scenario / Instructions	01/26/2011	----------
53	Outreach/Communications Material Development	11/15/2010	12/30/2010
54	Demo Participant Kickoff Meeting	1/5/2011	1/6/2011
55	Survey Development & Testing	12/21/2010	1/15/2011
56	Remind Participants about Bi-Weekly Survey	01/14/2011	04/25/2011
57	Email Participants about Focus Groups	04/04/2011	----------
Demo Monitoring & Reporting			
60	DEMO GO LIVE	02/01/2011	----------
61	Post Registration Reminder email	02/01/2011	----------
62	Generate DAILY VTI13, VTI0001, and 38G	02/01/2011	02/11/2011
63	Generate DAILY Q18 and Q8M	02/01/2011	05/16/2011
64	Generate VTI13, VTI00, and 38G on regular schedule	02/15/2011	05/16/2011
65	Weekly Status Call	01/24/2011	05/23/2011
66	First Invoices Generated	02/15/2011	----------
67	Finance Settlement	02/15/2011	05/16/2011
68	Generate Questions & Comments Log	02/18/2011	05/13/2011

69	Generate Bi-Weekly Survey Responses Report	02/18/2011	05/29/2011
70	Generate Monthly WebTrends Report	03/01/2011	05/02/2011
71	Generate Monthly CSC Report	03/01/2011	05/02/2011
72	Replace Participant License Plate on FasTrak accounts	----------	04/16/2011
Demo Demobilization & Evaluation			
80	Last On-Site Meeting	----------	04/26/2011
81	Last Demo Invoice Generation	----------	4/30/2011
82	Last Day for VT/VT-I Transaction Processing	----------	05/06/2011
83	Transaction Processing Cutoff	----------	5/6/2011
84	System Demobilization	----------	5/6/2011
85	Develop Participant Post-Demo Activities (Focus Groups ?)	4/18/2011	4/21/2011
86	Data Gathering & Analysis	5/9/2011	5/18/2011
87	Final Report – Draft/Briefing	----------	5/23/2011
88	Final Report	----------	5/31/2011
89	Project Closeout	5/21/2011	5/31/2011

APPENDIX C: Settlement Procedures & Report Delivery

Video Toll (LTOL)

No new reports were created for Video Toll transactions (LTOL). These transactions will populate in existing Transaction and Financial reports (e.g. Q18, Q8M, FIN1002 and FIN1001) and will be part of the regular daily transaction reconciliation process.

Fund Settlement:

Video Toll transactions (LTOL) will be part of the daily Q18 Wire settlement. No change to the current Golden Gate ETC settlement procedure, LTOL's will be transferred along with regular ETC transactions.

Report Number	Report Name	Delivery Date	Frequency
Q18	Bank Wire Report	Next Day	Daily
Q8M	Casual Use Report	Next Day	Daily

Reports Descriptions:

Q18 – Bank Wire Report

Report Q18 summarizes all toll transactions reconciled by the VECTOR system for a given date. This report is very important to reconcile transactions on a daily basis. This date is typically one day after the reconciliation process. This report will be used to balance the toll revenue going to the agencies. This report will display only toll revenues.

It lists agency-specific transactions with respect to the revenue agency, deposit number, transaction type, and revenue or posted transaction date. If an agency number is entered in the input parameters, the report is generated for all the transactions that are summarized or reconciled on that day using that agency's facilities.

The report shows the number of transactions and transaction amount by account agency or customer home agency, posted date or the revenue date of the transaction, unique deposit number for that group of transactions, transaction type and revenue date or collection date.

The sub-totals by revenue agency and each transaction type are also displayed in the reports. Following are the sections of the report displaying each section.

This report reconciles with the Q8M – Casual Use Report. This report is generated daily and sent to the home agencies.

Actuate Path: BATA > Financial Reports > Q18 - Bank Wire Deposit

Q8M – Casual Use Report

This report is sorted by the home agency, and reports all casual use of home agency customers on different facilities/plazas. There could be various versions of this report. This report will show all toll transaction types posted to the account.

Data is presented in this report by vehicle class, grouped by agency facility details, and agencies. Options are provided to run the report by reconciliation, collection or posting date. Only home agency facilities can be chosen to show on the report. The Q8M report provides transaction counts and amount by axels.

On the Q8M report all the transactions are of Transaction Type (Regular Toll, Paid by Import VTOL, Pay by Plate ITOL and Video Toll LTOL). This report provides only Toll Revenue. Toll Adjustments and Reversals will be available on report 21 (Disputed Tolls Report). Report Q13 is revenue reconciliation report that reflects all types of Toll Revenue. In order to reflect the Violation notice payment Report 38G needs to be used along with Q8M to reconcile revenue by axle.

This report reconciles with the Q18 report and is generated daily.

Actuate Path: BATA > Financial Reports > Q8M - Casual Use > Recon

Video Toll Invoice (VT-I)

There are three reports that will be used to monitor, reconcile and settle funds for Video Toll Invoice. VTI Reports will be placed in a new folder under the BATA home folder.

Actuate Path: BATA > VTI Reports

During the 1st two weeks, reports will be placed in the BATA folder on a daily basis; with a 2 business day lag for summarization and financial reconciliation to be completed (i.e. you will receive Feb 1st reports on the 3rd).

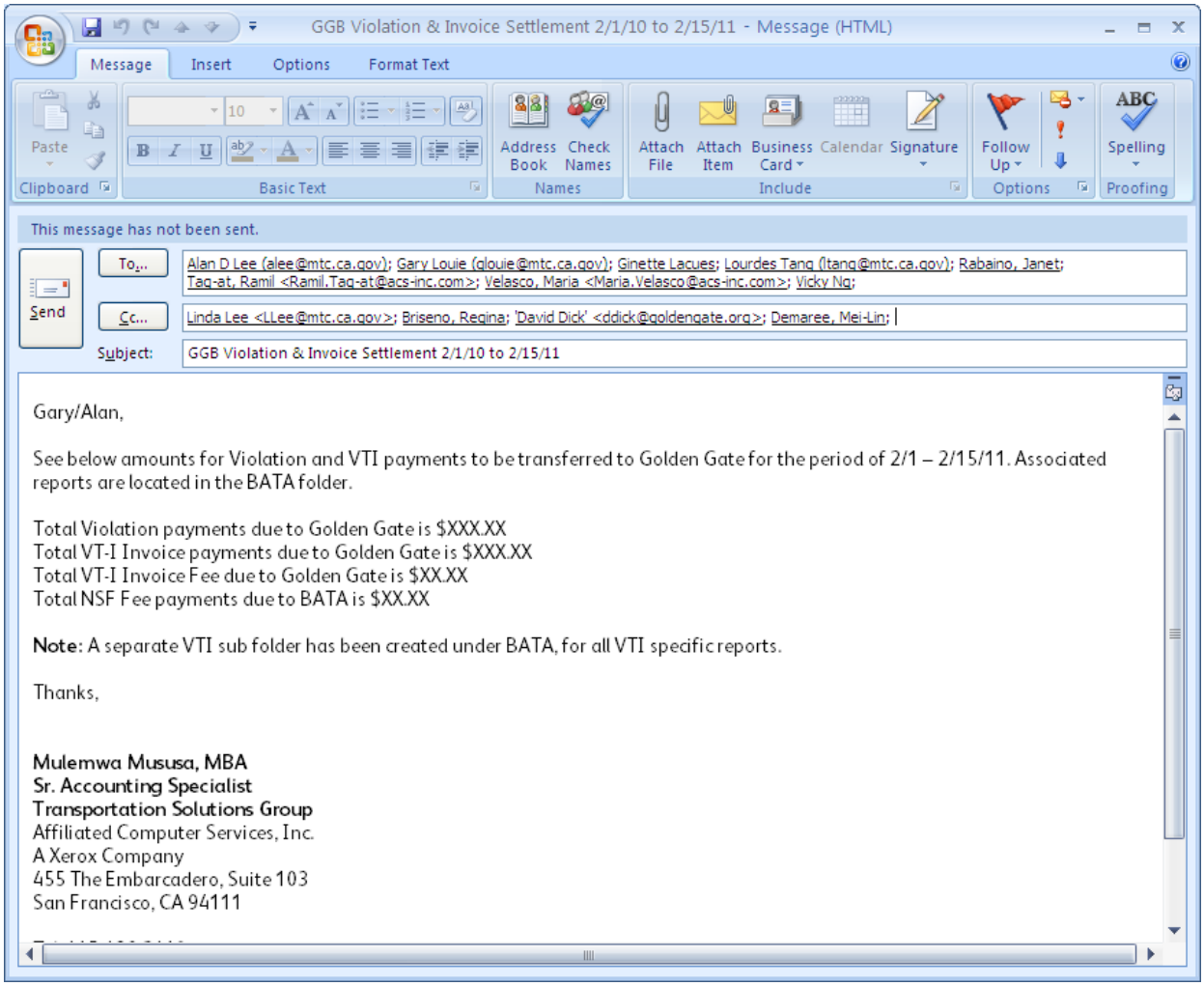
Thereafter, reports will placed in the BATA folder based on the schedule below, report period 1st to 15th and 16th to month end.

Report Number	Report Name	Delivery Date	Frequency
VTI13	VT-I Receivables Report	After 2 business days	15th & month end
VTI001	VT-I Invoice Report	After 2 business days	15th & month end
38G	Viol. Notice Pmt Report	After 2 business days	15th & month end

Fund Settlement:

VTI payments will be settled on the same schedule as the regular Golden Gate Violation payments since VTI payments flow into the modified 38G report. The VTI invoice fee will also be transferred to Golden Gate during this process.

Once VTI reports have been reconciled and placed in the BATA folder, an email notification will be sent to BATA finance. See sample violation settlement email that has been modified to include VTI below:



Report Descriptions:

VTI13 – VT-I Receivables Report

This report provides the count and dollar amount expected by GGB for all Video Toll Invoices. The report provides the opening receivable balance, cumulative Due, and outstanding invoice receivables.

The report shows all payments made and additional receivables such as new invoice transactions, tolls and fees. The report also shows the net outstanding closing invoice receivables.

This report reconciles with the VTI001 report. The payments section will reconcile to the VTI columns on the modified 38G report.

VTI001 – VTI Invoice Report

The top of this report displays a beginning balance which is the culmination of all outstanding receivables before the reporting period. The report displays a row for each invoice that had any financial activity during the reporting period, including those with partial unpaid balances or those that got fully paid. The calculated Ending Balance at the end of this report represents the total outstanding invoices for the reporting period.
This report will reconcile to the VTI13 report. The payment & payment reversals columns will reconcile to the VTI columns on the modified 38G report.

38G – Violation Notice Payment Report

This report provides a breakdown and distribution of the violation and Invoice payment activity by CSC revenue day, by axle and plaza for non-customers Invoices and violation notices only. Non-customer tolls and fees further classify the Invoice and violation activity. This report is for Invoice and Violation Notice payments only; no VTOL or pay-by-plate ITOL will appear on the report. Additionally, this report is available as an on-line report for ad hoc reporting purposes. This report is run by CSC revenue day and used to track the Payments on Invoices and Toll Evasion Notice transactions. The 38G report gives the amount that will be transferred by CSC to the Revenue agencies (in this case GGB) for the invoiced and noticed transactions.

The 38G report will reconcile to the payments sections of the VTI13 and VTI001 reports.

Final Settlement

The last Video Toll Invoice funds settlement will be performed on May 17th. The CSC will coordinate with BATA Finance to ensure all Video Toll and Video Toll Invoice funds from the Demo have been transferred to Golden Gate. The transfer of all funds will mark the end of the Video Toll Demonstration.

APPENDIX D: Acronyms

ACS	Affiliated Computer Services, Inc - BATA FasTrak Consultant
BATA	Bay Area Toll Authority
CSC	Customer Service Center
CSR	Customer Service Representative
DMV	Department of Motor Vehicles
FT	FasTrak
GGB	Golden Gate Bridge
IVR	Interactive Voice Response
ITOL	Image-Based Toll (license-plate account match)
LTOL	License Plate Toll
PbP	Pay By Plate
PBS&J	Post, Buckley, Schuh & Jernigan - BATA Consultant
RCSC	Regional Customer Service Center
SDLC	System Development Lifecycle
T&M	Time & Materials
TCRP	Traffic Congestion Relief Program
TTI	Traffic Technologies In - GGB Consultant
URL	Uniform Resource Locator
VT	Video Toll (Pay-By-Plate)
VT-I	Video Toll Invoice

ATTACHMENT J:

Amendment Application to the TCRP Grant

METROPOLITAN
TRANSPORTATION
COMMISSION

Joseph P. Bort MetroCenter
101 Eighth Street
Oakland, CA 94607-4700
TEL 510.817.5700
TTY/TDD 510.817.5769
FAX 510.817.5848
E-MAIL info@mtc.ca.gov
WEB www.mtc.ca.gov

Scott Haggerty, Chair
Alameda County

Adrienne J. Tissier, Vice Chair
San Mateo County

Tom Azumbrado
U.S. Department of Housing and Urban Development

Tom Bates
Cities of Alameda County

Dean J. Chu
Cities of Santa Clara County

Dave Cortese
Association of Bay Area Governments

Chris Daly
City and County of San Francisco

Bill Dodd
Napa County and Cities

Dorene M. Giacopini
U.S. Department of Transportation

Federal D. Glover
Contra Costa County

Anne W. Halsted
San Francisco Bay Conservation and Development Commission

Steve Kinsey
Marin County and Cities

Sue Lempert
Cities of San Mateo County

Jake Mackenzie
Sonoma County and Cities

Jon Rubin
San Francisco Mayor's Appointee

Bijan Sartipi
State Business, Transportation and Housing Agency

James P. Spering
Solano County and Cities

Amy Rein Worth
Cities of Contra Costa County

Ken Yeager
Santa Clara County

Steve Heminger
Executive Director

Ann Flemer
Deputy Executive Director, Operations

Andrew B. Fremier
Deputy Executive Director, Bay Area Toll Authority

Therese W. McMillan
Deputy Executive Director, Policy

May 12, 2009

Dan McKell
Senior Transportation Planner
Caltrans, Division of Transportation Programming
Office of Capital Improvements Program (OCIP)
1120 N Street, MS-82
Sacramento, CA 95814

Subject: Fund Transfer Agreement No. 74a0403 - Amendment/Application Request

Dear Mr. McKell:

This letter is being submitted to you to request a TCRP#11.1 application amendment to the above-referenced Fund Transfer Agreement (FTA), which authorizes the Metropolitan Transportation Commission/Bay Area Toll Authority (MTC/BATA) to conduct a Video Tolling Feasibility Study and implement a demonstration project on the State-owned bridges in the San Francisco Bay Area. To date, Tasks 1 through 8 of the Project have been completed. However, at this time, we are requesting the following:

1) An extension of the period of performance from September 30, 2009 to May 31, 2011 –
Task 2 of the Feasibility Study included a legal and legislative review to determine whether there are any legal barriers to implementing video tolling on the Bay Area's State-owned bridges. The findings of this task concluded that changes to current state statutes would be required. For example, current statutes would need to be revised to give MTC/BATA the authority to charge a video tolling user fee. This change is being pursued in the current 2009-2010 legislative session. If passed, it would not be effective until January 2010. Until passage, a video tolling demonstration on the State-owned bridges cannot be implemented.

In the meantime, in order to keep the project on schedule (i.e., the extended schedule), MTC/BATA intends on moving forward with Task 9 (Development of Implementation Schedule and Budget), as well as portions of Task 10 (Implementation of Demonstration Project), e.g., development of back-office system modifications. Attached is an updated project schedule (Attachment A). As shown, it is estimated that Task 10 could take up to 15 months, of which 12 months would be expended on back-office system modifications. The amount of time necessary to complete Task 10 was not anticipated in the original schedule until some of the earlier tasks of the Feasibility Study had been completed. Also attached is a list of key milestones to be completed (Attachment B).

2) The inclusion of the Golden Gate Bridge for possible project demonstration –
The project study area identified in the FTA includes the State-owned bridges in Alameda, Contra Costa, Marin, San Francisco, and San Mateo Counties. While not a State-owned bridge, the Golden Gate Bridge, which is owned and operated by the Golden Gate Bridge, Highway and Transportation District (GGBHTD), is an important part of the Bay Area's regional transbay network. As with the Bay Area's State-owned bridges, tolls on the Golden Gate Bridge are collected both manually in staffed lanes and electronically using FasTrak®. MTC/BATA and the GGBHTD jointly operate the FasTrak® Program in the Bay Area. As such, we are requesting that the Golden Gate Bridge be added to the project study area, and as part of the project study area, it can be considered for the demonstration phase of the Project. It should also be noted that unlike MTC/BATA, the GGBHTD currently has the authority to charge a video tolling user fee. (A user fee is being proposed as a requirement for a video tolling program in the Bay Area.) Therefore, a video tolling demonstration project could be implemented on the Golden Gate Bridge without the passage of the user fee legislation described above.

In summary, to the extent possible, MTC/BATA will prevent further project delays by minimizing review periods for future deliverables and ensuring that contractor/consultant work continues to move forward while awaiting the outcome of proposed legislation changes. The time extension will allow MTC/BATA to expend the additional time necessary for the development/implementation phase of the project.

If you should have any questions, or need further information, please feel free to contact me at (510) 817-5860, or Project Manager Linda Lee at (510) 817-5825.

Sincerely,

Rod McMillan
BATA, Bridge Oversight and Operations Director

Attachments

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (REV. 3/08)

General Instructions

☐ New Project ☑ Amendment (Existing Project)				Date: 04/29/09
Caltrans District	**EA**	**PPNO**	**MPO ID**	**TCRP No.**
4	60911	T0111		11.1

County	Route/Corridor	Project Sponsor/Lead Agency	MPO	Element
VAR		MTC	MTC	MT

Project Title

San Francisco Bay Southern Crossing; Video Tolling

PM Bk	PM Ahd	Project Mgr/Contact	Phone	E-mail Address
		Linda Lee	(510) 817-5825	llee@mtc.ca.gov

Location, Project Limits, Description, Scope of Work, Legislative Description

San Francisco Bay Southern Crossing; Video Tolling Demonstration Project for state-owned toll bridges in Alameda, San Francisco, Contra Costa, Marin and San Mateo Counties.

Component	Implementing Agency	AB 3090	Letter of No Prejudice
PA&ED	MTC	☐	☐
PS&E		☐	☐
Right of Way		☐	☐
Construction		☐	☐

Legislative Districts

Assembly:		**Senate:**	
Congressional:			

Purpose and Need

The purpose of the project is to conduct an analysis, plan, and implementation of a video tolling demonstration project on one or more of the state-owned bridges in the Bay Area. The project will study the feasibility of implementing video tolling, which incudes charging tolls by reading license plates and billing motorists by mail rather than the current system of payment at a toll plaza. Implementation of such a sytem could alleviate congestion and reduce traffic delays at bridge toll plazas, as vehicles would not have to stop tolls.

Project Benefits

Project Milestone	Existing	Proposed
Project Study Report Approved		
Begin Environmental (PA&ED) Phase		
Circulate Draft Environmental Document — Document Type		
Draft Project Report		
End Environmental Phase (PA&ED Milestone)		
Begin Design (PS&E) Phase		
End Design Phase (Ready to List for Advertisement Milestone)		
Begin Right of Way Phase		
End Right of Way Phase (Right of Way Certification Milestone)		
Begin Construction Phase (Contract Award Milestone)		
End Construction Phase (Construction Contract Acceptance Milestone)		
Begin Closeout Phase		
End Closeout Phase (Closeout Report)		

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (REV. 3/08)

Date: 04/29/09

County	CT District	PPNO	TCRP Project No.	EA
VAR	4	T0111	11.1	60911

Project Title: San Francisco Bay Southern Crossing; Video Tolling

Existing Total Project Cost									Implementing Agency
Component	Prior	08/09	09/10	10/11	11/12	12/13	13/14+	Total	
E&P (PA&ED)	1,881							1,881	MTC
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	
Proposed Total Project Cost									
E&P (PA&ED)	1,881							1,881	
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	

Fund No. 1:	TCRP (Committed) - Traffic Congestion Relief Fund (TCRF)								Program Code
Existing Funding									30.10.710.040
Component	Prior	08/09	09/10	10/11	11/12	12/13	13/14+	Total	Funding Agency
E&P (PA&ED)	1,881							1,881	MTC
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	
Proposed Funding									Notes
E&P (PA&ED)	1,881							1,881	
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	

Fund No. 2:									Program Code
Existing Funding									
Component	Prior	08/09	09/10	10/11	11/12	12/13	13/14+	Total	Funding Agency
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									
Proposed Funding									Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (REV. 3/08)

Complete this page for amendments only

Date: 04/29/09

District	Co	Route	EA	PPNO	TCRP No.
4	VAR		60911	T0111	11.1

SECTION 1 - All Projects

Project Background

This amendment is being requested to: 1) extend the period of performance; and 2) include the Golden Gate Bridge as part of the project study area. An extension of the schedule is being requested due to the need for changes to state legislation that currently prohibits the implementation of video tolling in the Bay Area. These changes are being pursued in the current 2009-2010 legislative session, and if passed, will not be effective until January 1, 2010. A request is being sought to include the Golden Gate Bridge in the project study area since it is an important part of the Bay Area transbay network, and the Golden Gate Bridge, Highway and Transportation District, which owns and operates this bridge, is jointly responsible for operating the FasTrak Program with MTC. As such, a video tolling program in the Bay Area would not only affect the state-owned bridges but also the Golden Gate Bridge.

Programming Change Requested

A programming change is not being sought under this amendment. A request is being made to extend the project's period of performance and expand the project study area.

Reason for Proposed Change

No programming action is being sought under this amendment.

If proposed change will delay one or more components, clearly explain 1) reason the delay, 2) cost increase related to the delay, and 3) how cost increase will be funded

No programming action is being sought under this amendment. While a request is being made to extend the project's period of performance, there are no cost increases resulting from this delay.

Other Significant Information

Not applicable, as this project is not part of the Corridor System Management Plan.

SECTION 2 - For TCRP Projects Only

☐ Alternative Project Request (Please follow Instructions at http://www.dot.ca.gov/tcrp/LETTERguidelines)

☐ Letter of No Prejudice (LONP) (Please follow Guidelines at http://www.dot.ca.gov/tcrp/docs/042706.pdf)

SECTION 3 - All Projects

Approvals

I hereby certify that the above information is complete and accurate and all approvals have been obtained for the processing of this amendment request.*

Name (Print or Type)	Signature	Title	Date
Linda Lee	Linda Lee	Project Manager	5/5/2009

Attachments

1) Concurrence from Implementing Agency and/or Regional Transportation Planning Agency

2) Project Location Map

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROJECT PROGRAMMING REQUEST

DTP-0001 (REV. 3/08)

Date: 04/29/09

County	CT District	PPNO	TCRP Project No.	EA
VAR	4	T0111	11.1	60911

Project Title: San Francisco Bay Southern Crossing; Video Tolling

Existing Total Project Cost									Implementing Agency
Component	Prior	08/09	09/10	10/11	11/12	12/13	13/14+	Total	
E&P (PA&ED)	1,881							1,881	MTC
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	
Net Change									
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									
Proposed New Result									
E&P (PA&ED)	1,881							1,881	
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	

Fund No. 1:	TCRP (Committed) - Traffic Congestion Relief Fund (TCRF)								Program Code
Existing Funding									30.10.710.040
Component	Prior	08/09	09/10	10/11	11/12	12/13	13/14+	Total	Funding Agency
E&P (PA&ED)	1,881							1,881	MTC
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	
Change									Notes
E&P (PA&ED)									
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL									
Proposed Funding									
E&P (PA&ED)	1,881							1,881	
PS&E									
R/W SUP (CT)									
CON SUP (CT)									
R/W									
CON									
TOTAL	1,881							1,881	

ATTACHMENT A
PROJECT SCHEDULE - REVISED

PROJECT TITLE: VIDEO TOLLING DEMONSTRATION PROJECT

			FUND SOURCE	FY07/08				FY08/09												FY09/10												FY10/11											
TASK #	TASK NAME	RESPONSIBLE PARTY	CALTRANS	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	DELIVERABLES
1	Video Tolling Concepts Review	Consultant	$ 36,543	X	X	X	X																																				Video tolling concepts report
2	Legal and Legislative Analysis	Consultant	$ 52,550	X	X	X	X	X																																			Legal analysis report
3	Policy and Operations Plan	Consultant	$ 55,419				X	X	X	X																																	Business Rules and Operations Plan
4	Facilities Review	Consultant	$ 48,993	X	X	X	X	X	X																																		Facilities review report
5	Technology Review of Toll Plaza and CSC systems	Consultant	$ 71,834	X	X	X	X	X																																			Technology review report
6	Financial Impact Analysis	Consultant	$ 35,737						X	X	X	X	X																														Financial Impact Analysis report
7	Conversion Plan Concept	Consultant	$ 52,243								X	X	X	X	X																												Conversion Plan Concept
8	Facility Selection for Demonstration	Consultant	$ 65,802								X	X	X	X	X																												Facility selection and recommendation
9	Development of Implementation Schedule & Budget	Consultant	$ 50,455																	X	X	X	X																				Implementation schedule & budget
10	Implementation of Demonstration Project	Consultant/Contractor	$ 965,170																		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								Bid docs, technical specs, signs, syst mods, PI plan
11	Evaluation of Demonstration Project	Consultant/Contractor	$ 446,254																																	X	X	X	X	X	X	X	Monthly Evaluation reports and final recommendations
TOTAL			$ 1,881,000																																								

ATTACHMENT B
KEY MILESTONES

Month	Key Milestones
Jul-09	Develop video tolling business rules and policies
Sep-09	Complete video tolling business rules and policies
Oct-09	Obtain approvals from Agency Boards (MTC/BATA and GGBHTD); complete CSC contractor change order.
Nov-09	Begin CSC back-office system modifications
Jan-10	Video tolling legislation in effect, if passed.
Sep-10	Public outreach for demonstration project; sign installation at demonstration bridge.
Oct-10	Complete CSC back-office system modifications
Nov-10	Begin video tolling demonstration
Apr-11	Complete video tolling demonstration
May-11	Complete evaluation of demonstration; complete final report.

MTC/BATA = Metropolitan Transportation Commission/Bay Area Toll Authority
GGBHTD = Golden Gate Bridge, Highway and Transportation District
CSC = Customer Service Center

ATTACHMENT K:

Formal Approval of the Amendment to the TCRP Grant

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

To: CHAIR AND COMMISSIONERS

CTC Meeting: July 8-9, 2009

Reference No.: 2.1a.(5)
Action Item

From: CINDY McKIM
Chief Financial Officer

Prepared by: Rachel Falsetti
Division Chief
Transportation Programming

Subject: **TRAFFIC CONGESTION RELIEF PROGRAM PROJECT APPLICATION AMENDMENT APPROVAL**
RESOLUTION TAA-09-01, AMENDING RESOLUTION TAA-07-18

RECOMMENDATION:

The California Department of Transportation recommends the California Transportation Commission (Commission) approve an application amendment for Traffic Congestion Relief Program (TCRP) Project 11.1, as described below.

ISSUE:

The Metropolitan Transportation Commission (MTC) requests approval of the following TCRP Project application amendment.

TCRP Project 11.1 – San Francisco Bay Southern Crossing; Video Tolling Demonstration Project for state-owned toll bridges in Alameda, San Francisco, Contra Costa, Marin and San Mateo Counties (PPNO T0111). Amend the application to:

- Update the project schedule to extend the Environmental phase to Fiscal Year (FY) 2010-11.
- Expand the project scope to include the Golden Gate Bridge.
- Revise the project title to reflect the new scope: "Video Tolling Demonstration Project for San Francisco Bay Area Bridges".

BACKGROUND:

On September 20, 2007, the Commission approved Resolution TAA-07-18, designating sub-project 11.1 - San Francisco Bay Southern Crossing; Video Tolling Demonstration Project for state-owned toll bridges in Alameda, San Francisco, Contra Costa, Marin and San Mateo Counties, and programming $1,881,000, which was made available from completed TCRP Project 11 – San Francisco Bay Southern Crossing; complete feasibility and financial studies for new San Francisco Bay crossing. The Commission concurrently approved Resolution TFP-07-04, allocating $1,881,000 in TCRP funds for Environmental for Project 11.1.

In executing the feasibility study for Project 11.1, MTC identified legal barriers to implementing video tolling on state-owned bridges. MTC determined that legislative proposals would need to be made and is currently pursuing these changes in the 2009-2010 legislative session.

RESOLUTION TAA-09-01

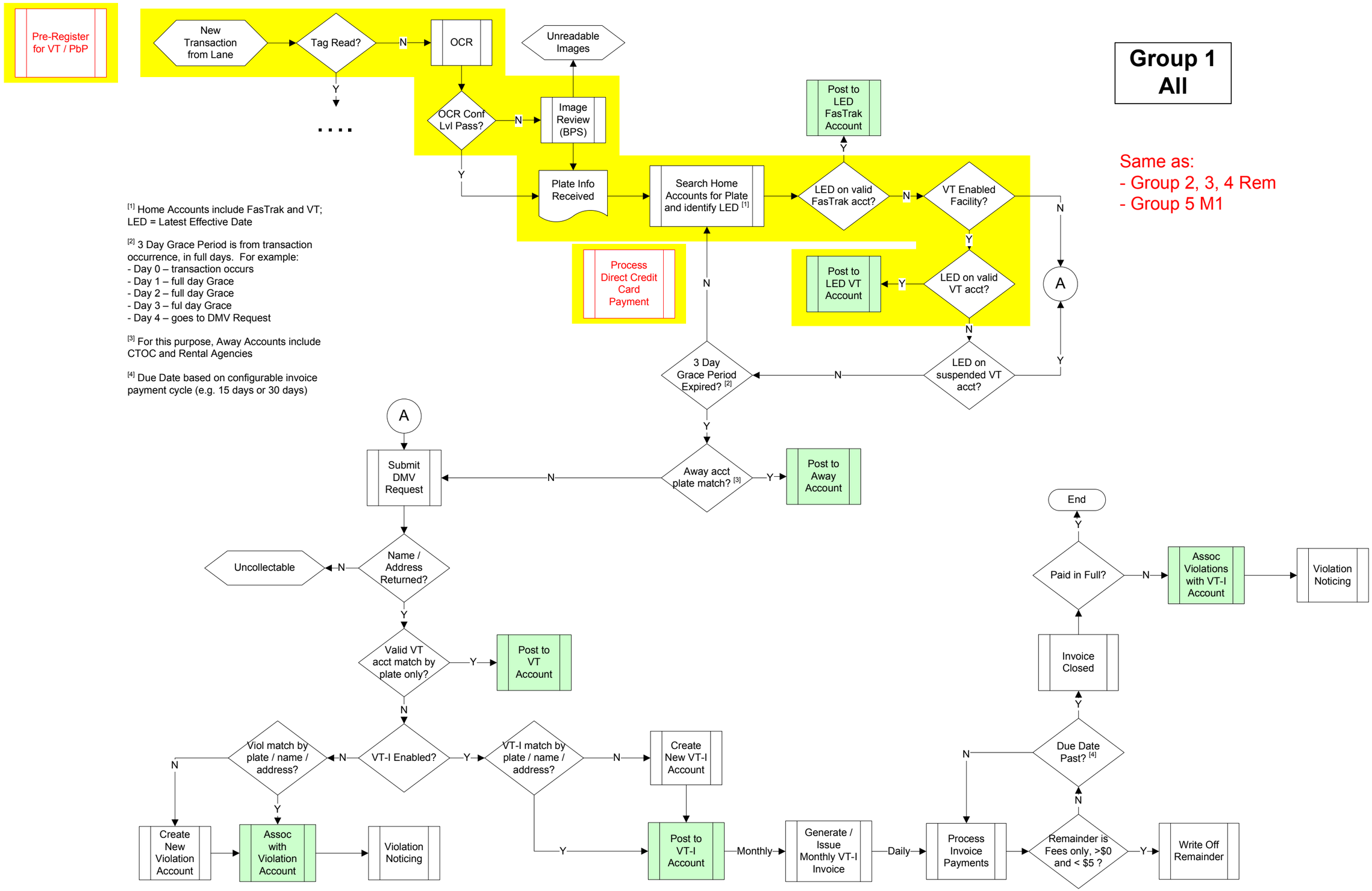
Be it Resolved, that the California Transportation Commission does hereby amend Traffic Congestion Relief Program Project 11.1 – San Francisco Bay Southern Crossing; Video Tolling Demonstration Project for state-owned toll bridges in Alameda, San Francisco, Contra Costa, Marin and San Mateo Counties (PPNO T0111), to reflect the changes described above.

ATTACHMENT L:

Transaction Processing Flow Chart

Group 1
All

Same as:
- Group 2, 3, 4 Rem
- Group 5 M1



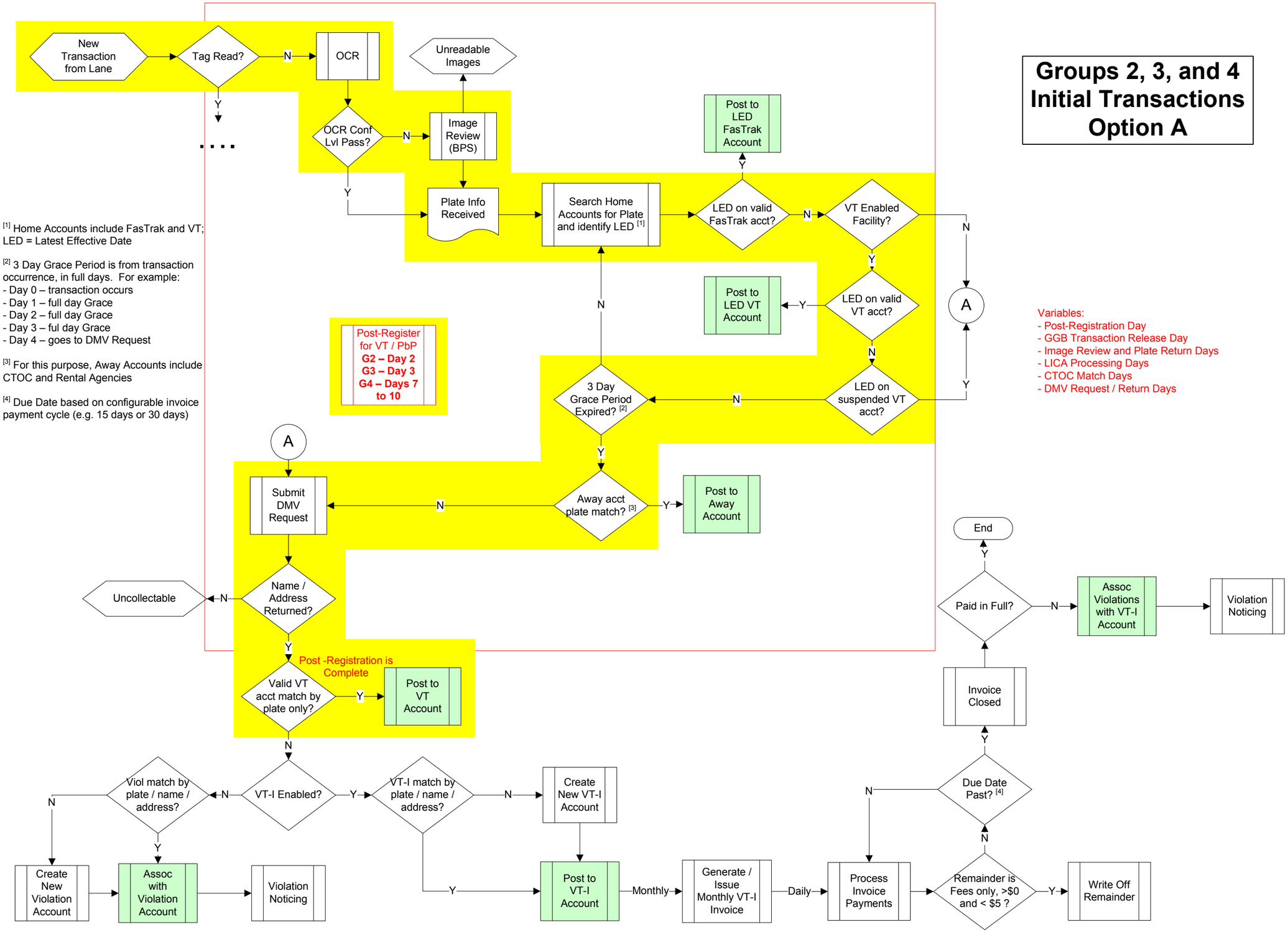
[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Groups 2, 3, and 4 Initial Transactions Option A



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

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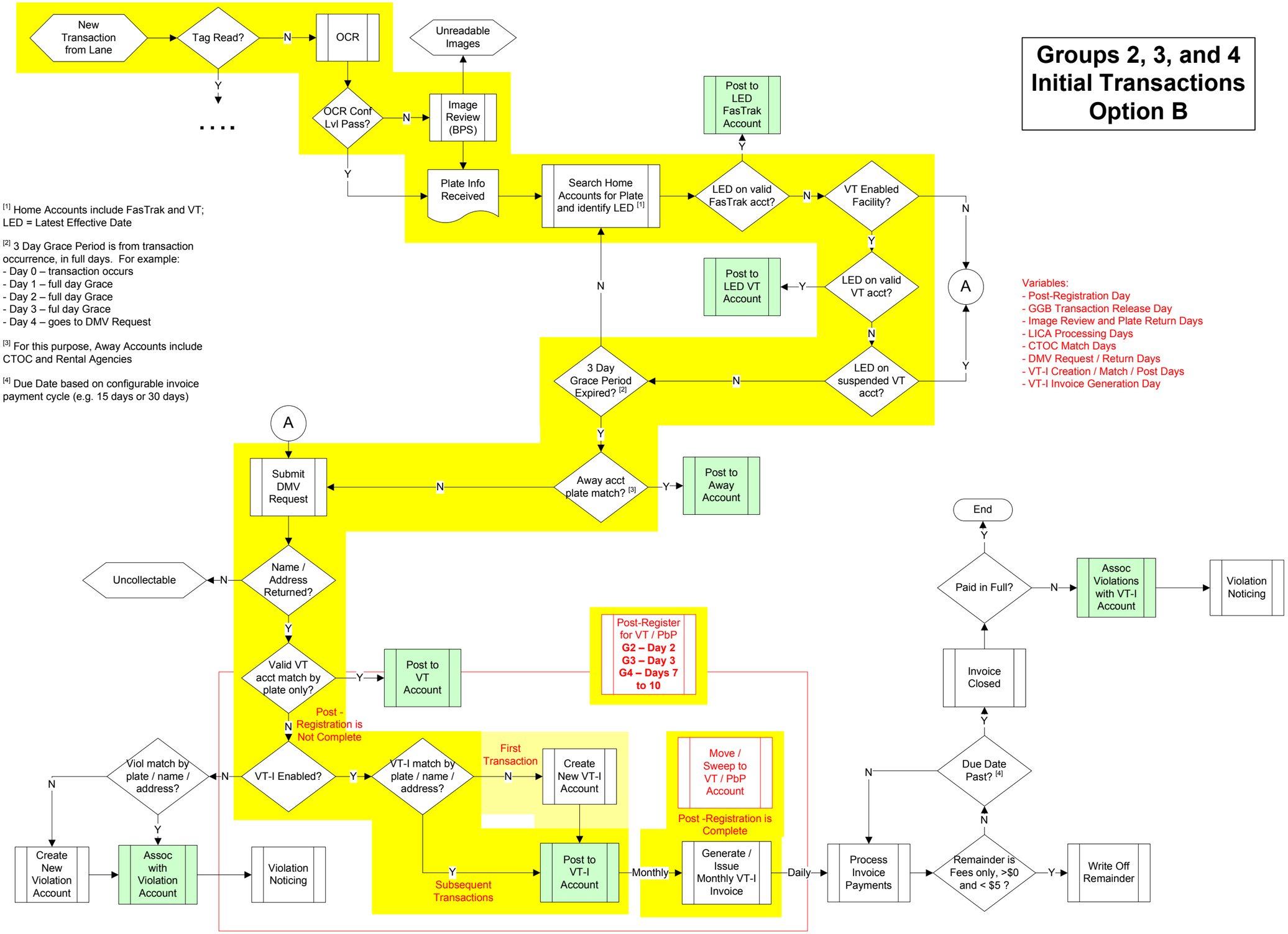
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Variables:
- Post-Registration Day
- GGB Transaction Release Day
- Image Review and Plate Return Days
- LICA Processing Days
- CTOC Match Days
- DMV Request / Return Days

Groups 2, 3, and 4 Initial Transactions Option B



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

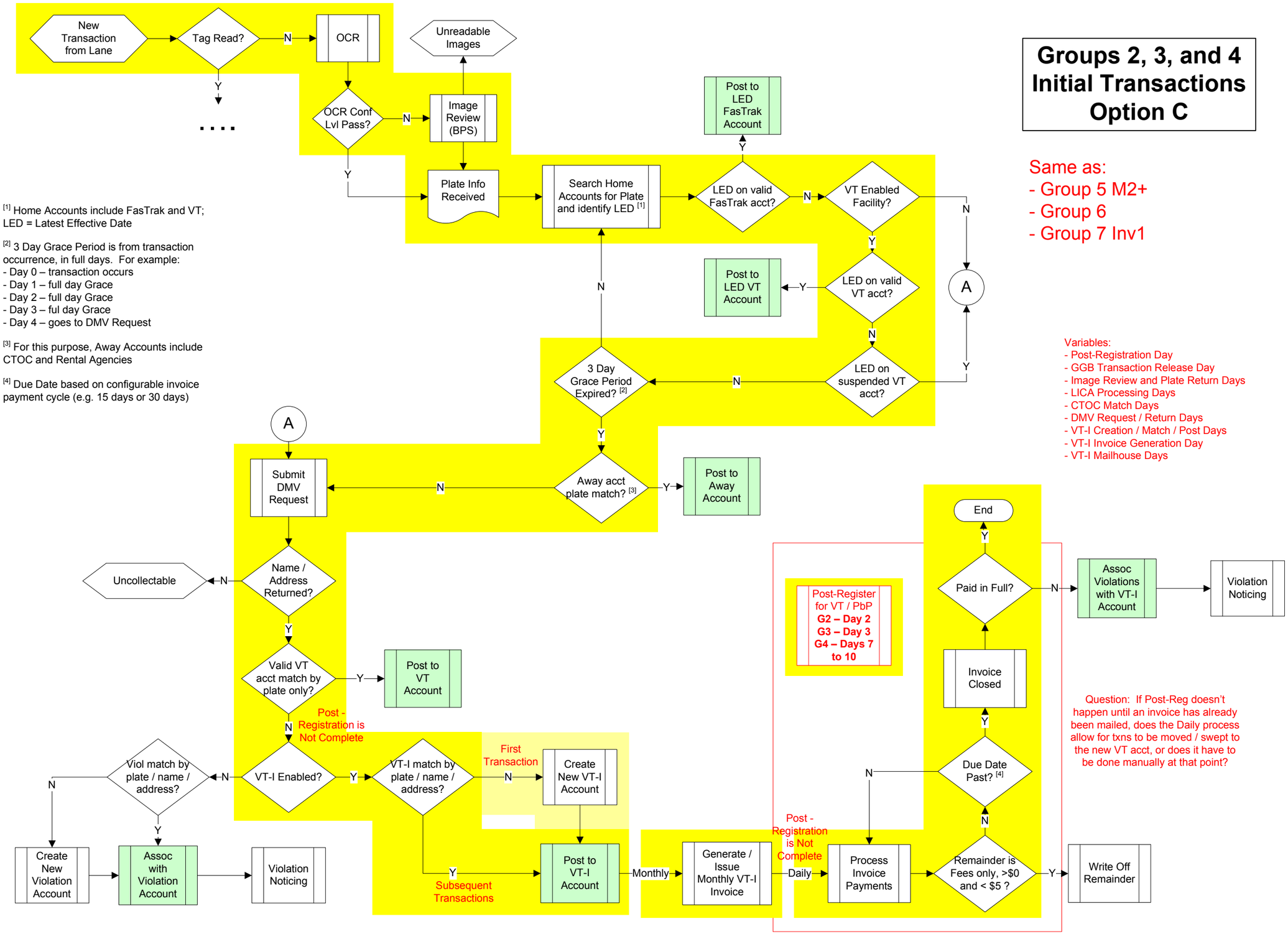
[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Variables:
- Post-Registration Day
- GGB Transaction Release Day
- Image Review and Plate Return Days
- LICA Processing Days
- CTOC Match Days
- DMV Request / Return Days
- VT-I Creation / Match / Post Days
- VT-I Invoice Generation Day

Groups 2, 3, and 4 Initial Transactions Option C

Same as:
- Group 5 M2+
- Group 6
- Group 7 Inv1



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

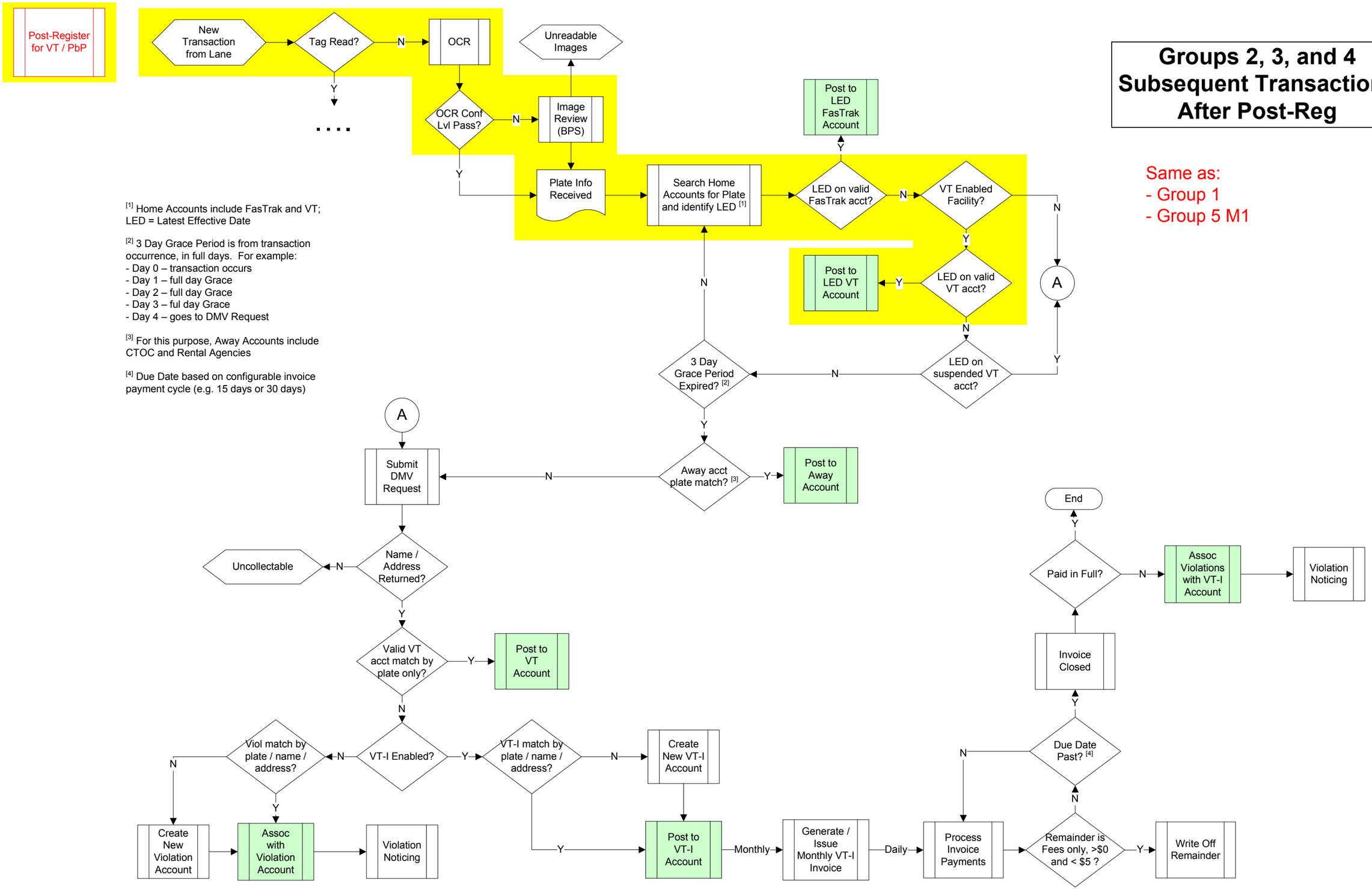
[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Variables:
- Post-Registration Day
- GGB Transaction Release Day
- Image Review and Plate Return Days
- LICA Processing Days
- CTOC Match Days
- DMV Request / Return Days
- VT-I Creation / Match / Post Days
- VT-I Invoice Generation Day
- VT-I Mailhouse Days

Question: If Post-Reg doesn't happen until an invoice has already been mailed, does the Daily process allow for txns to be moved / swept to the new VT acct, or does it have to be done manually at that point?

Groups 2, 3, and 4 Subsequent Transactions After Post-Reg

Same as:
- Group 1
- Group 5 M1



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

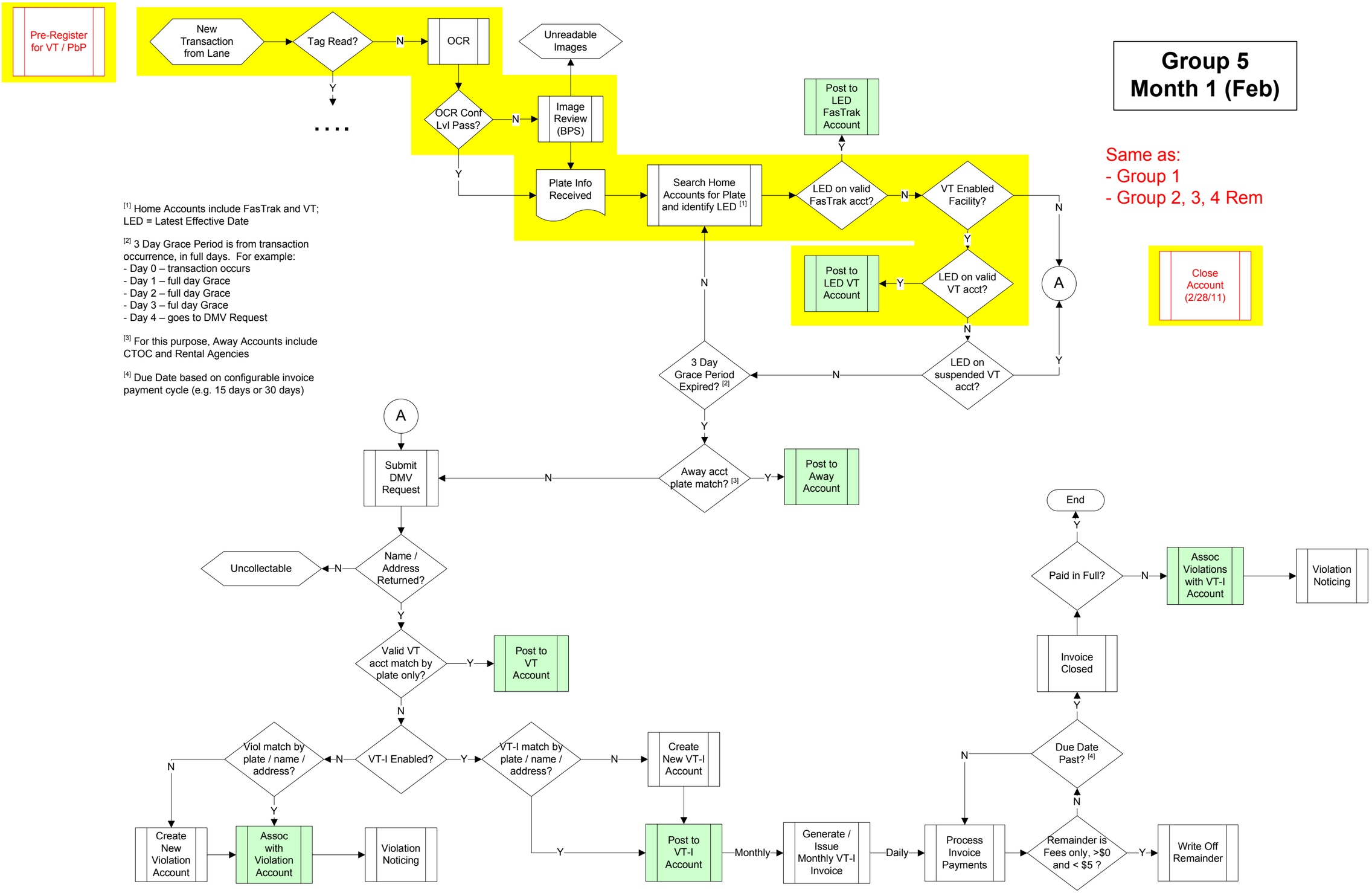
[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Group 5
Month 1 (Feb)

Same as:
- Group 1
- Group 2, 3, 4 Rem



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

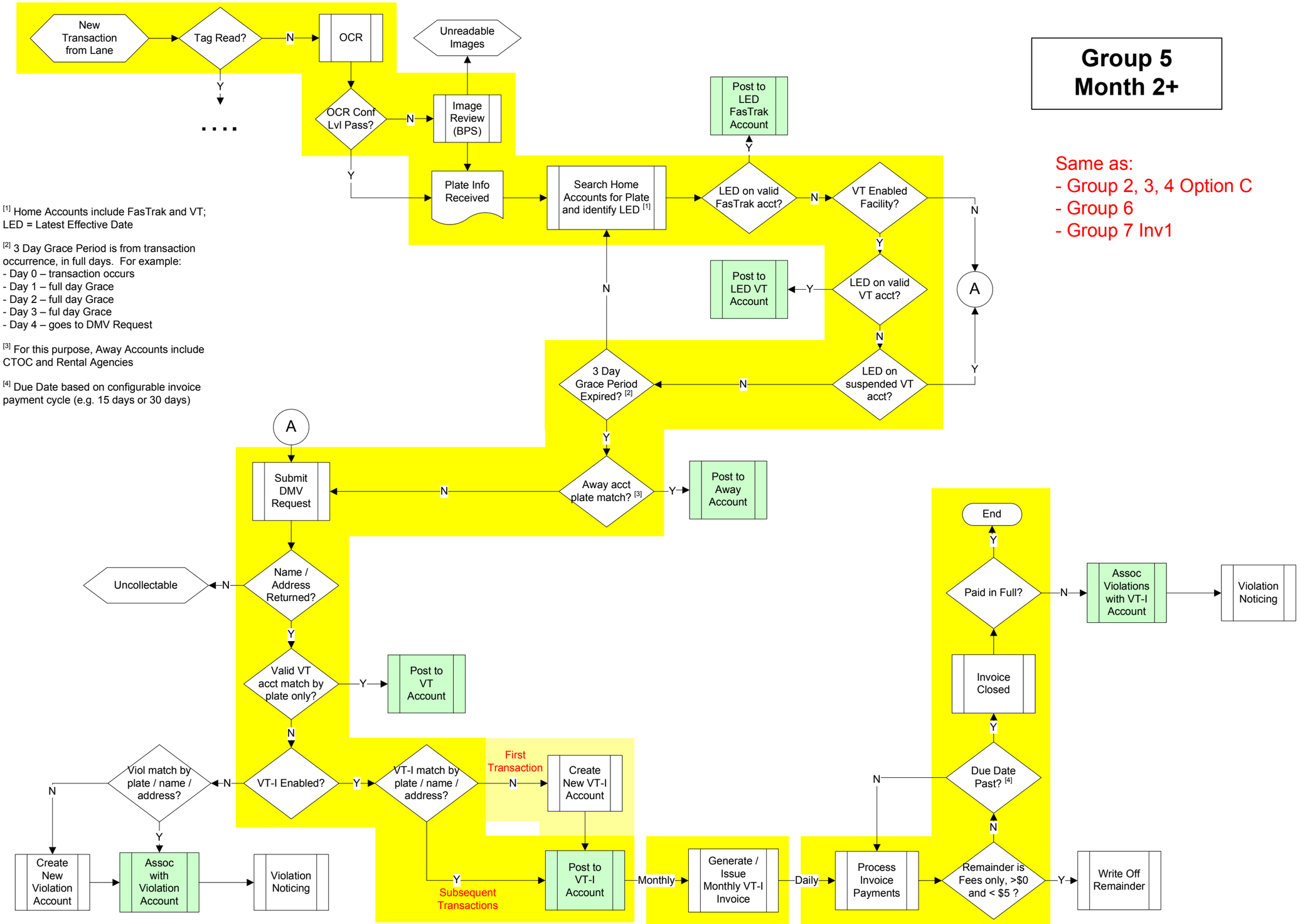
[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Group 5
Month 2+

Same as:
- Group 2, 3, 4 Option C
- Group 6
- Group 7 Inv1



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

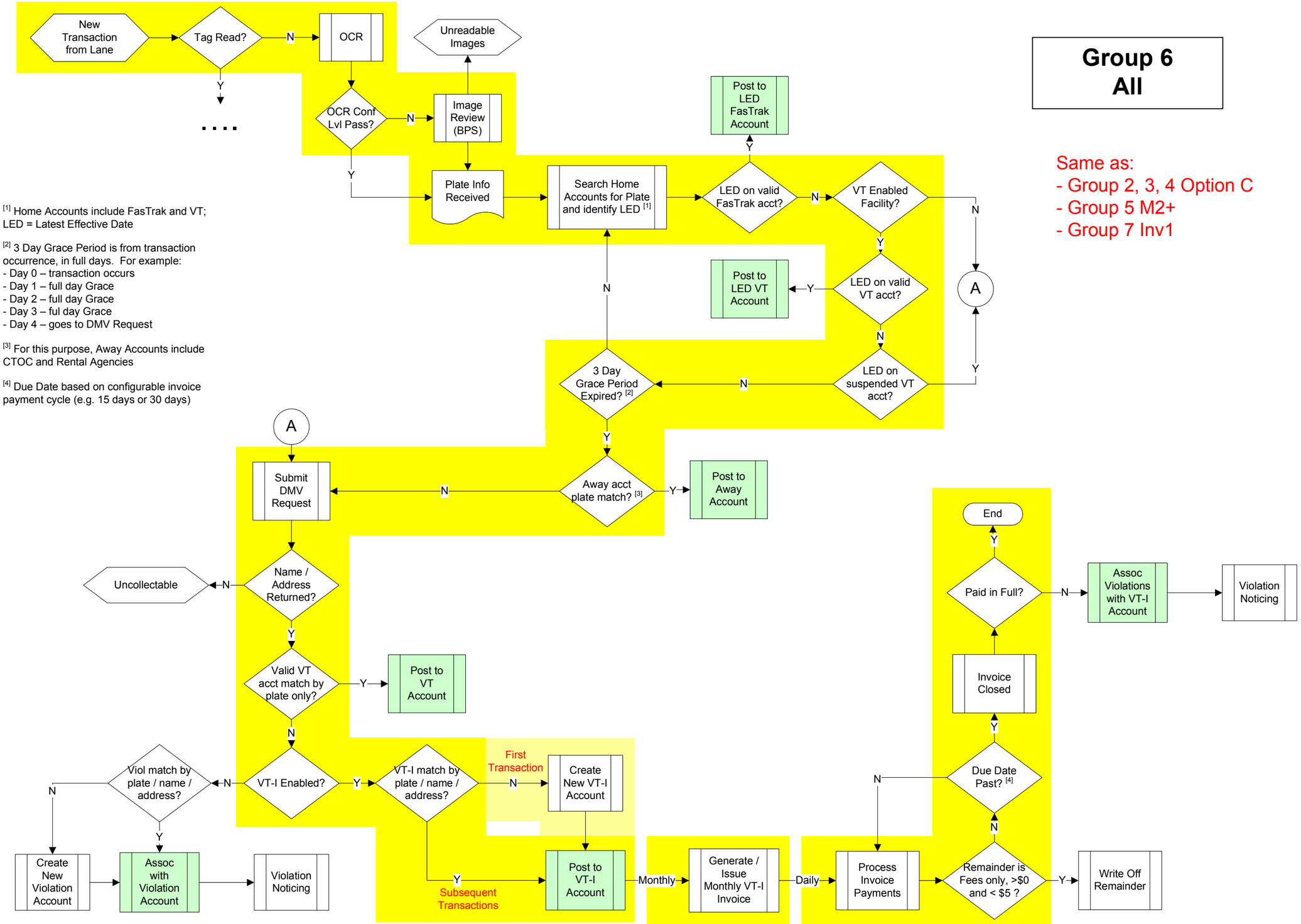
[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Group 6
All

Same as:
- Group 2, 3, 4 Option C
- Group 5 M2+
- Group 7 Inv1



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

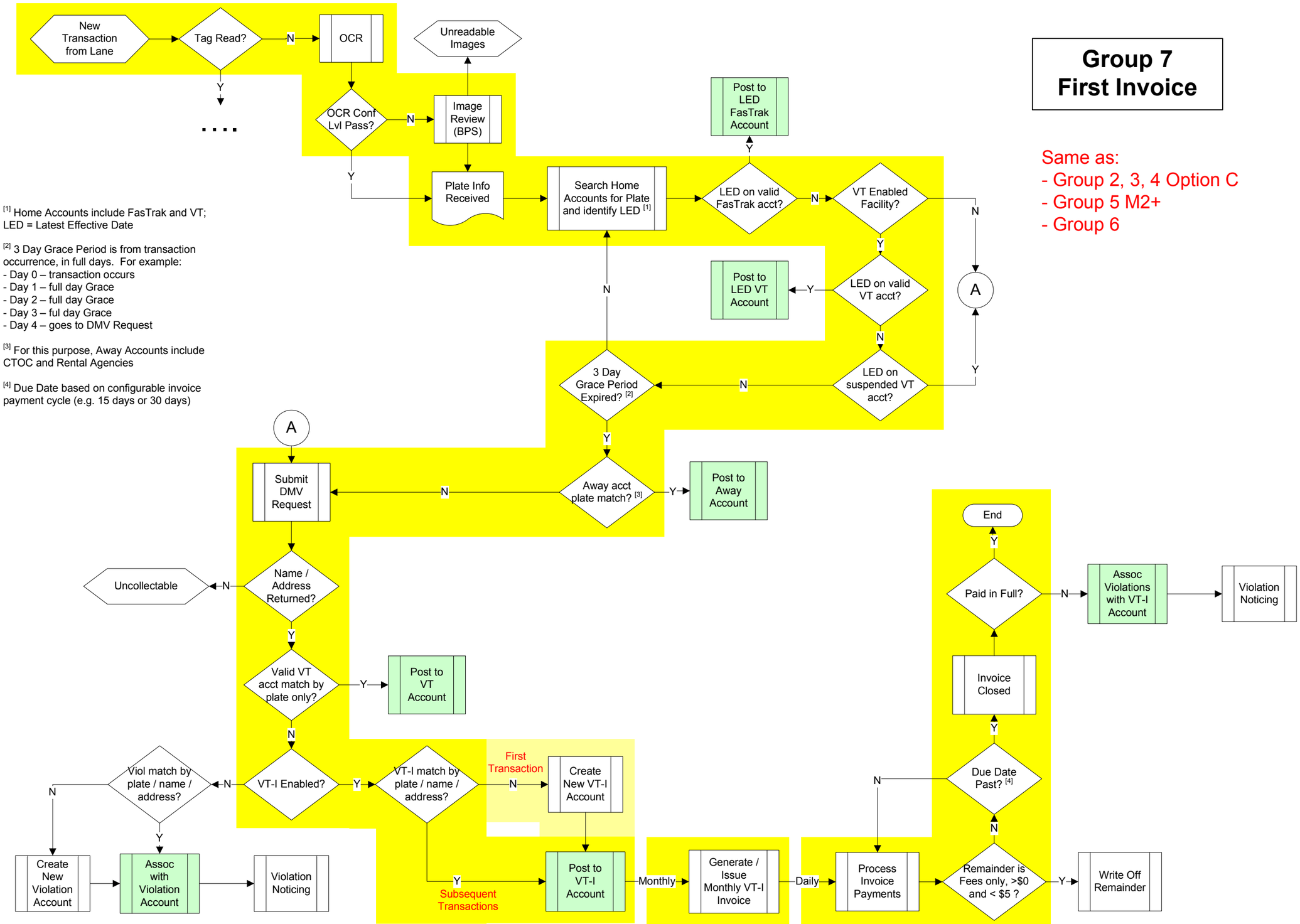
[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Group 7
First Invoice

Same as:
- Group 2, 3, 4 Option C
- Group 5 M2+
- Group 6



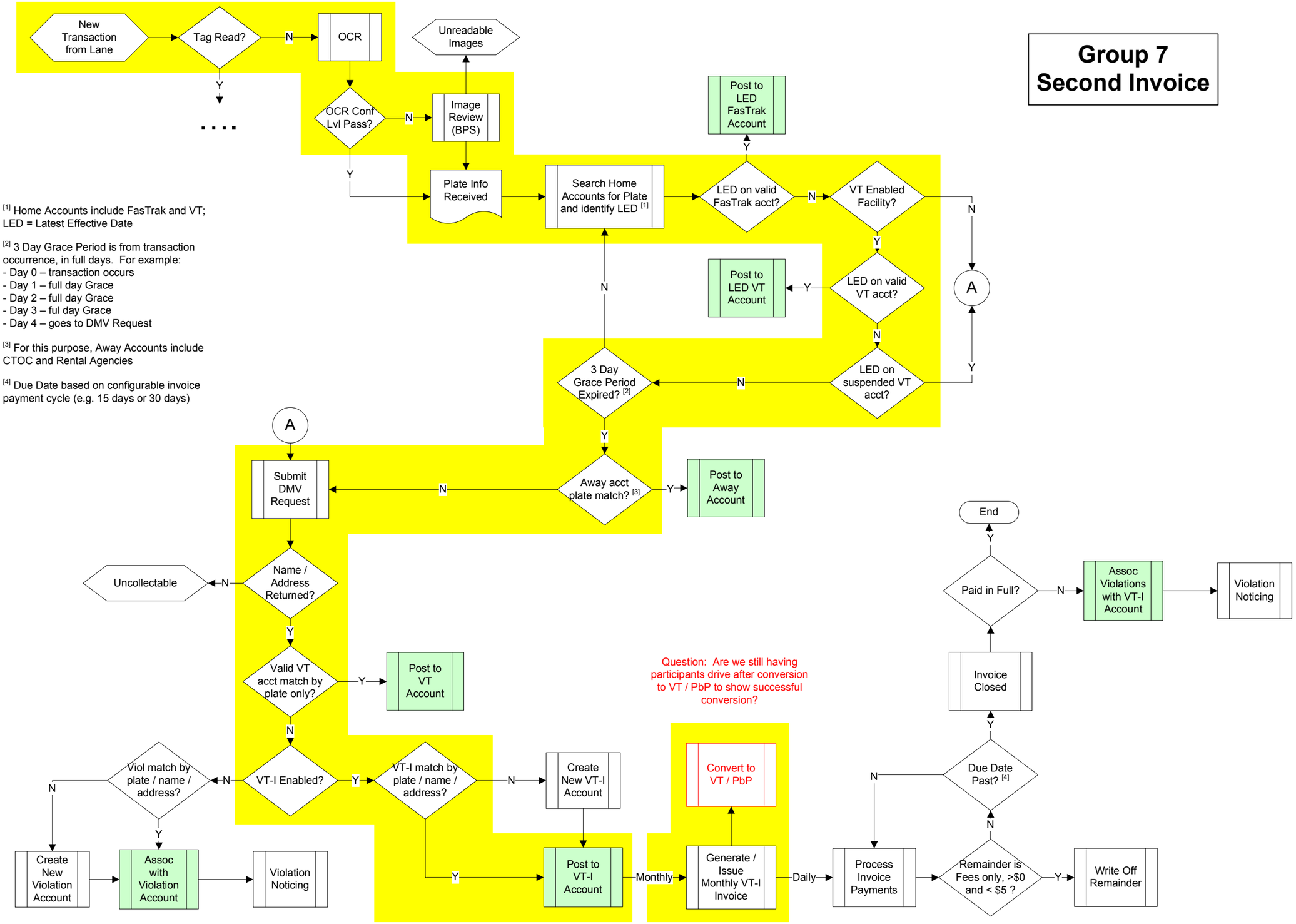
[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

Group 7
Second Invoice



[1] Home Accounts include FasTrak and VT; LED = Latest Effective Date

[2] 3 Day Grace Period is from transaction occurrence, in full days. For example:
- Day 0 – transaction occurs
- Day 1 – full day Grace
- Day 2 – full day Grace
- Day 3 – ful day Grace
- Day 4 – goes to DMV Request

[3] For this purpose, Away Accounts include CTOC and Rental Agencies

[4] Due Date based on configurable invoice payment cycle (e.g. 15 days or 30 days)

ATTACHMENT M:

VT Demonstration Transaction Processing Statistics

Summarized Statistics Definitions

VT

Total Processing Time: Average total processing time for all VT transactions generated by the participant. Calculated in full days from the date each transaction was generated (when participant crossed the bridge) to the date each toll transaction was posted to the VT account , and then averaged for the entire Demo period for each participant. All four headings listed below are subsets of this category.

- OCR Processing Time: Average processing time for VT transactions completed using OCR.
- Non-OCR Processing Time: Average processing time for VT transactions requiring manual image review.
- Min Processing Time: Shortest processing time for each participant's VT transactions.
- Max Processing Time: Longest processing time for each participant's VT transactions.

VT-I 1st Transaction to VTI Open: Time in full days from the date each participant's first VT-I transaction was generated (when participant crossed the bridge) to the date the associated VT-I account was opened by the system.

- 1st Transaction to 1st Invoice: Time in full days from the date each participant's first VT-I transaction was generated (when participant crossed the bridge) to the date when the associated invoice was generated by the system.
- Invoice to VT/FT Post: Average time in full days from each participant's invoices to the posting of the associated transactions to a VT or FasTrak accounts. These postings were associated with VT accounts opened later than five days after driving, or with account conversions. These statistics are not strictly system-related, since they are based on activities that required human interaction, so they are not measures of system effectiveness, but were tracked to ensure that Demo activities were proceeding as planned.
- Invoice to Payment Post Time: Average time in full days from the issuance of each participant's invoices to the posting of payments made to VT-I accounts. These statistics are not strictly system-related, since they are based on activities that required human interaction, so they are not measures of system effectiveness, but were tracked to ensure that Demo activities were proceeding as planned.
- Total Processing Time: Average total processing time from the date each participant's VT-I transactions were generated to the date each VT-I transaction was invoiced and posted. This statistic includes total transaction to invoice and invoice to payment (VT-I, VT, or FasTrak) posting time, averaged per participant.

Violation

Transaction to Violation Time: Average time in full days for all transactions generated by a participant that eventually converted to violations due to non-payment. These were primarily VT-I transactions associated with invoices that were generated and mailed, but never paid by the participant. Although scenarios were not planned that would cause participants to receive violations, it was anticipated that these situations would occur, and the associated statistics were tracked to ensure that the system was processing correctly. Violations issues were turned in to GGB for handling.

- Invoice to Violation Time: Average time in full days for all transactions included on a generated invoice but never paid, from the date of that invoice to the creation of an associated violation.

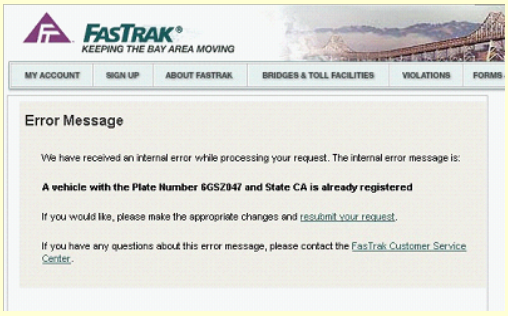
The following table has the summarized statistics per participant.

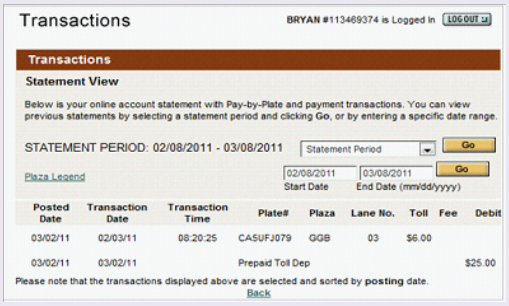
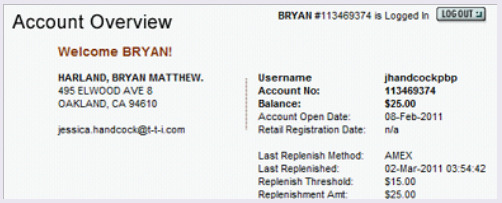
Participant	Group	VT					VT-I					Violation	
		Total Proc Time	OCR Proc Time	Non-OCR Proc Time	Min Proc Time	Max Proc Time	1st Txn to VTI Open	1st Txn > 1st Invoice	Inv > VT / FT Post	Inv > Pmt Post Time	Total Proc Time	Txn to Viol Time	Invoice to Viol Time
		Avg Days - Txn > Pmt			Days		Days		Avg Days			Avg Days	
19	1	4.67	2.25	6.94	2.00	9.00							
15	1	5.73	3.11	7.65	2.00	12.00							
61	1	2.00	2.00		2.00	2.00							
3	1												
35	1						6.00	22.00		8.67	21.72		
11	1	5.68	2.79	7.88	2.00	12.00	5.00	21.00	55.00		76.00		
45	1	5.25	2.50	8.00	2.00	9.00							
2	1	5.44	2.70	7.83	2.00	12.00							
6	1	7.00		7.00	7.00	7.00							
27	1	7.00		7.00	7.00	7.00							
59	1						7.00	22.00	5.00		15.50	33.00	17.00
23	2	6.55	3.71	7.45	2.00	12.00							
63	2	5.13	2.00	7.00	2.00	9.00							
40	2	5.50	2.00	7.25	2.00	8.00							
54	2												
28	2	5.75	2.73	7.90	2.00	12.00							
37	2	5.92	2.67	6.90	2.00	9.00							
55	2	5.40	3.35	7.53	2.00	9.00							
47	3	6.50	5.00	7.00	4.00	9.00							
20	3												
39	3	8.00		8.00	7.00	9.00							
64	3	4.95	2.40	7.08	2.00	9.00	5.00	20.00	10.00		28.33		
51	3												
25	3	5.59	2.86	7.26	2.00	9.00							
58	4						6.00	23.00		8.50	38.50		
60	4	5.84	3.67	7.80	2.00	9.00	6.00	20.00		7.00	26.00		
43	4	5.40	2.50	7.33	2.00	10.00	6.00	20.00		8.00	25.50		
38	4	5.21	3.05	7.37	2.00	9.00	5.00	21.00	32.00		49.20		
57	4	6.22		6.22	3.00	9.00	7.00	21.00	19.50		33.00		
33	4	8.50		8.50	7.00	10.00	7.00	22.00	5.00		27.00		
46	5						5.00	19.00				33.05	17.33

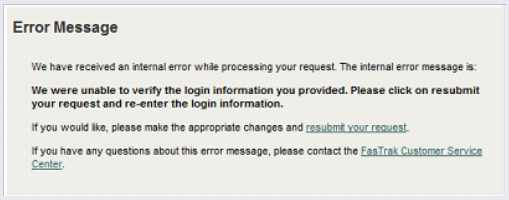
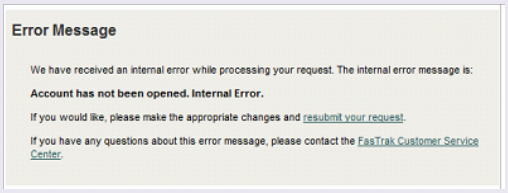
1	5	5.82	2.67	7.00	2.00	9.00	8.00	23.00	10.00		26.44		
13	5	2.00	2.00		2.00	2.00							
4	5	6.80	5.00	7.25	3.00	9.00	7.00	22.00		12.00	30.14		
31	5	6.00		6.00	6.00	6.00	7.00	22.00		15.00	34.00		
21	5	6.44	2.75	7.67	2.00	9.00	7.00	22.00		14.00	27.87		
62	6						8.00	23.00		13.00	29.00		
24	6												
7	6						7.00	22.00	2.00	12.33	22.88		
56	6						6.00	20.00	9.00	9.50	25.50	34.00	17.00
42	6												
48	6												
16	6						5.00	20.00		7.00	21.23	36.50	17.00
49	6						7.00	22.00		7.50	22.75		
5	6						5.00	20.00		9.67	25.46		
30	6												
26	6						9.00	24.00		7.50	32.00		
52	6						7.00	22.00		12.67	27.85		
14	6						4.00						
17	6						7.00	22.00		15.00	36.50		
12	6						5.00	20.00					
53	7						5.00	20.00	11.00	8.33	23.29		
44	7						5.00	20.00		10.00	24.10		
~~29~~	~~7~~												
9	7	2.00	2.00		2.00	2.00	6.00	22.00	16.12	14.56	24.85		
36	7												
50	7						5.00	20.00				32.78	16.50
18	7	7.63		7.63	6.00	10.00	6.00	20.00	11.00	12.00	28.45		
34	7						7.00	22.00		9.00	25.00		
10	7						6.00	21.00		18.00	34.25	33.88	18.00
		5.66	**2.86**	**7.34**	**2.00**	**12.00**	**6.18**	**21.25**	**15.47**	**10.87**	**29.73**	**33.87**	**17.14**

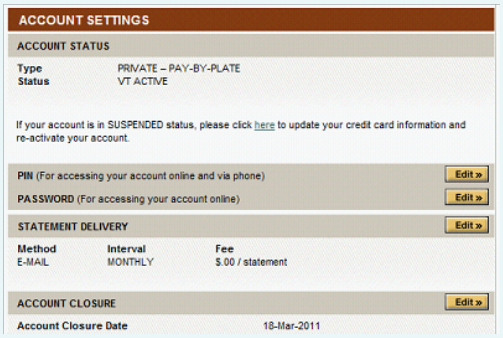
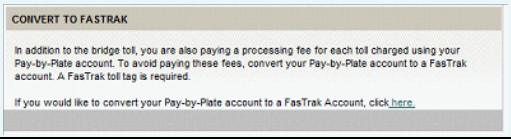
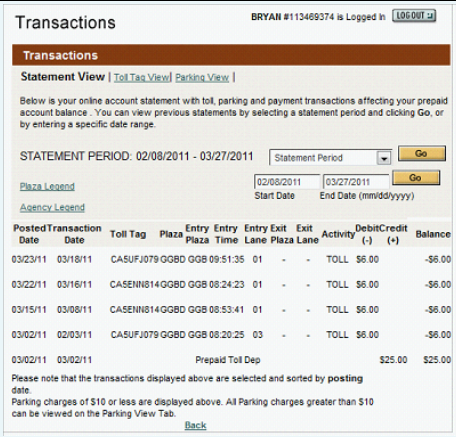
ATTACHMENT N:

Participant Issue Tracking Log

VT Demo Participant Issues Log					
Issue	**Date**	**Issue Description**	**Screenshot**	**Resolution**	**Disposition**
1	1/31	"Internal Error Found. Please contact Customer Service."		Second attempt successful. Possible timeout.	Low Level System Change
2	1/31	"Internal Error Found. Please contact Customer Service." "Internal Error Found. Username already exists."		Possible timeout. Instructed to try again. Participant was frustrated by this message and unclear how to proceed. Instructed to use a different username. This occurred twice.	Low Level System Change
3	1/31	Website would not accept the full CC number.		Visited Lona on 2/1. Instructed her to omit the dashes and complete the number.	User/Op Issue
4	1/31	Any need for CC name and security code?		Advised that these items are not needed for registration.	User/Op Issue
5	1/31	Internal error received when attempting to create account.		Second attempt successful. Possible timeout.	Low Level System Change
6	2/2	Four unsuccessful attempts to create PbP account.		Subsequent attempt successful. Possible timeout. Participant was frustrated by this message and unclear how to proceed.	Low Level System Change
7	2/2	Request to remove violation for 2/2 crossing (prior to registration).		Notified that the crossing will sweep to PbP account created 2/3.	To Do
8	2/12	Crosses GGB everyday. When will I receive an invoice?		Notified that invoices will be sent about 2 weeks after crossing.	User/Op Issue
9	2/15	Tolls not showing on PbP account online. Group 4, registered 2/8. Asked Stefany to confirm LPN entered is correct.		Incorrect LPN entered on PbP account. Hence tolls did not post.	User/Op Issue
10	2/16	Violation received on RSR bridge - 1/27. ACS unable to sweep to FT account without adding plate. Requested check for toll amount from Dan.		Check submitted to CSC for toll payment.	User/Op Issue
11	2/18	Unsure whether she needs to register before crossing GGB.		Group 6 - no account registration required.	User/Op Issue
12	2/22	Transponder in Mylar bag, but tolls charged to FT account - 2/18 and 2/22.		New Mylar bag provided.	User/Op Issue
13	2/22	Error: Plate already registered when attempting edit. 2/8 - Created VT account. 2/15 - Checked account online and noticed no txns. 2/22 - Incorrect LPN on account (6G52047). Unable to edit LPN; received error message (see screenshot). 2/24 - Added correct plate (6GSZ047) to VT account. Incorrect plate is still on the account. 2/28 - 1. Attempted to edit the first/incorrect LPN; reproduced error message (see screenshot). 2. Successfully changed the effective date of the second/correct plate to 2/15. 3. Attempted to change effective date of correct plate to 2/8 (eff. date of first/incorrect plate) and received same error message (see screenshot). 4. Successfully changed the effective date of the correct plate to 2/9.		This appears to be a timing issue. The participant attempted to create a PbP account around the same time that the system created a VTI account for the same license plate. Hence she was not able to create an account with the correct plate number.	User/Op Issue
14	2/28	Which address should be used to pay an invoice?		Indicated that the GGB address be used. Invoice successfully paid.	User/Op Issue
15	2/28	Receiving error message when attempting to pay invoice.		Was entering a lower-case letter 'L' rather than an upper-case letter 'i'. Invoice successfully paid. Invoice font should be addressed for full implementation to avoid confusion.	Low Level System Change
16	3/2	Unable to pay invoice online using GGB billing address and CC info.		Included +4 for GGB billing address = unable to pay, as billing address does not match what is on file. Omitting +4 = invoice successfully paid. 5/2/11 ACS - The participant should not receive an error the +4 after the zip. We would need an error message to research further.	User/Op Issue

Issue	Date	Issue Description	Screenshot	Resolution	Disposition
17	3/2	Pre-invoice, but post grace, txns do not sweep to VT. 2/2 - Crossed GGB. 2/10 - Created VT account according to Group 4 (on day 8). 3/1 - Received an invoice dated 2/22 (I1102800007). --Expectation was that this invoice would not be generated, rather sweep to VT account. 3/2 - Invoice paid online.		There is not currently an additional check against accounts prior to invoice generation.	System GAP
18	3/2	**VT created on grace day 3 does not sweep to account.** 2/7 - Crossed GGB. 2/10 - Created VT account (this is the 3rd grace day). 3/1 - Invoice # I1102800007, dated 2/22, received; includes txn on 2/7. 3/2 - Invoice paid online.		3/7 - Effective date message needs clarification. Customers must back-date the plate effective date in order to take advantage of the 'grace period'.	Low Level System Change
19	3/3	Received an invoice and unable to log into her account (per account number printed on invoice) because the website asks for a PIN, which she does not have.		Informed that she must go to a separate URL for invoices. She was confused that she could not log in to the account (via 'My Account' on FasTrak website), given that she had an account number listed on the invoice. May want to include a message on the 'My Account' tab for invoice recipients. Sent Nancy the URL for paying invoices. Invoice paid successfully.	User/Op Issue
20	3/7	Created VT account on 3/7. Account Overview page shows replenishment information (method/threshold/amt/date).	 **Username** lindatest1 **Account No:** 113622568 **Balance:** $.00 Account Open Date: 07-Mar-2011 Retail Registration Date: n/a Last Replenish Method: VISA Last Replenished: 07-Mar-2011 14:35:29 Replenish Threshold: $15.00 Replenishment Amt: $30.00	Removed from Account Overview page.	Minor Fix
21	3/8	Converted first invoice I1102800014 to VT account (113469374). Transaction history shows a 'Prepaid Toll Dep' charge of $25 on 3/2.	 Transactions BRYAN #113469374 is Logged In LOGOUT Transactions Statement View Below is your online account statement with Pay-by-Plate and payment transactions. You can view previous statements by selecting a statement period and clicking Go, or by entering a specific date range. STATEMENT PERIOD: 02/08/2011 - 03/08/2011 Statement Period Go Plaza Legend 02/08/2011 03/08/2011 Go Start Date End Date (mm/dd/yyyy) Posted Date / Transaction Date / Transaction Time / Plate# / Plaza / Lane No. / Toll / Fee / Debit 03/02/11 02/03/11 08:20:25 CA5UFJ079 GGB 03 $6.00 03/02/11 03/02/11 Prepaid Toll Dep $25.00 Please note that the transactions displayed above are selected and sorted by **posting** date. Back	Last replenishment date is the date when money was replenished via CC. 3/25/11 ACS - Can't re-create the scenerio - going to monitor the particpates converting from VTI to VT. 3/28/11 LL - I took a look in VECTOR, and under the "Non-Financial History", is shows the following transaction occurring on 3/1/11: "INVTOVT CONVERSION". This means that the VT-I acct was converted to VT on 3/1/11, not to FT. Then on 3/23/11, it shows the following tranaction: "PAYBYPLATE CONVERSION". This is correct, b/c JH converted to FT on 3/23/11. So the question is: If the first conversion was VTI to VT, then why did Vector charge a $25 rebill on 3/2/11, as if it were a FT conversion? 4/1/11 ACS - A fix has been put in to ensure that the VT and VTI accounts are not re-billed, Until the root cause is identified, this fix is in place. 4/8/11 ACS - In order to find the root cause, we have created a back-end job to track the transactions if this error occurs again. 5/2/11 ACS - VTI to VT conversion accounts were in the queue to be rebilled. This has been fixed. Closed. Jessica tested.	Major Fix
		3/23 UPDATE: The VT account was converted to FT. New Account Overview shows a 'Last Replenished' date of 3/2.	 Account Overview BRYAN #113469374 is Logged In LOGOUT Welcome BRYAN! HARLAND, BRYAN MATTHEW. 495 ELWOOD AVE 8 OAKLAND, CA 94610 jessica.handcock@t-t-i.com **Username** jhandcockpbp **Account No:** 113469374 **Balance:** $25.00 Account Open Date: 08-Feb-2011 Retail Registration Date: n/a Last Replenish Method: AMEX Last Replenished: 02-Mar-2011 03:54:42 Replenish Threshold: $15.00 Replenishment Amt: $25.00	4/13/11 GGB: A replenishment amount ($25) and method (AMEX) show on my statements (dated 3/8 and 4/6) as well. This week, I can convert a first VTI to VT again to test the fix for Issue 38. This is the only other time a participant is converting from a first invoice. Do we want to disable the temporary fix when this happens to monitor? Please advise. FYI - No charge on my AMEX. 4/14/11 ACS - There is a trigger which inserts accounts into the rebill queue, whenever the rebill paytype or rebill amount is changed. We made a fix to the trigger so VT or VTI accounts are not to inserted into the queue. 4/18/11 GGB: ACS provided the BofA deposit report for this card, and I located $25 charge on AMEX statement. (We checked the wrong statement...) 4/20/11 GGB: Unable to test this issue, as repeated attempts to convert a first invoice to VT were unsuccessful.	

Issue	Date	Issue Description	Screenshot	Resolution	Disposition
21.1	3/15	'Prepaid Toll Dep' shows on Transactions View. Jess to follow up with Stefany re FT conversion.		3/7 - Participant (unintentionally) converted to a FasTrak account while attempting to pay an invoice online. 3/8 - $30 replenishment charged to GGB AMEX. 3/12 - $30 replenishment charged to GGB AMEX. 4/14/11 ACS - There is a trigger which inserts accounts into the rebill queue, whenever the rebill paytype or rebill amount is changed. We made a fix to the trigger so VT or VTI accounts are not to inserted into the queue.	User/Op Issue
22	3/16	Attempting to use my PbP account to pay invoice I1103800003 (i.e. via 'FasTrak or Pay-by-Plate Account Holders' section). The license plate 5ENN814 is on the PbP account already. Received the error message at right on each of several attempts with both credential pairs (acct # and pin; username and pwd). 3/24 UPDATE: Same error message received when trying to pay invoice using FasTrak account--again trying both acct#/pin and username/pwd.		3/25/11 ACS - Jessica converted to VT account before we could research the issue. We will have Tim re-create the scenerio once he rec'es his invoice. 4/1/11 ACS - This error was caused by having the wrong IP - this has been fixed. Please try again. 4/7/11 GGB: David to attempt this with current invoice. PbP account created 4/7/11. 4/11/11 GGB: David successfully paid an invoice to a VT account on 4/7/11. -- CLOSED	Minor Fix
23	3/16	Violation received for 2/13 GGB crossing (T1102010397). No VTI account created.		LP not added to demo plates until 3/9.	User/Op Issue
24	3/17	Invoice I1102800016 was partially paid (toll only). Invoice status is now 'Posted by license plate'. What is this status?		3/25/11 ACS - Invoice had 1 transaction. Customer paid the toll (in full) only, which converted the invoice status to PART-PAID. Plate sweep checks OPEN & PART-PAID notices/invoices and as part of this process, since there was no outstanding TOLL receivable, the other INVOICE FEE was written-off by plate sweep & hence the status of DISPLSWEEP. The description for the plate sweep is maybe what is causing the confusion?. There was no posting by plate to any account. 3/28/11 LL - The status on the web needs to be changed. 4/1/11 ACS - Long term code change - place on GAP	Low Level System Change
25	3/17	Expired CC caused acct suspension; VTI account created. It was anticipated the account would not be suspended--rather that txns would post successfully to the VT account because the bank has updated CC info.		When the new CC was activated (new number and new expiration), the old card number was de-activated, causing a hard decline from the bank. System behaved as expected--suspended account.	User/Op Issue
26	3/18	Crossing on 3/16 does not show on account. 99% OCR on 3/16 and violations released on 3/17. Shouldn't this toll have been charged on 3/17? 3/16 at 8:24 in Lane 1.		Images were not released by GGB until 3/21. Transaction posted that night as expected.	User/Op Issue
27	3/21	Error message shown at right received when attempting to convert VTI (second invoice) to VT using invoice I1103800007. Attempted to convert VTI (second invoice) to VT; received error message at right. Attempted to convert from second invoice to VT. Provided unique username and password. Forwarded to the 'Verify Info' page, selected 'Sign Me Up', and forwarded to error message at right.		3/25/11 ACS - Seems to be an issue when there is a email on the a/c. Probably the email was added at the time of 1st invoice payment. While Analyzing the issue, we would like others to try and re-create it. 3/28/11 LL - The statement "...the email was added at the time of 1st invoice payment" does not make sense, b/c an email address is not required when making an online invoice payment. 3/31 GGB: The participant I asked to recreate this missed the payment deadline - the transactions had escalated to violation. We will continue to monitor participants asked to convert. 4/1/11 ACS - The long term fix is on the development system - it will be released into production by 4/13/11. Then we can test. The short term fix is to remove the email address and the account can convert. 5/2/11 ACS - Test results will be available this week, an client testing to discuss this week. 4/12/11 GGB: I can test with Aida's invoice (I1104800004) when this fix is in place. 4/15/11 ACS - The long term fix will be in production on 4/19 and we can test it at that time. 4/20/11 GGB: Able to convert VTI (fourth invoice) to VT acct # 113466669. Asked to enter and re-enter an email address to register, so it does not appear that this carried over from previously paid invoices. Also, no transactions are shown on the VT account. There were 7 on the invoice used to convert. These should show on the VT txn history (new issue 44). This issue is closed.	Major Fix

Issue	Date	Issue Description	Screenshot	Resolution	Disposition
28	3/21	Invoice delay. Invoice dated 3/11 (system Invoice Date is 3/10) not received until 3/19. Tim to monitor receipt of next invoice.		Check with MH 3/25/11 ACS - We will monitor via Tim's invoice. Also- any other feedback from participates would be great. 3/31 GGB: We received an email from a participant indicating that the time between invoice receipt and due date was unrealistically short--although she could not remember the date of receipt. Participant also upset that the invoice had already escalated to violation ON the printed Due Date (see issue 36). 4/1/11 ACS - Thanks - let's continue to monitor. 4/12/11 GGB: This will not be an issue for full, as the CA mailhouse will be used. -- CLOSED 4/13/11 GGB: I1104800004, dated 4/7 (system date), received 4/12.	User/Op Issue
29	3/22	Misleading Invoice Status on website. Participant confused by violations received for txns on an invoice with an 'INVOICE DISMISSAL' Invoice Status.		Invoices with transactions that have been escalated to violation should have an Invoice Status value that indicates this. Long term fix.	Low Level System Change
30	3/22	Invoice payments show on CC statement as 'FASTRACK VIOLATIONS' payments.		Will need to be addressed for full implementation.	Low Level System Change
31	3/23	VT account created on 3/16 with an account closure date of 3/18. The rental car was driven across GGB on 3/16 and returned on 3/18. On 3/23 the Account Profile indicates that the status is 'VT ACTIVE'. The statement just below indicates that the account is in 'SUSPENDED' status and suggests that the CC info be updated. 3/25: Woops, it says "If"; disregard this bit... What is the status of this account?		3/25/11 ACS - The status will remain as ACTIVE until Monday. There is a separate job that runs to close accounts automatically for VT. This job will be running daily as of Monday, 3/28. 3/31 GGB: As of 3/31, I am still able to log in to the account, and the 'Account Prifile' page indicates that the Status is 'VT ACTIVE' 4/1/11 ACS - The account status will change after 90 days - no tolls will post to account with a transaction date past the account end date - but if tollsare processed within the acct open timeframe - they will post. 4/7/11 GGB: This will be addressed for full implementation. Would like to have the status indicate something other than 'ACTIVE' and shorten the 90-day period to 30 days.	Low Level System Change
31.5	3/23	The "If your account is SUSPENDED…" should only appear on suspended accounts.		3/28/11 LL - The SUSPENDED note is only suppose to appear if the "status" = SUSPENDED. If the account is "ACTIVE", the note about suspension should not appear. During web testing, this was corrected. It seems the correction was undone. This needs to be fixed. 4/7/11 GGB: To be addressed for full implementation.	Defect
32	3/23	Account profile page indicates that Pay-by-Plate users are charged a processing fee per transaction.		Processing fees, and all references to them, must be addressed for full implementation.	Low Level System Change
33	3/23	VT account converted to FT on 3/23. Website indicated that VT transactions would not be viewable on the web after conversion. However, the 'Transactions' page shows all previous (VT) transactions. Note that the 'Latest Toll Transactions' section of the 'Account Overview' page shows no VT/pre-FasTrak transactions.		3/25/11 ACS - They are viewable on the FT account but not the VT account after conversion. If you would like them - they can stay. We will need direction and we can modify to accomadate and change veribage. 3/28/11 GGB: Will need to address possible changes to verbage/display.	Low Level System Change
34	3/24	Why is this 'Toll Evasion Penalty' shown as $26 when all others are $25?		This includes the invoice fee carried over from an unpaid invoice. Demo only--violation notices will be addressed for full.	System GAP

Issue	Date	Issue Description	Screenshot	Resolution	Disposition
35	3/30	Tagged Vio w/ no images on VT facility. A vehicle with two tags (one valid and one invalid) driven across GGB. Transaction manually ended, generating one Tagged Violation transaction (for 02620080237). No images captured for the transaction. No transaction for the other tag (02608180426) or plate (5ENN814). If a plate were captured, an invoice should be generated, correct? So what should happen here? Need to monitor. Txn ID: 0107316001 Lane 1 3/30 at 9:23:11 No OCR		4/1/11 ACS – If a violation has a tag associated to it and no image, we will still try to post to the account. If the account has a valid balance, we post as a VTOL. If the account is invalid, we reject the transactions. 4/4/11 GGB: Tagged violations for which we have valid images should prompt the VTI invoicing process. This was tested and confirmed for the demo. As violations require a DMV lookup, and this cannot be done without a license plate, no change to this process. That is, a tagged vio with no images must be rejected.	User/Op Issue
36	3/30	**Invoice Date discrepancy** Participant received an invoice (I1103800005) dated 3/10 and indicating a due date of 3/25; however, the ad hoc report indicates an invoice date of 3/8. Appears that the system and mailhouse dates are out of sync.	Portion of scanned invoice from participant: TOLL INVOICE Invoice Date: 03/10/11 Invoice Number: I1103800005 Account Number: 113466677 Total Amount Due: $13.00 Due Date: 03/25/11	**4/8/11 ACS** - We populate the ACK file date in Vector. This may differ by a day or 2 from the mailing. **4/12/11 GGB:** This should be addressed for full, as the 'Invoice date' indicated on the website does not match the printed 'Invoice Date'.	Defect
37	3/30	**Due Date = Escalation Date** Participant received an invoice (I1103800005) dated 3/10 and indicating a due date of 3/25. I logged into the VTI website on the morning of 3/25 and saw that the invoice had been dismissed/escalated.	Same as previous.	4/1/11 ACS - The VTI RD states that the violations will be escalated 15 days from invoice date not allowing customers time to pay. We need to re-define the date for escalation. Suggestion: 15 day +5 for Demo (total 20 days). Maybe longer for full implementation. 4/4/11 GGB: Currently the Invoice Due Date is equal to the date for unpaid, invoiced transactions to be escalated to violations. This will need to be changed for full implementation so that the escalation date is the day (or x days) after the invoice due date.	System GAP
38	4/4	First attempt to log in to VT account (after conversion from VTI), prompted to "Please enter your email address to continue to your online account. If you do not remember the email address on file with FasTrak, please contact the FasTrak Customer Service Center." See email from Linda 3/28. Should attempt to reproduce. This was after conversion from first invoice.		4/8/11 ACS - Email address are being manually removed from VTI accounts to allow for conversion. A long term is being created and tested now. 4/12/11 GGB: I can attempt to recreate with Ging Ging's first invoice (I1104800002) in order to confirm error message or to test fix if one is in place by 4/15. Please advise. 4/15/11 ACS - The long term fix will be in production on 4/19 and we can test it at that time. 4/20/11 GGB: Unable to test this issue, as repeated attempts to convert a first invoice to VT were unsuccessful. 5/2/11 ACS - This has been fixed. The error message only occurred when email addresses were manually removed from VTI accounts as the short term resolution to #27. Test results will be available this week, an client testing to discuss this week.	Major Fix
39	4/5	No Due Date shown on the VTI website.		Should be addressed for full implementation.	System GAP
40	4/7	VTI -> VT requires plate entry David created a VT account and added his LP with a back dated effective date. He then logged into the VTI site with his invoice and attempted to pay the invoice with his VT account (under the 'FasTrak or Pay-by-Plate Account Holders' section). He was forced to enter a plate number. Added the same plate number with a different effective date.		4/15/11 ACS - The LP (effective date 4/7) was not back dated far enough to sweep the invoice transaction (3/25) , so he had to add the plate again with a further back effective date (3/21). Alternatively, he could have back dated his plate on his VT account before paying the invoice. 4/18/11 GGB: Need to communicate this to the customer. Revisit wording for full implementation.	Low Level System Change
41	4/8	Two open invoices for one plate Participant was able to pay two invoices (I1103800028 and I1104800006) on 4/8. My understanding was that, for the demo, system due date = system invoice date + 15 = escalation date = next invoice date. And hence that there should never be two open invoices at one time for one VTI account. Need to get clear on our invoice cycle dates/timing.		4/15/11 ACS - The transactions on the invoices are different. There maybe some overlap between when the first invoice is escalated and when the second invoice is created. The first invoice is escalated on the 15th day from the mail date and the second invoice is mailed on the 15th day from the first invoice creation date. 4/18/11 GGB: The invoice schedule will need to be addressed for full implementation.	System GAP
42	4/8	**Error message displayed when selecting invoice txn** Logged into VTI account (I1103800028), selected invoice, selected txn (e.g. I1103800028-1), received null error message at right. No issue viewing images on other invoices	Error Message We have received an internal error while processing your request. The internal error message is: If you would like, please make the appropriate changes and resubmit your request. If you have any questions about this error message, please contact the FasTrak Customer Service Center.	4/15/11 ACS - The image server may have been down momemtarily. No errors were found in the error log. The participant should be able to view the image. 4/18/11 GGB: Logged in on 4/15 and was able to view images with no problem. No ACS intervention required.	User/Op Issue

Issue	Date	Issue Description	Screenshot	Resolution	Disposition
42.5		No issue viewing images on other invoices (I1102800003 and I1103800003).		Should change (populate) this error message.	Defect
43	4/11	Need to determine which invoice date is used to calculate the escalation date for invoiced transactions - system invoice date or printed/MH invoice date (see issue 36). As the system invoice date is a day or two earlier, use of this date would cause transactions to escalate prior to the printed due date.		4/15/11 ACS - The invoice escalation date is calculated from the mail house date. For the demo this is set at 15 days. We are comparing this to the escalation calculation of violations. 4/18/11 GGB: The system escalation date is 15 days from the MH invoice date. Invoice timing will be revisited for full implementation.	System GAP
44	4/20	When converting VTI to VT, txns should show on VT acct The 7 transactions from invoice I1104800004, which was converted to VTI on 4/20, should show as posted on the VT account. When logging into the invoice, invoice status is 'Dismissed Citation Posted as Toll', as expected. When I converted VTI to VT early in the demo (acct # 113469374), invoiced txns carried over to VT account.			To Do
45	3/30	Online payment asked for address information. Since I used District credit card, wasn't sure what to enter. Finally just put a 1 in each blank and the computer accepted it.		5/2/12 ACS - There are no checks for content in the address fields. The only check in place is validating the zip code. All "1s" for the zip code it would be accepted because it is a valid zip code. However, a single digit "1" for the zip code would not be accepted. We would need the exact information that was entered to do further research.	User/Op Issue

ATTACHMENT O:

Final Participant Survey

VIDEO TOLLING DEMONSTRATION

FINAL PARTICIPANT SURVEY

Thank you for participating in the Video Tolling Demonstration! Now that the Demonstration Phase is over, we would like to get your general feedback about implementing these programs in the future. Before answering the questions below, please review the following information about the three different types of toll payment programs being considered.

Program	**EXISTING OPTION**	**NEW OPTIONS – VIDEO TOLLING PAYMENT**	
	FasTrak	**Pay-By-Plate**	**Invoice**
How it works	First open a FasTrak account. When you cross the bridge, a toll tag inside your vehicle deducts your tolls from a pre-paid toll account.	When you cross the bridge, toll equipment reads your license plate and charges your tolls to the credit card on your account. You can register for this account before you cross or up to a few days after.	When you cross the bridge, toll equipment reads your license plate. An invoice is mailed to you to pay your tolls.
Account Setup Requirements	Credit Card - $25 initial account balance Cash/Check - $50 initial account balance	A credit card is kept on the account to pay for tolls after trips are taken (that night).	None
Toll Tag Deposit	Credit Card - None Cash/Check - $20 (refundable)	None (no toll tag needed)	None (no toll tag needed)

SURVEY (Fill in the gray areas with your response.)

1. If stopping to pay cash at a booth was no longer an option, which one of the programs described above would you prefer to use?

2. Why? What do you believe are the advantages? What do you like about it?

3. Explain any disadvantages you see or concerns you have with the preferred program indicated on question 1.

4. What makes the other programs less desirable to you (e.g., credit card requirement, license plate reading by toll equipment)?

5. If you used Pay-By-Plate during the demo, is there anything you would change about the program? If so, please explain.

6. If you were a Pay-By-Plate customer, do you think you would be more likely to set up (register) your account before or after crossing a bridge?

7. If you were a Pay-By-Plate customer, was it clear to you how your tolls were paid?

8. If you received video tolling invoices during the demo, is there anything you would have changed? If so, please explain.

9. If you received invoices during the demo, was it clear what the invoice was for / why you received it?

10. If you were a customer receiving invoices, do you think you would be more likely to pay online with a credit card or by mailing a check?

ATTACHMENT P:

System Gap List

BATA / GGB VT Gap List (Post-Demo Final)

Gap #	Gap Subject	Demo	Full	Disposition
1	Bridges Included	Golden Gate Bridge and possibly one state-owned bridge	TBD based on BATA and GGB board direction after Demo results are presented	To Do - Business Rule Decision
2	Participants	Internal GGB employees only (tentatively including VT team members, knowledgeable staff)	Full public participation on selected bridges.	Done
3	Toll Rates and Fees	GGB will use the current Cash rate for VT and VT-I, with the surcharge already included	TBD, based on authority for BATA and GGB to change toll rates and add associated fees prior to full implementation	To Do - Business Rule Decision
4	Account Conversion	Following Demo Account Conversion business rules, using GGB Cash rate as noted above	Regarding waiver of fees / reduced rates at conversion / sweep	To Do - Business Rule Decision
5	Account Conversion - License Plate Effective Date	Customer may not be able to change / back-date the license plate effective date.	The ability for the customer to change / back-date the license plate effective date date up to 90 days prior to the conversion date will be added.	Done
6	VT Toll Disputes	Disputes and refunds / credit card reversals and chargebacks will not be supported, since demo participants will be internal GGB employees and refunds would go back to GGB credit card.	Dispute and refund / credit card reversals and chargebacks would be added and fully automated to meet BATA's original business rules (included in Demo pricing)	Defect
7	VT Refunds / Credit Card Reversals and Chargebacks			
8	Violation Notices	Current violation notice will not be modified / will be used as-is. VT / VT-I data to be used in existing data fields will be matched.	Violation notices will be modified to align with policies set for Full deployment.	System Gap
9	VT Web Access	Demo participants will be provided with a secured URL, login, and password to access the demo site. Demo web access will not be attached to the production website or made available to the public.	Full deployment participants (public customers) will be able to access VT / VT-I web functionality from the production website.	System Gap
10	Demo Clean Up / Prep for Full	At end of demo, remove vehicles from test accounts, add users back to FasTrak accts where applicable, save demo data, change / disable filters, disable demo URL, leave code in place	Before full deployment, re-enable filters and code, enable access from production website	Done
11	Invoice Frequency	Shorter 15-day invoice frequency was used to fit multiple cycles within 90 day Demo duration	TBD - frequency will be re-examined for public invoicing.	To Do - Business Rule Decision
12	GGB AET	Current cash collection functionality will remain in place	[Separate GGB parallel project] Potential future move to AET would eliminate cash, keep VT / VT-I, possibly add pre-registered VT-I, provide addtl accommodations for unbanked / underbanked customers	System Gap
13	IVR	Minimal revisions to ensure that VT and VT-I accounts can't be accessed by IVR	Evaluate complete IVR functionality, add VT and VT-I related capabilities	System Gap
14	Invoice Fees	GGB fees are built into their toll rates, so no additional fee will be imposed. Invoice fee-related fields will be left in place as designed / developed for potential future fees.	Functionality to support BATA Legal's selected option regarding VT-I related fees must be designed and incorporated. 11/10/10: Legal prefers Option 1: One freebie with authorized/signed form. BATA Legal is working towards changing legislation in future.	To Do - Business Rule Decision
15	Credit Card Expiration and Declined Letters	Use current template and mail+email configuration for Demo.	Evaluate letters to see if changes are necessary to support full VT functionality.	Defect
16	VT Inactive Account Warning and Closure Letters	Use current template with email-only configuration for Demo.	Develop new VT-specific templates and re-evaluate process prior to Full.	
17	VT Inactive Account Closure process	Accts with no activity for 90 days are closed. After closure, a "Account Closed Due to Inactivity" letter is sent.	Accts with no activity for 90 days are sent an "Inactive Account Warning" letter. Then, if no action taken by customer within 30 days from date of letter, the acct is closed. No "Account Closed Due to Inactivity" letter is sent.	Defect
18	VT Email Correspondence	As noted above and in RD, SDD docs for individual correspondence during Demo	Evaluate ability to use email correspondence only, as originally intended, for full implementation.	Defect
19	All Customer Correspondence	As noted above and in RD, SDD docs for individual correspondence during Demo	Review and evaluate all customer correspondence for necessary changes prior to Full.	System Gap
20	Mailhouse changes	No changes to mailhouse for Demo - minimize by using email correspondence wherever possible.	Develop projections for mailhouse volumes during Full, and establish necessary field changes / additions for new and modified correspondence.	System Gap
21	Reports	Additional / modified reports only as specified in Reports design document.	Evaluate all existing reports for potential needed changes, and identify any necessary additional reports.	System Gap
22	Invoice Escalation	Pending final Invoice design. Demo invoice will escalate to violation 15 days after invoice date.	First invoice should say that failure to pay will result in violations. Escalation timeframes will be revisited for Full.	Done
23	Standard Operating Procedures (SOPs)	None, or only mini version for GGB staff supporting	Full SOPs needed for all involved and supporting staff areas	System (Operational) Gap
24	Single Violation vs Multiple Violation Notice	No change from current - one violation per notice	Rather than escalating each transaction from an unpaid VT-I invoice into separate violation notices, all transactions on the unpaid invoice will escalate to a single violation notice. Each transaction listed on the violation notice will have its own $25 penalty associated with it. (As discussed by GGB with legal counsel)	System Gap
25	Violation Notice Text	No changes to current violation notice for Demo.	From 8/9/10 mtg: First invoice should indicate that failure to pay will result in violations.	Same as item 22
26	Additional Reports	Basic reports as defined in Reports doc.	Additional reports will be defined based on demo activities and results	Same as item 21
27	Include scenarios, etc., to test Credit Card Expiration and Credit Card Declined letters during Demo.	ACS: This is part of normal operations, if BATA/GGB would like to test, please arrange for the CCs to be added to specific accounts that will decline and or expire during the demo. Credit Card activities were tested as part of Special Scenarios during Demo, to the extent possible.	All credit card scenarios will be supported for VT and VT-I.	Done
28	Check all docs for fee references to be updated once fee solution is decided	Will be updated in the next version of documents. VT will be sent by 11/10/10 and VT-I will be sent by 11/19/10.	All docs to be updated based on Full deployment policy decisions.	To Do
29	When converting to FT a new transponder must be issued to the customer.	No changes - basic capability to issue transponder was incorporated during Demo.	There should also be an option in the conversion web-page and interface that allows customer to use a retail transponder for this conversion	System Gap
30	On the VT web, add a section entitled "FasTrak Account Holders" (this is already on the VT-I web) allowing for VT customers with FasTrak accounts to add their license plate to their FasTrak account. This can also be done currently by the logging into the FasTrak account and adding their plate. (1/26 email from Mei-Lin)	Not pursued as part of Demo.	Additional capability for customer to directly add VT plate to their existing FasTrak account to be considered by BATA / GGB.	System Gap
31	VT-I transactions don't currently "exist" until they show up on an invoice. It's not clear where they reside within the system before that point. Concern expressed several times, discussed at 2/14 mtg and added to list.	No changes made for Demo.	Consideration should be taken for making transactions accessible / payable prior to invoicing. Would allow for customers to pay or convert earlier, if they chose, and save agencies the cost of invoicing.	Defect
32	Similar to item 28, check all customer website screens for fee references, update once solution is decided.	No changes made for Demo, although issues were logged.	Customer website screens and routing between them must be cleaned up to reflect production BATA and GGB policies, and to ensure client understanding and usability.	System Gap