San Benito County
Local Transportation Authority

Mapping Intelligent Transportation Systems for the 21st Century
Needs Assessment Report and Implementation Plan
March 2017

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Section 1. Introduction

The San Benito County Local Transportation Authority (LTA) has completed an Intelligent Transportation System (ITS) Plan for the County Express. The ITS Plan provides a framework to guide future ITS-related capital investment through LTA's capital program. The following Needs Assessment, which includes an Implementation Plan, is intended to build upon the ITS improvements currently in place and identify those areas were further improvements should be pursued for the County Express system.

As LTA and the County Express services have evolved, the agency has always maintained a focused effort on providing a safe and reliable transit system. In creating it's ITS Plan, the agency is ensuring pursuit of cost effective improvements that address existing riders' needs, as well as, making the system attractive to future passengers. ITS improvements use technology, for example, to provide real time travel information which serve to inform passengers of the status of their service, create operating efficiencies, and improve the collection of operating data.

This Needs Assessment Report took into consideration the ITS technology currently being advanced throughout the transit industry and has included recommended improvements that are consistent with the size and scale of the County Express system. These improvements are intended to be carried out over the following periods of time, short term implementation (1-3 years), intermediate term implementation (3-5 years), and long term (5+ years) dependent on funding availability.

Section 2. Needs Assessment Analysis

The previous ITS Plan Existing Inventory Report captured the current County Express ITS investments improvements in place and aggregated these into distinct categories. These categories, ITS definitions, and procurement considerations were created in the multijurisdictional 2007 Central Coast ITS Implementation Plan (CCIIP). As part of this Needs Assessment, several subsequent planning reports and other material were reviewed and analyzed for reference and recommendations that have been made in pursuit of further ITS improvements for the County Express system.

Of the 12 planning reports reviewed (see Appendix A for complete list of reports), those included below made specific references to ITS improvements to the County Express. The selected reports recognized the technological benefits of ITS improvements, sought to improve the quality of life of residents, and looked to improve the economic efficiency of service provision. Additionally, some went further and referenced the mobility, safety, and reliability advantages from pursuing ITS improvements to optimize the County Express system.

Section 2A. Central Coast ITS Implementation Plan

The Existing Inventory Report provided detail on the CCIIP and its recommendations for the five Central Coast counties that participated in this regional effort. The 2007 report inventoried the participant's ITS investments in place at that time, looked at regional transportation network need, and recommended improvements specifically for the transit providers including onboard equipment, dispatch communications, electronic fare media and collection, real-time and static information signage, and facilities improvements.

LTA began the process of carrying out the recommendations in 2012/2013 with the procurement of the County Express radio communication system upgrade, continued with improvements to the County Express website and the Paratransit and DAR automated schedule management system, and will continue through this ITS Plan.

Section 2B. LTA Short/Long Range Transit Plan

As relevant as the CCIIP is to this ITS Plan, it was also very important to look at the findings and recommendations generated in LTA's 2016 Short Range Transit Plan/Long Range Transit Plan (SRTP/LRTP). This comprehensive planning effort examined all aspects of the County Express system, including existing service routes and schedules, operational performance and productivity, fares and fare structure, and

capital investment. The SRTP/LRTP also included recommended system wide County Express improvements to be considered over the next 1-5 years (SRTP) and 5-20 years (LRTP). The SRTP/LRTP illustrated the importance of embracing changes in demographics and commute patterns but it also stressed the continuing evolution of technology. Specifically, it highlighted how ITS's increasing capacity and ability to push out information, "will offer unprecedented amounts and variety of data, and even greater interaction among people independent of geographic location, with implications on public expectations for information."

The SRTP/LRTP recommended that the agency consider future service expansions to new markets such as Salinas/Monterey and Watsonville. The ITS Plan's recommended improvements would serve these expanded markets well.

Table 1 below includes the ITS related improvements found in the SRTP/LRTP and highlights those that were also recommended in the CCIIP. Of the improvements not found in the CCIIP, fare media sales options were not specifically examined; and Wi-Fi on buses was not a technological option available at that time.

Table 1. SRTP/LRTP ITS Recommended Improvements

ITS category	In CCIIP	SRTP/LRTP Recommendation
Transit Electronic Fare Collection	Yes	Examine possibility of participating in Bay Area Clipper program allowing automated transfer to other transit providers VTA & Caltrain
Transit Electronic Fare Collection	No	Pursue more fare media sales options for County Express pass and token users
Transit Electronic Fare Collection	Yes	Introduce electronic fareboxes on County Express buses
Transit Real-Time Route/Schedule Information	Yes	Provide real time information to County Express passengers, including responsive design applications for mobile devices
Transit Static Route/Schedule Information	Yes	Redesign County Express website and improve bus stop signage to provide more system information
Transit Station and Bus Stop Information	Yes	Consider developing a Central Transit Center in Downtown Hollister (4th Street and San Benito)
Transit Static Route/Schedule Information	Yes	Provide trip planning functionality to County Express passengers
Transit Travel Information	No	Consider Wi-Fi on Intercounty routes as marketing "low cost extra"
Transit Management	Yes	MDT's should be procured for Paratransit service

Section 2C. Monterey Bay Area Coordinated Public Transit - Human Services Transportation Plan

In 2013, LTA participated, as it has before, in an ongoing regional planning study effort, the Monterey Bay Area Coordinated Public Transit - Human Services Transportation Plan (CPTP). The CPTP study, which is required by the State and Federal Transit Administration, included the counties of Monterey, Santa Cruz, and San Benito. The CPTP mandate is to identify the services within regions and individual counties and the providers of these services; to identify how these providers coordinate their efforts to avoid service duplications; to look at the strategies agencies use to ensure resources are being used efficiently; to look at how agencies address service gaps; and how they prioritize service improvements.

Another important component of the CPTP, which helped to broaden the scope of the ITS analysis, is that it considers the transportation needs of individuals with disabilities,

older adults and persons with limited incomes. With these criteria in mind the CPTP aggregates its analysis into four categories to identify possible deficiencies within the participating counties: Service Levels; Before and After School Hour Service; Accessibility and Mobility; and Fleet Type.

Under the Fleet Type category, the CPTP found and noted the following on the County Express: "Due to budget constraints, LTA equipment has limited amenities," and the, "vehicles do not have security cameras."

From the deficiencies found on the participants' systems, the report went on to recommend strategies for each agency. The 2013 CPTP recommended that LTA consider implementing eight strategies to address the deficiencies. One of the eight recommended strategies was to introduce, "Intelligent Transportation Systems (ITS) and technology," to County Express, which would benefit the special needs community. This ITS Plan recognizes the CPTP's recommendation and has included ITS related improvements that benefit these County Express patrons.

Section 2D. The Hollister Downtown Strategic Plan

In 2008, the Downtown Hollister Association commissioned a study, the Hollister Downtown Strategic Plan (HDSP) to prepare a community-based vision and implementation strategy for the future of Downtown Hollister. This effort included workshops, walking tours, stakeholder interviews, and community events. The HDSP is a summary of the community vision. While not necessarily designed to promote ITS type improvements, the HDSP sought to identify ways to support and improve visitor and resident experience within Downtown Hollister. This included walking, biking, driving, and taking public transportation. The vision document included the following recommendations:

- Existing bus routes [encourage improvements that support them]
- Encourage additional transit ridership [support design and physical improvements to accomplish this]
- Create a Downtown loop trolley and/or bus depot

One of the ways the HDSP identified to accomplish the recommendations was the pursuit of wayfinding signage. This signage would be designed to direct pedestrians

and motorists to major destinations (buildings, public spaces, parking, and other important areas within a community). As stated previously, such signage might not necessarily consist of ITS type electronic signage. However, it is possible to pursue a collaborative effort to standardize signage locations and design between LTA, the City of Hollister, and the Downtown Hollister Association that could produce a shared benefit. Perhaps transit real time arrival/departure electronic signs (see Long Term recommendation 7C.5) could be incorporated into Downtown wayfinding signage. In 2016, the City of Hollister adopted a plan titled, "Multi-Governmental Wayfinding System Wayfinding Master Plan," and LTA will aim to coordinate new signage in the future. The following section highlights an important agency planning effort that examined bus stop signage.

Section 2.E. Bus Stop Improvement Plan

In June of 2016, the San Benito County Local Transportation Authority Bus Stop Improvement Plan (BSIP) was completed. The BSIP performed a comprehensive review and inventory of all 87 County Express Fixed Route and Intercounty[1] bus stops and the amenities at each stop (i.e. shelter, trash bin, bench, etc.). The Plan also noted any deficiencies and/or inconsistencies amongst system wide bus stops.

From the inventory, a baseline cost for physical improvements to a bus stop was created along with objective evaluation criteria to prioritize the bus stops improvements. The individual prioritized recommended bus stop improvements and estimated costs were presented in the BSIP. As part of this ITS Plan, bus stop improvements were also recommended (Long Term recommendation 7C.5) and the BSIP analysis incorporated.

Section 2.F. County Express Current and Future Demographics

It was important during the data review to understand the population served by the County Express. As such, the most significant finding was the County of San Benito's projected population growth. According to the Association of Monterey Bay Area Governments 2014 Regional Growth Forecast, the County's projected growth rate is over 1.5% annually, which is higher than other portions of the State. It could be surmised that a growing region, such as the County, would have and continue to have families with children. This, in turn, would account for the high concentration of younger rider that use the County Express services.

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[1] Intercounty is a County Express service provided between San Benito and Santa Clara Counties.

From a transportation demand management perspective, exposing young riders to dependable public transit options is important, especially as this group transitions to adulthood. ITS features such as Wi-Fi, real time schedule information, improvements to the County Express website, and a service notification system will be well received.

One of the primary reasons for the County's growth appears to be due the availability of affordable housing stock, which serves as a natural attraction for the large job market found in neighboring Silicon Valley. Thus the second significant finding from this review was that 48.5% of the County's population commutes outside of the county for work. Therefore, continued growth in this commute market shed will undoubtedly result in increases in congestion upon freeways and local roads and commensurately result in the need for alternative modes of transportation to the automobile.

An increase in intercounty commuters does create an opportunity for LTA to attract more discretionary riders to the County Express system. Both transit dependency (youth) and choice ridership (commuters) may explain the current ridership levels on the County Express routes. Arguably both ridership markets have an interest and will benefit from further ITS improvements on the County Express system.

Section 3. Outreach - Public Participation

An integral part of the ITS Plan was the concerted effort to outreach to existing passengers. The ITS Plan contained a comprehensive outreach component that included a review of past agency surveys and communication with passengers, and feedback provided to LTA on ITS improvements. In addition, interviews were conducted with LTA staff and LTA's contract service provider, MV Transportation staff.

In May of 2012, LTA conducted an onboard passenger survey on the County Express fixed route services. This survey was an important planning and outreach effort that also captured riders' interest in ITS improvements. A majority of the survey respondents indicated a desire in having technology-based transit improvements such as electronic fare cards, automated bus stop arrival/departure announcements, and online fare purchase capabilities.

Section 3A. ITS Plan - Passenger Survey

On September 28 and 29, 2016, a passenger survey was conducted onboard each of the County Express Fixed Route (Blue, Green, and Red lines) and Intercounty routes (Caltrain and Gavilan College). In addition, an intercept survey was conducted with County Express passengers that were purchasing bus tokens and monthly passes at LTA's administrative offices. (See Appendix B for the full report)

A total of 148 responses were collected and helped to create a composite of County Express passengers. The system enjoys a steady ridership base with 48% of those surveyed riding County Express five days per week. In addition, those surveyed were young riders with 45% being less than 18 years of age and another 34% being between 18 and 24 years of age. The majority of riders (65%) stated their trip purpose on County Express as for traveling to school. Those using the service to commute to work were the next highest rated trip purpose at 17% of riders.

Looking forward with the ITS Plan in place, the overwhelming majority of riders surveyed (93%) have access to a smart phone and 46% of riders had both a smart phone and a laptop computer. The survey presented riders with a list of 11 ITS technologies from which to choose from and asked that they also rank their preferred choices. The highest passenger ranked ITS improvement (28%) was to have access to "Wi-Fi on the bus." Presented below in Table 2 are the top five highest ranked ITS technology passenger choices.

Table 2. 2016 Passenger Survey Results

ITS Technology	Ranking	Included in CCIIP	Included in SRTP /LRTP
Wi-Fi on Buses	28%	No	Yes
Real Time Info at Bus Stop	11%	Yes	Yes
Buy Fare Media Online	9%	No	Yes
Pay Fares Electronically	9%	Yes	Yes
More Places to Buy Media	9%	No	Yes

Section 3B. Public Workshop

On January 26, 2017, a public workshop was held at the Hollister Community Center to share the draft ITS Plan recommended improvements and gain further feedback to include in this report. In addition, for those not able to attend the workshop, the ITS recommended improvements were posted on LTA's website for review and comment. Invitation to the workshop and solicitation for feedback on the ITS recommendations took place in the form of flyers posted on County Express vehicles, bus stops, shelters, thorough social media, and on the County Express website.

The solicitation of input yielded general questions pertaining to County Express service as well as positive reaction to the recommended ITS improvements. The ITS Plan questions ranged from inquiries into the cost of the recommended improvements, how LTA would go about identify funding to implement the recommendations, whether the recommended onboard improvements might impact a driver's ability to safely operate equipment, to how long would it be before the ITS improvements would be in place. The improvements that draw the most support, very much in line with the results of the survey, were the introduction of Wi-Fi and the ability to pay for fares online.

3C. Social Services Transportation Advisory Council

The draft ITS Plan recommendations were presented to the Social Services Transportation Advisory Council (SSTAC) on January 27, 2017. The SSTAC members received a general overview presentation of LTA's planning efforts leading up to and including this ITS Plan and the recommendations. SSTAC provided invaluable input and considerations for improvement to the ITS Plan going forward.

Section 4. County Express Facilities

The County Express Operating and Maintenance (O&M) facility, located on 3240 Southside Road Hollister, is a well-positioned space for the daily operations of County Express service. It also affords LTA the opportunity to consider ITS improvements as there is sufficient physical space at the facility to accommodate such improvements. The existing computer server space and loft area could accommodate the majority of the software/hardware improvements being recommended as part of this ITS Plan.

However, there are two long term recommendations put forth that may require the agency to consider reconfiguring the existing facility space, which are the pursuit of an onboard video camera system and a new automated fare collection system (Short Term recommendation 7A.2 and Long Term recommendation 7C.5, respectively). For example, the shift to an automated fare collection system would require that the current physical layout of the facility be reconfigured to accommodate a secure space for the fareboxes and daily revenue received from the system, to allow for each vehicle's farebox to be electronically probed daily for data stored on each farebox, and for the farebox equipment maintenance and storage.

A video camera system may be less intrusive in terms of physical space needed. However, this is dependent on the chosen methodology for long term video data storage (see Section 5 below). Also, space may be required for additional antennae to collect daily video data retrieved from each vehicle.

Section 5. ITS System Configuration – Onsite vs. 3rd Party Cloud Based Hosting

Over time as LTA's ITS Plan continues to be implemented, the agency should consider existing policy and practices with regard to the electronic data being generated on the County Express system and the preferred way this data is managed and stored. Currently, LTA's radio system and automated schedule management system data is captured and stored at the O & M facility. As more ITS improvements are implemented and consequently more data is generated more server space will become necessary. The agency may decide to continue its existing practices of housing, maintaining, and storing LTA-owned ITS infrastructure and data. Traditionally, agencies that choose this ITS configuration prefer to maintain and control the data generated by their systems and assume the responsibility and ongoing resources necessary to maintain these ITS systems. This has historically been the approach large transit systems choose due to amount of data generated balanced against data storage space and ITS staff support necessary.

An alternative ITS system configuration would be to require that future ITS vendors host their software applications, allow LTA licensed access to the software, and that the vendor store LTA generated data (cloud based solution). In most cases, this option would free physical space (network equipment, servers, wiring, etc.). Additionally, this option would provide the agency relief from the need for staffing ongoing ITS support. LTA staff and designated contract provider staff would have access to the licensed software system in this configuration. However, it is recommended that LTA consider security system protocols carefully for each of the ITS systems.

Several of the recommendations in this ITS Plan will introduce new automated features/functionality, introduce the capability to generate more data reporting, and will generate new operating and maintenance data. Therefore, in deciding between in-house hosting or cloud based solution, careful considerations should be given to system access, data storage, ongoing support necessary to manage these systems, and staff support.

It is important to note that a contemporary example of such an ITS cloud based system configuration exists with the Paratransit and DAR automated scheduling management system. Currently this system is set up on a server at LTA's O & M facility. However, the system vendor RouteMatch©, offers a cloud based hosting option as well. In this example, LTA could shift to this model and have RouteMatch© host the scheduling management system and storage of the data at their operation's headquarters.

The following are factors that should be considered for a switch to cloud based solutions:

- o Data would be stored offsite (e.g. RouteMatch© facility)
- o Shift in responsibility for ongoing IT support to vendor (From LTA to a vendor)
- o Reduction in equipment maintenance costs (no longer require server, etc.)
- o Elimination of the need for redundant back up of data (vendor assumes this responsibility)
- o Creates a reliance on vendor's server network and infrastructure reliability
- o Cloud based solution is scalable and could accommodate vendor product expansion/increases in data storage (i.e. future RouteMatch© enhancements)

With the RouteMatch© cloud based example, LTA would have to weigh the previously referenced costs currently expended to support the in-house configuration against the cloud based solution costs included in RouteMatch's © product literature, which would be approximately $3,600 annually. This does not take into account the capital expense already incurred by LTA to procure the existing in-house ITS equipment.

Section 6. Other Considerations

This ITS Plan has been developed with the understanding that the technology improvements being recommended will make the oversight of the operations and maintenance, customer experience, and County Express service better. However, it is important to point out that the introduction of such technologies also will bring other factors to bear for the agency. This includes the financial prioritization and programming of future funds necessary for initial one time ITS capital expenditures along with ongoing annual licensing and maintenance costs. In addition, the ITS improvements will require staff and those using the technology to increase their proficiency with the technology, become active users (i.e. participate in user forums, conferences, etc.), monitor and maintain the most updated software, and actively train/retrain on the technology systems.

Another consideration for the agency as the ITS Plan improvements begin to be put in place is to ensure that adequate staff resources are made available to maintain optimal operation of ITS components, which includes: scheduling ongoing training, project managing the individual ITS vendor contracts, pursue needed maintenance and repair, and monitor product warranty and support agreements. Of concern is whether this could be accomplished with existing LTA staffing levels and perhaps, instead, the agency might look to obtain 3rd Party ongoing ITS support.

One final consideration is that LTA should revisit its current service contract with MV Transportation, meet with the provider to ensure that they understand the ITS improvements planned, are clear on their role in using and/or maintaining these improvements on behalf of the agency, and that they have sufficient and adequately trained staff to assume these responsibilities. For future operation contracts, the agency expectations regarding the operation and maintenance of LTA owned ITS technologies can be more explicitly presented.

Section 7. ITS Improvements to County Express Service

As previously mentioned, the ITS definitions created in the CCIIP have been used throughout this ITS Plan. The CCIIP aggregated ITS technology into distinct categories and the applicable category has been included with each ITS Plan recommended improvement.

In addition, the ITS Plan recommended improvements have been prioritized and broken up into three distinct time periods to allow LTA the time necessary to incorporate the improvements into its ongoing capital planning program and identify and secure the funding necessary to implement the recommendations. The implementation time periods include: short term considerations that could be implemented over the next 1 to 3 years; intermediate term considerations that could be implemented within 3 to 5 years; and long term improvements that could be implemented within 5 years or more.

Should discretionary funding become available sooner for an item programmed in an out-year, that project could then possibly be shifted and implemented earlier then presented here. However, there are some ITS improvements that would need to be in place first for other ITS improvements to function fully. For example, the Automated Vehicle Location (AVL) technology found in two of the recommendations below would need to be in place to provide the real-time data feeds necessary for automated scheduling, next bus arrival/departure signage, and passenger schedule notifications.

After review of previously prepared planning documents, past planning efforts, public input received, and an inventory of existing ITS investments, the following is a series of recommended ITS improvements and enhancements for LTA and the Board of Directors to consider, subject to availability of funding.

Section 7A. Short Term Recommended ITS Improvements (1-3 years)

Taking into consideration the necessary financial and staffing resources needed, the following ITS improvements have been selected for their relative readiness to implement and/or less restrictive resource needs to realize within the next year to 3 years. In some cases, these projects are currently included in LTA's capital plan and some projects have identified funding sources as well.

1. **Install Mobile Data Tablets on County Express Paratransit & DAR Vehicles**

[CCIIP category – Transit Management –Demand Response Transit Ops]

Estimated Cost - $38,000 capital cost and $3,800 ongoing annual cost

This first recommendation is intended to acknowledge one of LTA's most significant ITS investments - the acquisition of the automated scheduling management system for the Paratransit and DAR programs - and to promote further enhancement of this investment.

The scheduling management system is currently configured with 14 integrated software modules which allows the County Express contracted service provider, MV Transportation to electronically manage all rider requests and schedule them in the most operational efficient manner. At the time LTA purchased this system it was clear that RouteMatch© had other product offerings which allows the agency to choose whether and how to enhance the system at its discretion.

There is one such RouteMatch© product offering being recommended which was identified by LTA staff earlier as an enhancement worth pursuing, the installation of RouteMatch© Mobile Data Tablets (MDT's) as shown in Figure 1. The MDT's would be installed onboard each of the fleet vehicles used for Paratransit and DAR service. This enhancement has already been programmed into the agency's capital plan and a funding source identified.

Figure 1. RouteMatch© Mobile Data Tablet

The MDT's allow drivers and dispatchers to communicate through the automated schedule management system. This includes a graphic interface that shows drivers client information, all scheduled trips assigned to a driver, mapping software for locating client's destinations, and the ability to record and transmit trip level information back to dispatch (late arrival/departures, client no-shows, etc.). Also, once in place, the MDT's introduce Automated Vehicle Location (AVL) functionality to this portion of the County Express fleet, allowing the contractor and LTA staff to be able to see in real time where fleet vehicles are always.

The MDT functionality was called out as a recommendation in the CCIIP and the MDT installation was referenced in the SRTP/LRTP as a capital project the agency should pursue. In addition, the SRTP/LRTP further recommended that enhancements be pursued for, "dispatch operations to effectively manage service operations and respond to changes on a real-time basis," both of which will be accomplished with this recommendation.

See the ITS Implementation Plan Section 9 for further cost and other details.

2. **Video Surveillance on County Express Fixed Route and Intercounty Buses**
[CCIIP Category – Transit Management - Transit Security]

Cost estimate $47,000 – 75,500 capital costs and $15,000 -35,000 ongoing annual cost

This recommendation is for the procurement of an onboard video surveillance system for the County Express Fixed Route and Intercounty fleet. Similar to the previous recommendation, this recommendation is promoting an ITS project which LTA has also programmed into its capital plan and has identified a funding source. This is a significant investment in the safety and security of passengers, drivers, and it recognizes the capital equipment investment made by LTA.

Traditional surveillance systems consist of a set number of video cameras, dependent on the size of the vehicle, mounted in specific locations throughout a vehicle to capture video images of the activity transpiring onboard a vehicle while in service. There are optional enhancements to these systems such as cameras mounted on the outside of vehicles to capture surrounding activity and cameras with built-in microphones to capture audio feeds along with video imaging.

There are also options to consider regarding the quality and formatting of the video/audio captured in these systems including: varying degrees of video resolution, color or black and white imaging, and various recording/play back formatting options.

Benefits of video surveillance systems include serving as a crime deterrent onboard buses, providing validation of customer or driver incidents, and creating insurance protections for transit agencies in liability cases (theft, bodily injury, etc.). Additionally, these systems can create an opportunity for partnerships between transit agencies and law enforcement, educational institutions, and community organizations by promoting a safe rider experience.

The technology involved in how video data is retrieved from vehicles is important and can significantly impact the costs of these systems. The options range from the more mechanical methods of manually retrieving daily stored data on each bus one at a time to the more advanced method of retrieving the data through a cloud based solution. So, as consideration should be given in advance to the method in which data is retrieved on the video surveillance system, it is also recommended that consideration be given to the agency's future policy on what to do with the video data once retrieved.

2.A. Video Data Review and Storage

LTA's video data and storage policy should address the following protocols: how the daily collected video data will be reviewed (After revenue service ends, specific routes at specified times, etc.), by whom will the video data be reviewed (LTA staff, service contractor staff, etc.), and how long the video data will be retained (recorded over after review, held for 1-2 days, etc.). The primary reason for the policy has to do with the large amount of computer data memory used with video. These systems are designed to store a limited amount of video data onboard each bus, usually not more than one day of video images, before requiring that the data be transferred to another source capable of larger volumes of data storage and review of the images. These systems, in turn, are designed to hold the system-wide video data for a longer period, usually for one week, before recording over previous captured video data.

Thus, video data storage is the motivation behind needing to systematically review video data regularly, in most cases within a short period from when the video data was captured, perhaps daily, every other day or weekly. Another factor to consider is that the volume of data captured requires review be performed soon after being retrieved because of the importance of images captured (e.g. incidents, accidents) or that delay could quickly lead to backlog.

Regarding who will perform the data review, there are several options. Some agencies find it economical to have in-house staff review the video data, especially if they have security staff. Other transit agencies work with local law enforcement to perform the review, which may require funding of staff time to carry this function out. Still other transit agencies contract with private security firms or work through vendor contracted solutions. LTA may want to approach the service contract provider and inquire if this data review function could be amended into the existing contract.

Another component of LTA's future video review and storage policy should address how long video data should be retained. Some of this decision will be driven ultimately by the video surveillance system purchased and how much data storage capacity will be included. Generally, increased data storage capacity equates to higher product cost. However, the scope (revenue service hours and number of vehicles) of the County Express fixed route services may be able to be accommodated well with a base level of data storage. Additionally, the nature of daily video captured is such that the majority of the images captured will be routine and could be recorded over without consequence.

See the ITS Implementation Plan Section 9 for further cost and other details.

3. Enhance County Express Website
[CCIIP Category - Transit Management – Transit Traveler Information]

Estimated cost $25,000-$50,000 one - time cost and $10,000 - $20,000 ongoing annual cost

The next three ITS recommendations (Enhance County Express Website, Enhance County Express Trip Planner, Pursue On-Line/Mobile Fare Media Sales) are to be considered and pursued together. Each recommendation has been separated out to recognize its importance and how it was called out by passengers or in previous planning documents as being important for the County Express program. However, there is a natural progression and economies of scale benefit in pursuing them together as they will all be integrated into the County Express website.

The first of the three recommendations and the most significant undertaking is a redesign of the existing County Express website (Figure 2). A redesign would ensure that all information regarding the County Express service and LTA is fully optimized and readily available for existing riders as well as potential new riders. Optimization would include interactive maps, more detailed travel information, and provision of more detailed fare and fare media information. Also, information that is more time sensitive, such as route detours, bus stop closures, or reduced schedule service

reminders should be highlighted more prominently on the website. Access to new information, such as links to Caltrain's website and schedules for changes, or Gavilan college's website and calendar for class schedules could also be featured.

Figure 2. County Express Website
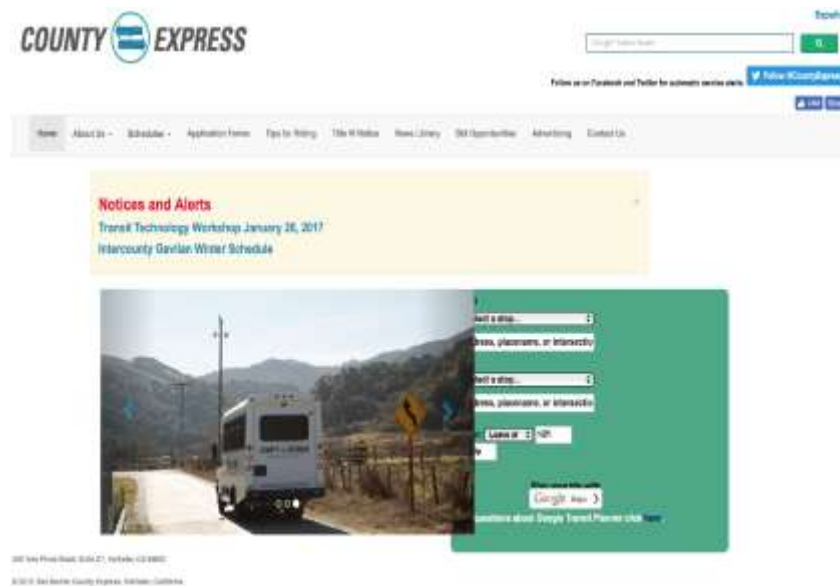
In addition to being included in the CCIIP, the County Express website redesign was recommended in the SRTP/LRTP with detail under its marketing plan. Here an important and timely recommendation to incorporate a responsive design format for mobile viewing and application on smart phones and tablets was included. Given the County Express ridership's access to mobile devices per the passenger survey, this is an important recommendation that should be included in the website redesign and will be received well by riders.

As LTA looks forward through the ITS Plan, consideration should be given to redesigning the website in a content management system (CMS) format which will support the creation and modification of LTA's digital content and can support multiple applications feeding into the website in a comprehensive manner. This is becoming more common in website design, especially as multiple systems are being required to integrate with one another. With several ITS improvements that would appear or feed into the County Express website, it may be practical to include CMS in the redesign.

LTA currently uses a 3rd Party firm to administer the County Express website. It is recommended that for this large and comprehensive redesign that the agency competitively solicit for the services of web design firm, particularly a firm with

experience with the transportation industry. Once the website has been redesigned, it might be possible to retain the services of the existing website manager. However, here as well it is recommended that a detailed proposal of services be required and reviewed to determine whether the new County Express website and enhancements could continue to be administered by the existing website manager or to competitively solicit proposals from website management firms.

Once this ITS project is completed, it is suggested that the agency consider decaling County Express vehicles with the website address and adding this information to planned BSIP stop improvements being planned.

See the ITS Implementation Plan Section 9 for further cost and other details.

4. **Enhance County Express Website Trip Planner**
[CCIIP Category - Transit Management – Transit Traveler Information]

Estimated cost assumed in recommendation 7A.3 above

As stated above, this recommended improvement would be pursued as part of the County Express website redesign. The trip planning tool and function, which is hosted on the County Express website home page, was acknowledged as in the CCIIP and SRTP/LRTP as an important feature for passengers. The trip planner allows existing and new County Express riders to input a desired destination and, in turn, provided route and schedule information on how to get to that destination on County Express service. The feature is provided by Google© thorough a link to their proprietary product Google Transit ©. The partnership between Google© and transit agencies across the country has grown significantly and the technology has improved with the automation of public transit schedules and Google's© mapping and search engine capabilities.

The recommendation here is to more fully utilize this trip planning functionality by customizing the Google Transit trip planning portal, adding more detailed bus stop information, and adding other trip planning portals designed to highlight service options that are unique to the County Express system. For example, Figure 3 shows how one transit agency, Marin Transit, created a separate trip planning portal from the main trip planner just for the school service offered by the agency. Here, the trip planner has been auto populated with all the schools serviced and the bell times for each of these schools. When an individual goes to this potion of Marin Transit's website they can pull down the desired school and the route and schedule is automatically displayed that meets the bell time for the desired school.

Figure 3. Customizable Google Transit© Trip Planner Portal
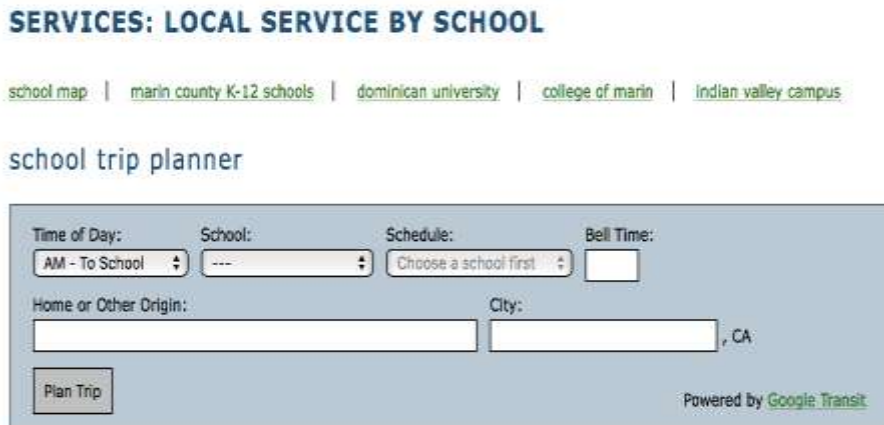
Fortunately, LTA's schedules are already formatted to the General Transit Feed Specification (GTSF), which is the common format for public transportation schedules and associated geographic information. These GTFS "feeds" allow public transit agencies to publish their transit data and web developers to design applications so the data functions in an interoperable way. However, to modify the trip planner portal or add other trip planning features as described above, it is recommended that LTA have these enhancements performed by a web designer familiar with Google Transit and the GTSF formatting. The scope of this enhancement could be built into the County Express website redesign as a requirement.

See the ITS Implementation Plan Section 9 for further cost and other details.

5. **Pursue On-Line and/or Mobile Fare Media Sales**
[CCIIP Category- Transit Management - Transit Passenger & Fare Management]

Estimated website design cost assumed in recommendation 7A.3 above
Estimated ongoing 3rd Party payment vendor cost $8,000 - $16,000 annually

This final Short Term recommendation to pursue on-line purchasing of County Express bus passes and tokens is the third and final item to be incorporated into the scope of County Express website design. While this ITS improvement was not considered as part of the CCIIP, it was one of the more popular requests on the passenger survey. Also, in the SRTP/LRTP (Supplemental Working Paper: Strategic Workshop Summary), a key finding was that the "Location to purchase tokens and monthly passes makes it a challenge for riders to purchase tokens and monthly passes due to the limited number of pass sale outlets/options".

Therefore, this recommendation would be incorporated into the redesign of the County Express website as a safe and secure portal that accepts electronic payment. In addition, LTA would have to develop a fare clearinghouse and revenue reconciliation policy for on-line purchases. This policy would define how on-line transactions will be processed, how on-line purchases will be shipped to purchasers, and how revenue is to be collected and transactions documented properly. Currently, LTA is set-up to accept in-person payment for fare media sales at their administrative office and distributes purchases accordingly. By introducing an on-line purchase option, LTA must decide whether to continue in-person transactions and how on-line orders will be processed (in-house or through a 3rd Party). From a purchaser perspective, it makes practical sense to pursue a 3rd Party payment arrangement to avoid delays for on-line purchases that occur after business hours or on weekends.

If a 3rd Party vendor assumes the role of fare media payment processing only or the full clearinghouse functioning, then the policy would have to acknowledge any agreed upon contractual terms such as transaction fees, terms of payment, shipping and handling fees, and other reconciliation items necessary to account for and document all fare media sold on behalf of LTA. Depending on costs under this 3rd Party scenario, the agency may decide to retain the clearinghouse function of mailing out on-line purchased fare media.

See the ITS Implementation Plan Section 9 for further cost and other details.

5A. Mobile fare media sales

Should LTA desire to introduce an alternative fare media sales option sooner while the County Express website is being redesigned, the following is an interim option for consideration. Figure 2 depicts one solution that could be used to augment fare media sales beyond LTA's administrative offices and the Operations and Maintenance facility. The Los Angeles Department of Transportation (LADOT) created this mobile fare media sales option that allows the agency to send staff to key ridership locations and sell fare media in this unique way. This featured vehicle is equipped with small safe for revenue and fare media storage, and a portable generator for the sales representatives to accept credit card transactions.

Figure 4. LADOT Mobile Fare Media Sales Option

See the ITS Implementation Plan Section 9 for further cost and other details.

Section 7B. Intermediate Term ITS Recommended Improvements (3-5 years)

The following list of recommended ITS improvements have been prioritized for implementation upon identification of necessary funding within the next 3 to 5 years. These improvements will both compliment the Short-Term improvements put in place earlier and set the foundation for several of the Long Term recommended improvements.

1. **Expand County Express Automated Scheduling Management System**

[CCIIP Category - Transit Management –Demand Response Transit Ops]

Estimated cost - $3,500 capital cost

As with Short Term recommendation 7A.1. (Install Mobile Data Tablets on County Express Paratransit & DAR Vehicles), this recommendation also supports LTA's automated scheduling management system investment and proposes further expansion. With the increased efficiency and proficiency with the RouteMatch© product, LTA is encouraged to take advantage of existing economies of scale and procure the license for an additional software module to be integrated with the other system modules.

The recommended module, called RouteMatch Events©, would automate the customer service function of the Paratransit and DAR programs by capturing all customer inquiries, commendations, complaints, and all service incidents and accidents. Once securely stored in a single relational data base, LTA will have the capacity to more efficiently manage customer relations and service incidents as they apply to daily operations. While this system does not generate data reports specifically in the format used by the Federal Transit Administration (FTA) and transit providers in the National Transit Database (NTD), it will allow LTA to generate detailed County Express reports by numerous data fields (i.e. incident type, day, time, service, etc.).

See the ITS Implementation Plan Section 9 for further cost and other details.

2. **Real Time System Passenger Notification on Fixed Route and Intercounty Service**

[CCIIP Category - Transit Management – Transit Traveler Information]

Estimated cost $1,000 - $5,000 in one-time costs (set-up) and $1,500 - $3,000 ongoing annual cost

An automated and real time solution to notify passengers of service information in addition to the County Express website is an important ITS enhancement and supported by the CCIIP. This recommendation is for the introduction of a Short Message System (SMS) text messaging system for County Express Fixed Route and Intercounty services (see Figure 5 below). With such a system, interested passengers would sign-up to receive notifications with a 3rd Party provider, contracted with LTA, to be notified of route information, such as route detours, delays, and holiday service reminders. In signing up, passengers would provide a cellular number capable of receiving text messages and would begin to receiving text messages about service related matters. While the capability exists, this system will not communicate real time schedule information for County Express fixed route services until the AVL system is put in place (Long Term Recommendation 7C.2.).

Figure 5. San Joaquin RTD SMS Passenger Notification System

It is important to note that the BSIP created unique bus stop identification numbers for each of the County Express bus stops primarily for planning and ongoing maintenance. This numbering system will be used to receive next bus arrival text message for Fixed Route and Intercounty riders, once the Long Term AVL project is completed.

See the ITS Implementation Plan Section 9 for further cost and other details.

3. **Wi-Fi on County Express Intercounty Buses**
[CCIIP Category - Transit Management – Transit Traveler Information]

Estimated cost - $15,000 - $20,000 one-time (6 vehicles assumed) and $5,000 - $8,500 ongoing annual cost

In the 2016 passenger survey the introduction of Wi-Fi on County Express vehicles was the highest rated ITS improvement requested. Not surprisingly, the rapid growth in mobile and wireless technology is making such ITS offerings more commonplace. However, given the equipment and ongoing costs associated with this technology, it is recommended that this improvement be considered only for the longer distance Intercounty commuter routes.

There are 3rd Party vendors that sell and install the equipment (wireless routers, antennae, etc.) needed for each bus to provide Wi-Fi service. In addition, these vendors can also set-up and manage the ongoing cellular data plans necessary to allow for Wi-Fi data communications. Some of the LTA's considerations for this project include: whether this is to be a complete "turn-key" venture whereby the vendor provides the equipment, maintenance, and service and leases everything to the agency on an ongoing basis (amortized capital costs and ongoing data charges); whether LTA desires to purchase and install the equipment (possible one time capital cost savings) and prefers

to pay the ongoing data polling charges only; or whether LTA prefers a hybrid approach whereby Wi-Fi access is limited to interested passengers willing to a pay an ongoing fee that could cover a portion of the Wi-Fi costs.

There are also policy considerations to consider, such as security protocols, content controls, and data usage allowances with the introduction of Wi-Fi. Consideration may also have to be given to those vendors that require online advertising through the Wi-Fi network as part of their data network coverage and whether this is acceptable to LTA.

The physical space requirements for this system will be more significant for the County Express bus fleet than space required at the Operating and Maintenance facility. Thus, it will be incumbent upon the agency to partner with a vendor that offers the right sized equipment for the County Express Intercounty fleet interior space. As LTA looks to the rolling stock portion of its capital plan, it is recommended that the existing County Express fleet replacement vehicle specifications be revisited. The ITS recommendations put forth at this point in the ITS Plan (video surveillance and Wi-Fi) as well as the upcoming Long Term recommendations require sufficient space for wiring, wiring harnesses, electrical capacity, and interior space to install the associated ancillary equipment (MDT's, fareboxes, and automated passenger counters)

See the ITS Implementation Plan Section 9 for further cost and other details.

Section 7C. Long Term ITS Recommended Improvements (5+ years)

The following recommendations represent the remaining ITS Plan improvements, to be implemented within 5 or more years. While these improvements are to be programmed into LTA's capital plan, they represent a significant one capital cost as well as ongoing costs. As such, the agency may choose to take some of these improvements out of the order presented here. It has been noted where this may not be feasible.

1. **Complete Expansion of County Express Automated Scheduling Management System**
[CCIIP Category - Transit Management –Demand Response Transit Ops]

Estimated cost - $25,000 capital cost and $3,600 ongoing annual cost

This final recommendation to enhance the County Express automated scheduling management system will complement the existing system, the Short-Term recommendation (7A.1), and Intermediate-Term recommendation (7B.1). This enhancement will introduce an integrated and sophisticated trip notification system for Paratransit and DAR passengers.

RouteMatch Notification© is a module designed to contact Paratransit and DAR passengers regarding scheduled trips via a computer aided telephone system. The telephone notifications can be programmed to occur the evening before a scheduled trip, just prior to a scheduled pick-up, and to notify passengers of other general service information. RouteMatch© hosts this telephony system and will manage LTA's client notifications through an Integrated Voice Response (IVR) system on behalf of LTA.

This module also includes a Self-Service Management Console that allows Paratransit and DAR passengers to modify or cancel their previously requested trips by calling into the IVR system. On the administrator side, the Console will allow LTA staff and the MV Transportation staff to view and manage these modified or cancelled trips by adjusting remaining trips accordingly. This is a LTA-viewed module only and is not configured with a viewing interface for County Express passengers.

See the ITS Implementation Plan Section 9 for further cost and other details.

2. **Automated Route/Scheduling Management for Fixed Route and Intercounty Services**

[CCIIP Category - Transit Management –Transit Fixed Route Operations]

Estimated cost - $90,000-$175,000 capital cost and $25,000 to $40,000 ongoing annual cost

The CCIIP and the SRTP/LRTP identified the need to automate the scheduling of the County Express Paratransit and DAR programs, which has been highlighted throughout this ITS Plan. In addition, both planning documents also recommended automating the route and scheduling functions of the County Express Fixed Route and Intercounty services. This recommendation is for a stand-alone system separate from the Paratransit and DAR system.

The scheduling for fixed route operations, unlike for demand response services, is static and explicitly timed for arrival and departure at designated bus stops, time points, and to allow for transfer to other routes/systems. Additionally, fixed route scheduling incorporates state and federal work regulations (i.e. meal, rest, breaks, etc.) for drivers and, if applicable, any labor contract requirements between employers and labor unions. An automated route and scheduling software system can incorporate these variables and generate fully optimized and efficient route and trip level schedules.

In addition, these systems can, in turn, transmit this electronic schedule data to a host of other ITS systems that an agency may have configured for integration. For example, the most common link to an automated schedule management system for fixed route systems, which is recommended here, involves the importing/exporting of schedule data directly through dispatch to drivers and eliminating the need for daily paper driver manifests. Also recommended is the procurement and installation of MDT's throughout the County Express Fixed Route and Intercounty bus fleet, which introduces AVL functionality. For complete system-wide integration, this system would tie into the Intermediate Term Recommendation (7B.2.) notification system, allowing for passengers to see or be alerted to where buses are in route and anticipated to arrive/depart from designated locations. The Short Term recommended website redesign (7A.2-4) would incorporate the real-time data display when this system comes on line.

While it is not always preferred to operate multiple stand-alone scheduling systems from an efficiency perspective, it is not uncommon amongst smaller transit providers due to the differences between demand response and fixed route operations. As part of this ITS Plan, consideration was given to the alternative product offerings from the County Express' existing automated scheduling management system vendor, RouteMatch©. While RouteMatch© does have a fixed route schedule distribution product, RM Fixed©, one of the limitations of this product is that it does not create fixed route schedules. Instead, the RM Fixed© solution takes already completed schedule data and transmits this to drivers (via an MDT) and the public (web and mobile device applications). Therefore, due to this lack of an ability to create fixed route schedules, it is not recommended that LTA pursue RM Fixed. See Section 8 for more information on RM Fixed©.

The recommended system requires that LTA commit to one time installation/licensing/training costs and ongoing licensing and support costs. Also, it is important to point out that this stand-alone automated fixed route scheduling management system will result in two separate license, warranty, and support agreements, for the existing Paratransit/DAR system and for Fixed Route/Intercounty system. In addition, the Operating and Maintenance Facility dispatch center should be reconfigured to accommodate the hardware and software associated for both systems.

Given possible economy of scale opportunities, it would be worth incorporating into the scope of this project an Automated Passenger Counting (APC) system as recommended in Long Term recommendation 7C.6. While out of order from the ITS Plan, vendors have more recently been including this system in an integrated package and it would be valuable to be able to compare a stand-alone system cost vs. an integrated system cost.

See the ITS Implementation Plan Section 9 for further cost and other details.

3. **Electronic Fare Media on Intercounty Routes**
[CCIIP Category - Transit Management – Transit Passenger & Fare Management]

Estimated cost of pilot - $40,000 - $55,000 (assumes 6 vehicles)

Historically, one of the most consistent ITS improvement requests from County Express passengers has been in the method in which rides are paid for (fare media) and the ease of access to purchase this fare media (fare media sales). The Short-Term recommendation 7A.5. (Pursue On-Line and/or Mobile Fare Media Sales) addresses the fare media sales. The focus of this recommendation is how best to proceed forward with the introduction of electronic fare media. This was done by taking into consideration both the high initial cost of electronic fare media (software and hardware investment) and the high ongoing cost (customer relations and revenue clearing house functions). Cost, in turn, was juxtaposed against the market segmentation of County Express riders (transit dependent vs. discretionary riders), the nature of fixed route travel patterns (Fixed Route vs. Intercounty trips), and the size of the ridership base (the number of County Express daily trips).

The next two sections represent an examination of LTA's options to implement a pilot Electronic Fare Media project on the County Express Intercounty routes.

A. Clipper Electronic Fare Media Program

As part of the ITS Plan, LTA was interested in exploring the possibilities, if any, into participating in an existing electronic fare media program, which neighboring Santa Clara County Transportation Authority (VTA) is a participant in. The Metropolitan Transportation Commission (MTC) introduced and is the administrative agency responsible for the Bay Area's regional electronic fare card system called Clipper (Figure 6). The local and regional transit providers within the nine counties, including VTA, are equipped with Clipper hardware that allows for seamless transfer between all the transit systems with the use of Clipper's propriety contactless radio frequency (RF) microchip embedded fare card.

Figure 6. Clipper Card Program

A large and complex fare revenue clearinghouse was created and is managed by MTC that reconciles each transit system's fare and the transfer credit value between each agency, which is then applied to each individual daily rider transaction. Largely invisible to passengers is the intricate system involved to deduct fares from a prepaid account necessary for Clipper use between systems and even more intricate are the numerous credits applied by each transit agency to ensure payment to each transit agency involved.

MTC management of the Clipper program were approached, as part of this ITS project, to determine if the County Express might become part of the Clipper program, especially for Intercounty riders desiring to transfer to VTA or Caltrain at the Gilroy Transit Center. Unfortunately, MTC staff informed that the Clipper program is programmed out to capacity and is not accepting any new transit agencies. Based on this revelation, the ITS Plan shifted to other alternatives.

B. LTA Electronic Fare Media Options

Based on the previously referenced considerations, it is recommended that LTA introduce electronic fare media as a pilot project to be tested on Intercounty service. The intent is to minimize the agency's investment, focus on a particular ridership market (commuters), and position LTA to make an informed decision after the pilot as to the viability and interest in electronic fare media.

The pilot could be for a period of 9 months to 1 year to account for seasonal variations in ridership. Perhaps the pilot could even be limited, initially, to testing on one Intercounty route - the Caltrain route. Passengers on this service may already be familiar with using the Clipper card if they transfer to Caltrain or VTA service and

could provide additional valuable insight. Again, the intent of the pilot project would be to limit LTA's initial investment of resources, and allow staff sufficient time afterward, to fully analyze the reception, assess larger scale needs, and foresee possible challenges with a full-scale rollout.

The CCIIP, the SRTP/LRTP, the 2012 and the 2016 passenger surveys all recommended/acknowledged that LTA should consider pursuing electronic fare media. However, only the CCIIP recommended a specific technology – "Smart Cards" Regarding the electronic fare media technology options, these come in the form of paper stock passes or a more durable Smart card, which is similar to a bank ATM card. The paper passes are produced with magnetic stripe technology and the cards are produced as Radio Frequency (RF) cards with microchip technology embedded with them.

The magnetic stripe card is used predominately on transit systems as an affordable electronic fare option with the cards used as short term disposable products. On these transit systems' they can be found as one time transfers between services and as short duration period passes (daily, weekly, monthly products). This technology allows for a limited amount of fare data to be imbedded on the card's magnetic stripe. Transit operators have electronic fareboxes that can dispense the card stock and are equipped with magnetic stripe card readers. Thus, the farebox can capture all fare transactions that take place such as cash/coin payment, transfers issued and received, and passes used. These fareboxes are included in the ITS Plan as a recommendation (see Long Term recommendation 7C.4 below). However, it is advised that LTA wait to proceed with improvement until after the implementation of on-line fare media sales (Short Term recommendation 7A.5) and this recommendation have been completed.

From a technology perspective, it is recommended that the County Express pilot demonstrate a stand-alone RF card technology based system rather than magnetic stripe technology. As with the Clipper program, RF cards have the capacity to store more information on the card and a demonstration of this technology will allow for a broader experience. An additional benefit to these cards is that they have a faster transaction time because they do require contact with a reader as do magnetic stripe cards. Instead these contactless cards need only be within close enough RF proximity to be read. Finally, this technology has the capacity to read stored information but it can also write information. For example, if a card is lost or stolen, the system can be alerted to void the lost or stolen card. If the card were then attempted to be used later it would be read as an invalid card and alert the driver as such.

Fortunately, there are several companies engaged in development and management of electronic payment systems, especially in neighboring Silicon Valley and the San

Francisco Bay area. These companies may be looking for smaller project partners to demonstration this technology as this will further validate their product effectiveness while aiding in gaining market visibility. Additionally, this technology industry is still very much evolving to keep pace with mobile device demands and the financial industry's demands on the technology.

The introduction of this technology, both for the pilot as well as system wide consideration, will require LTA to revisit the County Express fleet replacement program and the vehicle specifications. The onboard ITS recommendations (video surveillance, Wi-Fi, MDT's), to all be implemented at this point in the ITS Plan will require significant interior and exterior vehicle space. Unfortunately, it is not clear whether some of the smaller "cutaway" vehicles used on fixed route service can accommodate the ITS equipment. This may be minimized to the fixed route portion of the County Express fleet as the Wi-Fi project and this project are intended for Intercounty routes only. Also, the onboard electrical systems will need to be bolstered to accommodate the power draws from this ancillary equipment.

It is important to note that RouteMatch© has recently introduced a new fare collection solution, (RM Pay©) primarily designed for demand response operations, such as the County Express Paratransit and DAR services. However, this product offering is not being recommended as the ITS electronic fare media solution as its application for fixed route operations is limited. (See Section 8 for more information on RM Pay©).

See the ITS Implementation Plan Section 9 for further cost and other details.

4. **Electronic Fare Payment System on Fixed Route and Intercounty Routes**
[CCIIP Category - Transit Management – Transit Passenger & Fare Management]

Estimate cost - $230,000 - $250,000 one-time cost and $40,000 - $60,000 ongoing annual cost

It is recommended that LTA consider changing out its current fare collection system and introduce an electronic system of collecting and counting County Express farebox revenue. The County Express is the last remaining Central Coast transit system using the current manual drop style fareboxes and manual accounting of farebox revenues. In addition, the CCIIP and the SRTP/LRTP recognized the need for having electronic fare payment systems. By automating revenue and data collection the agency will improve operational efficiency, improve rider fare transaction times, improve data collection, and to reduce costly cash and paper transactions. Additionally, the fare collection

system can be integrated with the other ITS improvements.

Currently, County Express drivers visually validate each fare transaction, and manually record trip related data (passes and tokens used, number of passengers), which is later reported to LTA in a detailed report. The revenue must be unloaded from each farebox, the contents (coin, cash, tokens) manually separated, and counted at the end of each day by the contractor.

An automated system eliminates the manual sorting and counting of revenues. In addition, fare evasion will be reduced as the fareboxes have a validation function and can alert the driver as to whether additional fares are required. The data generated by these fareboxes will provide LTA with more comprehensive rider information (seniors, students, and adults are keyed into the farebox with each boarding).

As expressed in the previous ITS recommendation, it is unclear if the entire Fixed Route and Intercounty fleet has sufficient space and the electrical capacity to proceed with all the ITS recommendations. Depending on the remaining useful life of the fixed route vehicles, it may be more prudent to delay this project until the vehicle specifications can be revised and it is assured that the fleet is properly sized for all the ITS equipment.

See the ITS Implementation Plan Section 9 for further cost and other details.

5. Next Bus Arrival Displays at County Express Fixed Route and Intercounty Bus Stops
[CCIIP Category - Transit Travel Information -Station & Bus Stop Information System]

Estimated cost $73,000 - $80,000 one-time capital cost and $7,300 - $8,300 ongoing annual cost

Once Short Term Recommendation 7A.3. (Enhance County Express Website) and
Long Term Recommendation 7C.2 (Automated Route/Scheduling Management for Fixed Route and Intercounty Services), are in place, it is recommended that LTA consider installation of real-time arrival and destination signs at key County Express bus stops. The earlier improvements, an enhanced County Express website and the AVL functionality from an automated fixed route schedule management system, are necessary for this recommendation to be able to display Fixed Route and Intercounty route real time arrival/departure information.

In addition to being recommended in the CCIIP and identified in the SRTP/LRTP, the presentation of real-time information at bus stops was the second highest passenger request of the 2016 ITS survey. Further in support of improvements at County Express bus stops, the adoption of the BSIP was another milestone planning effort by LTA. The thorough analysis of the 87 County Express bus stop locations included recommendations and improvement costs, which have been incorporated into the ITS Plan considerations. The ITS Plan augmented the BSIP field survey efforts to identify the strongest candidate bus stops for real-time signage. This effort included determining whether electronic signage could be introduced, how these amenities might be introduced, and whether candidate locations had the upgrade capacity to connect to electricity to power real time LED signs.

The backend methodology used for the real-time signs consists of exporting AVL data and applying a predictive algorithm to generate individual route/stop estimated arrival and departure times which is transmitted to a specially designed LED sign. Given the expense of each sign and the ongoing maintenance costs necessary for this significant investment, it is recommended that no more than 9 (5 Fixed Route/Intercounty and 4 Intercounty stops) signs be considered on County Express Fixed Route and Intercounty routes

Table 3 below presents the recommended County Express Fixed Route and Intercounty candidate bus stop locations, based on planning document analysis, reviewed ridership data, and supplemental field work.

Table 3. County Express ITS Recommended Bus Stops

	Fixed Route Bus Stops	BSIP ID No.	County Express Routes	BSIP Ranking
1	4th Street and San Benito (in shelter)	Stop ID# 29	Blue Line and Intercounty routes	34th out of 84
2	San Benito High School (stand alone)	Stop ID# 53	Blue Line	7th out of 84
3	Mission Oaks (stand alone)	Stop ID# 18	Green and Blue Lines	13th out of 84
4	Mabie Northside (in shelter)	Stop ID# 79	Red and Green Line	21st out of 84
5	K-Mart (stand alone)	Stop ID# 67	Red Line	1st out of 84

	Intercounty Bus Stops	BSIP ID No.	County Express Routes	BSIP Ranking
1	Veteran's Park on Memorial (in shelter)	Stop ID# 72	Blue Line and Intercounty	59th out of 84
2	Gavilan College (in shelter)	Stop ID# 85	Intercounty	Not ranked
3	Caltrain/Greyhound (Gilroy Transit Station) (stand alone)	Stop ID# 84	Intercounty	Not ranked
4	Abbe Park (stand alone)	Stop ID# 87	Intercounty	Not ranked

It is important to point out that the BSIP priority installation ranking did not include three of the Intercounty bus stops included in Table 3, as these were outside of the City of Hollister.

There are additional considerations for the agency in proceeding forward with this recommendation such as the need for multijurisdictional coordination of sign installations, especially for those signs recommended in neighboring Santa Clara County (Intercounty route stops). There may be additional permitting requirements for the signs depending on local jurisdiction planning code and, given the expense of each sign, the ongoing sign maintenance should be considered. Given LTA's existing staff resources, it might be wise to attempt to partner with these local jurisdictions to perform and/or maintain the signs or consider an ongoing support agreement with the selected vendor of the real-time signage, if is an available option.

Also, given the importance of the physical bus stops to existing LTA passengers as well as an attraction for future riders, it is recommended that future bus stop signs be demarcated with additional service information, bus stop ID numbers, and the County Express website address.

5A. Solar Power Next Bus Arrival Sign Option

Of the bus stops recommended for next bus arrival/departure signage in Table 3, five of the nine stops would be free standing signs and four are recommended to be mounted within existing shelters at the bus stops. After reviewing the BSIP analysis and performing supplemental field work, the proposed five stand-alone bus stop locations and two of the four in-shelter proposed sign locations pose a challenge in being able to connect to a power source necessary for the real-time signs to operate. One option for LTA to consider is procurement of solar powered signs.

The example presented in Figure 7 is from a vendor, Waysine, which has partnered with the Contra Costa County Community Connection. Waysine, imports County Connection's AVL (separate system) data feed to the sign to present real time

arrival/departure information. These signs require no external electrical connection and have a built battery storage feature.

Figure 7. Waysine Solar Powered Next Bus Arrival Sign

See the ITS Implementation Plan Section 9 for further cost and other details.

6. Automated Passenger Counting System on County Express Fixed Route and Intercounty Vehicles

[CCIIP Category – Transit Management - Transit Passenger & Fare Management]

Estimated cost -$61,000 - $75,000 one-time cost and $6,000 - $8,500 ongoing annual cost

This recommendation for an Automated Passenger Counting (APC) system was recognized in the CCIIP as an important investment to validate ridership information and to generate more detailed and valuable ridership data. APC technology allows for the capture of daily route and trip level data as well as boarding and alighting activity at individual bus stops and is recommended to be installed on all Fixed Route and Intercounty vehicles. This data is important as it will allow LTA to gauge productivity and can be used for route and schedule planning purposes. As transit agencies introduce more ITS integrated systems, APC vendors can offer stand-alone systems or systems integrated with AVL systems to provide real-time passenger data.

Adding such a system to the County Express fixed route operations fleet would improve the reliability and timeliness of capturing passenger data. LTA's contract provider currently collects ridership data manually at the route level only and presents a comprehensive report to LTA staff monthly. This method of data collection and reporting, aside from being resource intensive and inefficient, also has a significant potential for error.

As previously mentioned under Long Term recommendation 7C.2, there may be an opportunity to pursue an APC system as part of the procurement of an automated route and schedule management system for the fixed route services. Therefore, it is recommended that the agency try to obtain an integrated cost for the APC system through that procurement process. This will allow the agency to evaluate if there are any economies of scale savings by procuring the APC system in this manner.

See the ITS Implementation Plan Section 9 for further cost and other details.

7. Electronic Maintenance System for County Express Bus Fleet
[CCIIP Category – Transit Management - Transit Maintenance]

Estimated cost - $30,000 - $60,000 one-time costs and $5,000 - $10,000 ongoing annual cost

This final ITS recommendation is put forth is recognition of the significant ITS investment that LTA will have made to the County Express system and to the County Express fleet. As such, it is recommended that an automated system be procured that will manage the maintenance records of the fleet vehicles, the ancillary ITS equipment, store and track work repair orders, track the spare parts inventory, monitor warranty periods, and schedule preventative maintenance. While the CCIIP included this software as a recommendation for the Central Coast transit providers, more recently the Federal Transit Administration issued directives to the transit industry on asset management and requiring equipment be maintained in a state of good repair. This has resulted in transit agencies investing in such automated fleet management and inventory systems to assist with staying in compliance with the FTA regulations.

These systems are housed in the maintenance facility and are populated with the complete inventory of equipment and spare parts associated with this equipment. As maintenance work is routine performed it is input into this system. This data is safely retained for historic and trend analysis purposes, to ensure compliance with Original Equipment Manufacturer (OEM) maintenance guidelines, and to have record of all maintenance performed on all equipment. These systems have security safeguards that

allow authorized users to access different levels of data and the ability to review activity for fiscal and maintenance practices auditing.

See the ITS Implementation Plan Section 9 for further cost and other details.

Section 8. Other Considerations – Not Included in ITS Plan

The CCIIP was a comprehensive initiative taking place over several years that considered the available ITS technology at the time and the integration opportunities for the participating Central Coast Transit Providers. However, looking at the projected need and evolving demographic population in the County Express service area, this ITS Plan did not include all recommendations found in the CCIIP.

In addition, there are product offerings from LTA's vendor, RouteMatch$^©$, that were recommended in this ITS Plan to be added to enhance the agency's initial automated schedule management system investment. However, there were other products mentioned that were not recommended for inclusion in this ITS Plan. Presented below are those strategies, products and recommendations not included in the ITS Plan.

1. Automated Dispatching Information

Computer Automated Dispatch (CAD) systems automate a transit agencies dispatch functionality and integrate with other systems such as voice/data (radio), routing and scheduling software, and AVL through operating software. These systems are used primarily in fixed route applications and secondarily in Paratransit applications.

As referenced in the Existing Inventory Report, RouteMatch$^©$ does have a complete CAD product offering designed for demand response services, although they also offer a CAD solution for fixed route operations. Given the system size and scale of the County Express operation, investment in a full CAD system could not be justified, especially given the investment necessary to get the fixed route automation up to the level of the demand response program. There were also concerns as to how well the RouteMatch$^©$ CAD product would integrate with LTA's radio system.

The ITS Plan focus instead was to gradually add further enhancements to the existing demand response system and to introduce ITS improvements to the fixed route operations.

2. Voice/Data Communication

As referenced in the Existing Inventory Report, voice communications was the first area that LTA proactively invested in with the County Express radio system upgrade in 2013. These new dedicated VHF digital mobile radios were a significant improvement to operations by eliminating radio transmission "dead spots" and introducing enhanced features such as the emergency notification "panic buttons" for drivers.

The CCIIP had envisioned a more comprehensive voice and data system more commonly found in larger transit systems. The ITS Plan again presents a more "piece meal" approach reflecting the County Express needs. The radio system improvements addressed system-wide voice communications, while the recommended MDT investments for both demand response and fixed route operations will vastly improve data communications.

3. RM Fixed© - Fixed Route Schedule Product

As discussed under Long Term recommendation 7C.2, this RouteMatch© product would bring very similar capabilities to the fixed route operations as RouteMatch Demand© does to the Paratransit and DAR operations. However, the one notable and important difference was that RM Fixed© does not perform automated scheduling functionality. Thus, the ITS Plan recommendation is to pursue a complete solution for the Fixed Route and Intercounty service.

4. RM Pay© - Automated Fare Payment for Paratransit and DAR

RouteMatch© recently introduced a new product, RM Pay©, to their suite of services. This software module is an account based fare management system that allows demand response clients that have accounts established with a transit agency, to ride in an all-electronic or cashless manner. Unfortunately, this program is designed primarily for demand response applications and it is not clear that this solution would address the needs of Fixed Route and Intercounty passengers as identified in the SRTP/LRTP and the passenger surveys (2013 and 2016). The ITS Plan strategy was to launch a pilot electronic fare media project to assess the feasibility of investing in this technology on a system-wide level.

Section 9. ITS Implementation Plan

The following section presents the implementation steps necessary for each of the ITS Plan's recommendations and is aggregated by Short Term (1-3 years), Intermediate Term (3-5 years), and Long Term (5+ years) implementation. The implementation steps identify the parties that will be involved in the project, the associated project tasks, the projected project time line, and the estimated one-time and ongoing annual project costs.

With the exception of Mobile Fare Media Sales (Short Term Recommendation 5A), all the recommendations will require the involvement of a 3rd Party vendor. Therefore, it is assumed that each 3rd Party vendor will be selected and work in accordance with LTA's adopted procurement policies, practices, and standards and shall comply with all State and Federal procurement requirements.

Short Term Recommended ITS Improvements (FY 2017/18 – 2021)

Recommendations: 5

Total Estimated
One-Time Cost: $153,000-$211,000

Total Estimated
Annual Cost: $46,800-$80,500

1. Install Mobile Data Tablets on County Express Paratransit & DAR **Vehicles (RouteMatch© Enhancement)**

Estimated Projected Cost:

Option 1 (Capital Model) - <u>Recommended</u>
- $38,000 in one-time capital cost
- $3,800 in annual costs beginning Year 2 (data polling and support)
- Onsite training provided
- Ruggedized in-vehicle MDT mount installed by RouteMatch
- LTA can elect a wireless provider (Verizon, AT&T, Sprint, US Cellular) $720 in savings applied if preferred wireless provider desired

Option 2 (Package Model)
- No one-time capital cost
- Instead monthly charge of $79 per tablet or $9,480 annually
- 3-year contract required commitment
- Remote training only provided
- Cup holder MDT mount provided to be installed by LTA
- Verizon network required wireless provider

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- RouteMatch© sales manager, technicians, account manager
- MV Transportation general manager, operations manager, supervisors, drivers

Tasks:
a. Contact RouteMatch© Sales Manager to verify 2015 MDT expansion cost quote remains valid and accurate
b. Choose project model cost option
c. Ensure that previously identified funding source remains available
d. Prepare and bring the project before Board of Directors for approval
e. Award contract and issue Notice to Proceed to RouteMatch©
f. Develop project time line with assigned responsibilities (LTA, MV Transportation, RouteMatch©)
g. Hold initial meeting/conference call prior to project start (LTA staff, MV Transportation staff, RouteMatch© representatives)
h. All parties to agree on installation time frame and responsibilities
i. All parties to agree to go-live date
j. Prepare rider notices, press release, website notice, and social media notice and release
k. All parties to agree on MDT operations training dates and attendees (MV Transportation operators, supervisors, dispatch, managers, LTA staff)

l. Installation of MDT's
m. Required training sessions performed
n. MDT's soft launch (not more than one week)
o. MDT go-live

Estimated project time frame:
3-4 months from confirmation of fund availability and Notice to Proceed

2. Video Surveillance on County Express Fixed Route and Intercounty Buses **(New 3ʳᵈ Party Vendor)**

Estimated Projected Cost:
One-time - $47,000 – 75,000
Annual - $15,000- 35,000 (not including video review costs)

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- 3ʳᵈ Party sales representative, field technicians, account or project manager
- MV Transportation general manager, operations manager, supervisors, drivers
- 3ʳᵈ Party consultant to LTA (TBD)
- LTA legal counsel
- Law enforcement representative (TBD)

Tasks:
a. Ensure that previously identified funding source remains available
b. Internal decision on staff resources to apply to project and/or 3ʳᵈ Party assistance
c. Internal decision on whom will perform ongoing video review
d. Prepare formal solicitation for qualified video surveillance proposals
   Subtasks:
   i. Include cost option for manual video data download and wireless video data download
   ii. Solicit cost to remove and reinstall the video system on future vehicles
   iii. Require breakdown of individual cost components (installation, ongoing support, training (on-site and offsite, etc.)
   iv. Require listing of spare parts needed and associated cost
   v. Require detailing list of system and parts warranty
   vi. Require information on software upgrades
   vii. Require service and operations manuals

e. Develop solicitation timeline
   Subtasks:
   i. Include due date for proposal questions
   ii. Identify pre-proposal meeting date
   iii. Proposal due date
   iv. Identify evaluation panel members
   v. Tentative evaluation panel review dates
   vi. Outreach to successful/unsuccessful proposers
   vii. LTA Board of Directors Action

viii. Award and Notice to Proceed

f. Develop list of qualified firms to forward proposals to when completed
g. Release solicitation and advertise project solicitation
h. Hold pre-proposal meeting at LTA and invite interested proposers to Operations & Maintenance facility
i. Evaluate proposals and prepare recommendation to Board of Directors
j. Bring project recommendation before Board of Directors for approval
k. Award contract and Issue Notice to Proceed
l. Develop project time line with assigned responsibilities (LTA, MV Transportation, selected 3rd Party vendor)
    Subtasks:
    i.   Identify initial meeting date(s)
    ii.   Location (O&M facility or administrative offices)
    iii. Fixed route operations fleet requirement (vehicle numbers, vehicle specifications, schematics, etc.)
    iv.   Facility requirements (computers, hardware, internet connections, etc.)
    v.   LTA project requirements (reporting, billing, etc.)
    vi.   MV Transportation requirements (advanced notice of equipment installs, facility access, etc.)
    vii. Vendor requirements (access, time to install, test, etc.)
    viii. Other participants or project requirements (stakeholders, law enforcement, etc.)
    ix.   Create video data storage policy
    x.   Introduce standing project meeting

m. Hold initial meeting/conference call prior to project start (LTA staff, MV Transportation staff, 3rd Party representatives, others TBD)
n. All parties agree on project time frame, requirements, installation, and other responsibilities
o. All parties to agree to go-live date
p. Begin standing project meetings
q. Begin project status updates
r. Prepare rider notices, press release, website notice, and social media notice and release
s. All parties to agree on video surveillance system training dates and attendees (video review designee, MV Transportation senior management, LTA staff, others TBD)
t. Installation of video surveillance system
u. Required training sessions performed
v. Video surveillance system go-live

Estimated project time frame:
6-8 months from confirmation of fund availability and Notice to Proceed

3. Enhance County Express Website   (**New**

4. Enhance County Express Website Trip   **3rd Party**

5. Pursue On-Line Fare Media Sales (website design only)   **Vendor**)

Estimated Projected Cost:

One-time - $30,000 – 60,000 (combined web design portion of each project*****)

Annual - $10,000 - $20,000 (dependent on costs to administrator and ongoing administrative needs)

Participating Parties:

- LTA Staff (Lead)
- 3rd Party project lead, design staff
- Stakeholders (TBD)
- Board members (TBD)

Tasks:

a. Identify funding source
b. Factor time for possible application for funds
c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
d. Internal decision on on-line fare media clearinghouse policy
e. Prepare formal solicitation for qualified website design proposals
   Subtasks:
      i. Require breakdown of individual cost components (design, LTA content set-up, training, etc.)
     ii. Include responsive design for mobile devices
    iii. Consider optional costs for ongoing administration and support
    iv. Consider option for Content Management System design
     v. Consider additional design or desired links
    vi. Include trip planner redesign and GTSF experience in scope
    vii. Include design and link to on-line sales portal
   viii. Inquire if 3rd Party sales services provided or recommended vendors
    ix. Require information on software upgrades

f. Develop solicitation timeline
   Subtasks:
      i. Include due date for proposal questions
     ii. Identify pre-proposal meeting date
    iii. Proposal due date
    iv. Identify evaluation panel members

<div align="right">
v.   Tentative evaluation panel review dates

vi.   Outreach to successful/unsuccessful proposers

vii.   LTA Board of Directors Action

viii.   Award and Notice to Proceed dates
</div>

g. Develop list of qualified firms to forward proposals to when completed
h. Release solicitation and advertise project solicitation
i. Hold pre-proposal meeting at LTA administrative office
j. Evaluate proposals and prepare recommendation to Board of Directors
k. Bring project recommendation before Board of Directors for approval
l. Award contract and Issue Notice to Proceed
m. Develop project time line with assigned responsibilities (LTA, 3rd Party vendor, stakeholders-TBD)
Subtasks:
  i. Identify initial meeting date(s)
  ii. LTA project requirements (reporting, billing, etc.)
  iii. Ensure trip planner modifications included
  iv. Ensure on-line fare media purchasing portal included
  v. Vendor requirements (LTA service information, time to populate content, test, beta test sites, etc.)
  vi. Other participants or project requirements (stakeholders, etc.)
  vii. Introduce standing project meeting

n. Hold initial meeting prior to project start (LTA staff, 3rd Party vendor, others TBD)
o. All parties agree on project time line, requirements, installation, and other responsibilities
p. All parties to agree to go-live date
q. Begin standing project meetings
r. Begin project status updates
s. Coordinate on-line fare media sales component to meet website go-live
t. Prepare rider notices, press release, website notice, and social media notice and release
u. All parties to agree on website training/overview (3rd Party vendor, LTA staff, others TBD)
v. Beta County Express website go-live
w. Required training/overview performed
x. Presentation to Board of Directors
y. New County Express website go-live

Estimated project time frame:
8-10 months from confirmation of fund availability and Notice to Proceed

* The one-time website design cost for Short Term recommended projects 3, 4, and 5 are combined to take advantage of potential economies of scale savings. However, the ongoing 3rd Party cost to administer credit card payments for on-line fare media sales also required for Recommendation 5 are not included in this cost. Please refer to the 3rd Party payment processing implementation plan for details on this portion of the project.

5. Pursue On-Line Fare Media Sales (New 3rd Party Payment Vendor)

Estimated Projected Cost:
Annual cost for 3rd party payment services - $8,000-$16,000 (depending upon transaction fees)

Participating Parties:
- LTA Staff (Lead)
- 3rd Party project lead, 3rd Party website vendor (if different)

Tasks:
  a. Identify funding source (if different from website redesign)
  b. Factor time for possible application for funds
  c. Internal decision on on-line fare media clearinghouse policy and fare media distribution
  d. Internal decision on whether this project scale to follow formal solicitation process or Purchase Order approach
  e. Prepare solicitation for qualified on-line payment processing vendors
  Subtasks:
     i. Require breakdown of individual cost and fees (credit card transactions, set-up, customer service, shipping, ongoing costs, etc.)
     ii. Requirements for secure site links
     iii. Coordination with website redesign effort

  f. Develop solicitation timeline
  Subtasks:
     i. Include due date for proposal questions
     ii. Proposal due date
     iii. Identify evaluation criteria
     iv. LTA Board of Directors Action
     v. Award and Notice to Proceed dates to coincide with new website launch

  g. Develop list of qualified firms to forward proposals to
  h. Release solicitation
  i. Evaluate proposals
  j. Seek clarification if going before Board of Directors for approval
  k. Award contract and Issue Notice to Proceed
  l. Develop project time line with assigned responsibilities (LTA, 3rd Party vendor, 3rd Party website designer)

Subtasks:
i. Identify initial meeting/call date
ii. LTA project requirements (consignment agreements, transaction agreements, etc.)
iii. Vendor requirements (LTA fare media product and cost information, etc.)
iv. Other participant's requirements (website designer access, etc.)

v. Hold initial meeting/call prior to project start (LTA staff, 3rd Party vendor, 3rd Party website designer TBD)
vi. All parties agree on project, requirements, agreed upon clearinghouse set-up, and other responsibilities
vii. All parties to agree to time go-live date with new website launch
viii. All parties to agree on website training/overview (3rd Party vendor, 3rd Party website designer, LTA staff, others TBD)
ix. Required training/overview performed
x. On-line portal ready for orders with launch of New County Express website

Estimated project time frame:
1-3 months as part of website redesign timeline

5A. Mobile fare media sales **(LTA sponsored initiative)**

Estimated Projected Cost:
One-time - $3,000
Annual –$10,000-15,000 for two-year period (not including staff time)

Participating Parties:
- LTA Staff (Lead)
- MV Transportation senior management
- Community partners - TBD

Tasks:
a. Internal decision on whether to proceed with interim project or not
b. Identify short term funding source
c. Internal decision on leasing of new or used vehicle
d. Internal decision on where mobile unit to be sent, when, and who will staff
e. Internal decision on how to proceed piece meal following Purchase Order policy
f. Solicit for individual components required
   Subtasks:
   i. Research vehicle lease options and proceed accordingly
   ii. Inquire with County of San Benito or other stakeholders about possible use of vehicle for stated purpose
   iii. Research cost of components needed (safe, generator, credit card transactions) and proceed accordingly

   iv. LTA to determine when and for long this interim solution proceeds

Estimated project time frame:
1-3 months from the acquisition of components

Intermediate Term ITS Recommended Improvements **(FY 2020/21 – 2024)**

Recommendations: 3

Total Estimated
One-Time Cost: $19,400 - $28,400

Total Estimated
Annual Cost: $6,500 - $11,500

1. Expand County Express Automated Scheduling Management System (RouteMatch© Enhancement)

Estimated cost:
One-Time: $3,300

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- RouteMatch© sales manager, technicians, account manager
- MV Transportation general manager, operations manager, supervisors

Tasks:
a. Contact RouteMatch© Sales Manager to verify RouteMatch Events© cost
b. Identify funding source
c. Factor time for possible application for funds
d. Verify whether project is amendment to existing contract, new contract, or Purchase Order change
e. Issue Notice to Proceed to RouteMatch©
f. Develop project time line with assigned responsibilities (LTA, MV Transportation, RouteMatch©)
g. Hold initial meeting/conference call prior to project start (LTA staff, MV Transportation staff, RouteMatch© representatives)
h. All parties to agree on installation time frame and responsibilities
i. All parties to agree to go-live date
j. All parties to agree on RouteMatch Events© training dates and attendees (MV Transportation senior management, supervisors, dispatch, LTA staff)
k. Installation of RouteMatch Events©
l. Required training sessions performed
m. RouteMatch Events© go-live

Estimated project time frame:
1-3 months from confirmation of funding and Notice to Proceed

2. Real Time System Passenger Notification on Fixed Route and Intercounty Service (New 3rd Party Vendor)

Estimated cost:
One-time - $1,000 – $5,000 (set-up)
Annual - $1,500 - $3,000 (dependent on carrier network fees)

Participating Parties:
- LTA staff (Lead)
- 3rd Party sales representative, account or project manager
- MV Transportation senior management
- 3rd Party consultant to LTA (TBD)

Tasks:
a. Identify funding source
b. Factor time for possible application for funds
c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
d. Prepare formal solicitation for qualified notification system proposals
   Subtasks:
e. Require breakdown of individual cost and fees (carrier network charges, set-up, customer service, training, other ongoing costs, etc.)
f. Include cost option for addition or real time AVL information output
g. Require specification on County Express schedule data feed requirements
h. Develop solicitation timeline
   Subtasks:
   i. Include due date for proposal questions
   ii. Identify pre-proposal meeting/call-in date
   iii. Proposal due date
   iv. Identify evaluation panel members
   v. Tentative evaluation panel review dates
   vi. Outreach to successful/unsuccessful proposers
   vii. LTA Board of Directors Action
   viii. Award and Notice to Proceed

i. Develop list of qualified firms to forward proposals to
j. Release solicitation and advertise project solicitation
k. Hold pre-proposal meeting
l. Evaluate proposals and prepare recommendation to Board of Directors
m. Bring project recommendation before Board of Directors for approval
n. Award contract and Issue Notice to Proceed

    o. Develop project time line with assigned responsibilities (LTA, MV Transportation, selected 3rd Party vendor)

Subtasks:
    i. Identify initial meeting date(s)
    ii. Fixed route operations schedule and stop information (GTST formatted schedules, BSIP stop ID, etc.)
    iii. LTA project requirements (reporting, billing, etc.)
    iv. Vendor requirements (schedule, stops, test environment, etc.)

    p. Hold initial meeting/conference call prior to project start (LTA staff, MV Transportation staff, 3rd Party Representatives)
    q. All parties agree on project time line, requirements, and other responsibilities
    r. All parties to agree to go-live date
    s. Prepare rider notices, press release, website notice, and social media notice and release
    t. All parties to agree on notification system/overview dates and attendees (3rd Party vendor, MV Transportation senior management, LTA staff)
    u. Required training/overview sessions performed
    v. Passenger notification system go-live

Estimated project time frame:
2-4 months from confirmation of funding and Notice to Proceed

3. Wi-Fi on County Express Intercounty Buses **(New 3ʳᵈ Party Vendor)**

Estimated cost:
One-time - $15,000 – 20,000 (dependent on equipment and data usage on 6 vehicles)
Annual - $5,000 - $8,500 (dependent on carrier network fees)

Participating Parties:
- LTA staff (Lead) – including Maintenance Function
- 3ʳᵈ Party sales representative, account or project manager
- MV Transportation senior management
- 3ʳᵈ Party consultant to LTA (TBD)

Tasks:
    a. Identify funding source
    b. Factor time for possible application for funds
    c. Internal decision on staff resources to apply to project and/or 3ʳᵈ Party assistance
    d. Prepare formal solicitation for qualified Wi-Fi system proposals
       Subtasks:
        i. Require breakdown of individual cost and fees (vehicle installation time, equipment required for each vehicle, carrier network charges, set-up, customer service, training, other ongoing costs, etc.)
        ii. Solicit cost to remove and reinstall the Wi-Fi system on future vehicles
        iii. Require detail on advertising policy and practices
        iv. Include options for 100% turnkey project, vendor/LTA shared cost, and vendor/user fee cost
        v. Require listing of spare parts needed and associated cost
        vi. Require information on software upgrades
        vii. Require detailing list of system and parts warranty
    e. Develop solicitation timeline
       Subtasks:
        i. Include due date for proposal questions
        ii. Identify pre-proposal meeting date
        iii. Proposal due date
        iv. Identify evaluation panel members
        v. Tentative evaluation panel review dates
        vi. Outreach to successful/unsuccessful proposers
        vii. LTA Board of Directors Action
        viii. Award and Notice to Proceed

    f. Develop list of qualified firms to forward proposals to

g. Release solicitation and advertise project solicitation
h. Hold pre-proposal meeting
i. Evaluate proposals and prepare recommendation to Board of Directors
j. Bring project recommendation before Board of Directors for approval
k. Award contract and Issue Notice to Proceed
l. Develop project time line with assigned responsibilities (LTA, MV Transportation, selected 3rd Party vendor)
    Subtasks:
    i. Identify initial meeting date(s)
    ii. LTA project requirements (reporting, billing, etc.)
    iii. Vendor requirements (Intercounty vehicle specifications, schematics, facility access, etc.)
    iv. MV Transportation requirements (advance notice and coordination during installation)

m. Hold initial meeting prior to project start (LTA staff, MV Transportation staff, 3rd Party representatives)
n. All parties to agree on project time line, requirements, and other responsibilities
o. All parties to agree to go-live date
p. Prepare rider notices, press release, website notice, and social media notice and release
q. All parties to agree on Wi-Fi system training/overview dates and attendees (3rd Party vendor, MV Transportation senior management, LTA staff)
r. Required training/overview sessions performed
s. Wi-Fi system go-live

Estimated project time frame:
4-6 months from confirmation of funding and Notice to Proceed

Long Term ITS Recommended Improvements (**FY 2023/24 - beyond**)
Recommendations: 7

Total Estimated
One-Time Cost: $556,000 - $713,000

Total Estimated
Annual Cost: $87,900 – $129,400

1. Complete Expansion of County Express Automated Scheduling Management System (RouteMatch© Enhancement)

Estimated cost:
One-time - $25,000
Annual - $3,600

Participating Parties:
- LTA Staff (Lead)
- RouteMatch© sales manager, technicians, account manager
- MV Transportation general manager, operations manager, supervisors, dispatchers

Tasks:
    a. Contact RouteMatch© Sales Manager to verify RouteMatch Notification© cost
    b. Identify funding source
    c. Factor time for application for funds
    d. Verify whether project is new contract or Purchase Order change
    e. Issue Notice to Proceed to RouteMatch©
    f. Develop project time line with assigned responsibilities (LTA, MV Transportation, RouteMatch©)
    g. Hold initial meeting/conference call prior to project start (LTA staff, MV Transportation staff, RouteMatch© representatives)
    h. Identify ways notification system will impact Paratransit and DAR client experience
    i. Develop outreach campaign to educate clients on how to use notification system
    j. All parties to agree on installation time frame and responsibilities
    k. All parties to agree to go-live date
    l. All parties to agree on RouteMatch Notification© training dates and attendees (MV Transportation senior management, supervisors, dispatch, LTA staff)
    m. Installation of RouteMatch Notification©
    n. Required training sessions performed
    o. RouteMatch Notification© go-live

Estimated project time frame:
4-6 months from confirmation of funding and Notice to Proceed

2. Automated Route/Scheduling Management for Fixed Route and Intercounty Services (New 3rd Party Payment Vendor)

Estimated cost:
One-Time - $90,000- $175,000
Annual - $25,000 - $40,000

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- 3rd Party sales representative, field technicians, account or project manager
- MV Transportation general manager, operations manager, supervisors, drivers
- 3rd Party consultant to LTA (TBD)

Tasks:
a. Identify funding source
b. Factor time for application for funds
c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
d. Prepare formal solicitation for qualified automated fixed route scheduling management system proposals
   Subtasks:
   i. Require breakdown of individual cost components (vehicle installation time, equipment required for each vehicle, carrier network charges, set-up, customer service, training, other ongoing costs, etc.)
   ii. Solicit information on space and IT requirements
   iii. Require information on proposed MDT's
   iv. Require information on proposed AVL functionality
   v. Solicit cost to remove and reinstall the MDT's on future vehicles
   vi. Solicit optional cost for APC system
   vii. Solicit optional information and cost to integrate APC and AVL systems
   viii. Require listing of spare parts needed and associated cost
   ix. Require detailing list of system and parts warranty
   x. Require information on software upgrades
   xi. Require service and operations manuals

e. Develop solicitation timeline
   Subtasks:
   i. Include due date for proposal questions
   ii. Identify pre-proposal meeting date
   iii. Proposal due date
   iv. Identify evaluation panel members

     v.   Tentative evaluation panel review dates

    vi.   Outreach to successful/unsuccessful proposers

   vii.   LTA Board of Directors Action

  viii.   Award and Notice to Proceed

f. Develop list of qualified firms to forward proposals to

g. Release solicitation and advertise project solicitation

h. Hold pre-proposal meeting at LTA and invite interested proposers to Operations & Maintenance facility

i. Evaluate proposals and prepare recommendation to Board of Directors

j. Bring project recommendation before Board of Directors for approval

k. Award contract and Issue Notice to Proceed

l. Develop project time line with assigned responsibilities (LTA, MV Transportation, selected 3rd Party vendor)
Subtasks:
  i. Identify initial meeting date(s)
  ii. Location (O&M facility or administrative offices)
  iii. Fixed route operations fleet requirement (vehicle numbers, vehicle specifications, schematics, etc.)
  iv. Facility requirements (computers, hardware, internet connections, etc.)
  v. LTA project requirements (reporting, billing, etc.)
  vi. MV Transportation requirements (advanced notice of equipment installs, facility access, system information materials, etc.)
  vii. Vendor requirements (access, time to install, testing, etc.)
  viii. If procured, coordinate installation of APC system timed with go-live
  ix. Develop LTA route and schedule reporting formats
  x. Introduce standing project meeting

m. Hold initial meeting prior to project start (LTA staff, MV Transportation staff, 3rd Party representatives, others TBD)

n. All parties agree on project time frame, requirements, installation, and other responsibilities

o. All parties to agree to go-live date

p. Begin standing project meetings

q. Begin project status updates

r. Prepare rider notices, press release, website notice, and social media notice and release

s. All parties to agree on automated fixed route scheduling management system training dates and attendees (MV Transportation drivers, supervisors, dispatchers, managers, LTA staff, others TBD)

t. Installation of automated fixed route scheduling management system

u. If procured, installation of APC system

v. Required training sessions performed

w. Automated fixed route scheduling management system soft launch (not more than one week)

x. Automated fixed route scheduling management system go-live

Estimated project time frame:
8-10 months from confirmation of funding and Notice to Proceed

3. Electronic Fare Media on Intercounty Routes (New 3rd Party Payment Vendor)

Estimated cost: 9 month to 1 year pilot project cost dependent on proportional split of costs (LTA, vendor, passengers)
One-Time - $40,000 - $55,000 (assumes 6 vehicles)

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- 3rd Party electronic fare media partner and representatives
- MV Transportation General Manager, Operations Manager, supervisors, dispatch, and drivers
- 3rd Party consultant to LTA (TBD)

Tasks:
  a. Identify funding source
  b. Factor time for application for funds
  c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
  d. Informal contact of firms specializing in electronic payment systems
  e. Based on contact and interest in pilot project – determine preferred solicitation (Request for Proposals, Request for Interest, etc.)
  f. Prepare solicitation for qualified electronic fare media proposals
     Subtasks:
     i. Require breakdown of individual cost components (equipment, installation, fare card stock, customer service, training, and other costs)
     ii. Require detail on how equipment to be installed on County Express vehicles
     iii. Solicit information on clearinghouse capabilities of firm
     iv. Require information on whether existing MDT's (Long Term recommendation 7C.2) can integrate with pilot project
     v. Require listing of spare parts needed and associated cost not covered during pilot
     vi. Require information on computer hardware and software required
     vii. Require service and operations manuals

  g. Develop solicitation timeline
     Subtasks:
     i. Include due date for proposal questions
     ii. Identify pre-proposal meeting date, if necessary
     iii. Proposal due date

      iv.   Identify evaluation panel members

      v.   Tentative evaluation panel review dates

      vi.   Outreach to successful/unsuccessful proposers

      vii. LTA Board of Directors Action

      viii. Award and Notice to Proceed

h. Based on initial outreach develop list of qualified firms to approach for pilot
i. Release solicitation
j. If necessary, hold pre-proposal meeting at LTA and invite interested proposers to Operations & Maintenance facility
k. Evaluate proposals and prepare recommendation to Board of Directors
l. Bring project recommendation before Board of Directors for approval
m. Award contract and Issue Notice to Proceed
n. Develop project time line with assigned responsibilities (LTA, 3rd Party vendor, MV Transportation, others TBD)
   Subtasks:

      i.   Identify initial meeting date(s)

      ii.   Fixed route operations fleet requirement (vehicle numbers, vehicle specifications, schematics, etc.)

      iii. Facility requirements (computers, internet connections, etc.)

      iv.   LTA project requirements (reporting, billing, etc.)

      v.   MV Transportation requirements (advanced notice of equipment installs, facility access, system information materials, etc.)

      vi.   Vendor requirements (access, space, time to install, testing, etc.)

      vii. Develop outreach and education plan for Intercounty passengers

      viii. Develop customer service plan for pilot

      ix.   Develop LTA data reporting plan

      x.   Introduce standing project meeting

o. Hold initial meeting prior to project start (LTA staff, MV Transportation staff, 3rd Party partner, others TBD)
p. All parties agree on project time frame, requirements, installation, and other responsibilities
q. All parties to agree to go-live date
r. Begin standing project meetings
s. Begin project status updates
t. Prepare rider notices, press release, website notice, and social media notice and release
u. All parties to agree on electronic fare media system training dates and attendees (MV Transportation drivers, supervisors, dispatchers, managers, LTA staff, others TBD)
v. Installation of electronic fare media system
w. Required training sessions performed
x. Electronic fare media system soft launch (not more than one week)
y. Electronic fare media system go-live

Estimated project time frame:
6-8 months to launch pilot from confirmation of funding and Notice to Proceed

4. Electronic Fare Payment System on Fixed Route and Intercounty Routes (New 3rd Party Payment Vendor)

Estimated cost:
One-Time - $230,000 - $250,000 one-time capital costs (assumes 10 vehicles)
Annual - $40,000 - $60,000 annual costs

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- 3rd Party sales representative, field technicians, account or project manager
- MV Transportation general manager, operations manager, supervisors, drivers
- 3rd Party consultant to LTA (TBD)

Tasks:
a. Identify funding source
b. Factor time for application for funds
c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
d. Prepare formal solicitation for qualified electronic fare payment system proposals
   Subtasks:
   i. Require breakdown of individual cost components (vehicle installation time, equipment required for each vehicle, set-up, customer service, training, other ongoing costs, etc.)
   ii. Require detail on fare collection vaults (mobile and stationary)
   iii. Solicit information on space and IT requirements
   iv. Require information on whether MDT needed or automated fixed route scheduling MDT's can be used
   v. Require listing of spare parts needed and associated cost
   vi. Require detailing list of system and parts warranty
   vii. Require information on software upgrades
   viii. Require service and operations manuals

e. Develop solicitation timeline
   Subtasks:
   i. Include due date for proposal questions
   ii. Identify pre-proposal meeting date
   iii. Proposal due date
   iv. Identify evaluation panel members
   v. Tentative evaluation panel review dates
   vi. Outreach to successful/unsuccessful proposers

       vii. LTA Board of Directors Action

      viii. Award and Notice to Proceed

f.   Develop list of qualified firms to forward proposals to

g. Release solicitation and advertise project solicitation

h. Hold pre-proposal meeting at LTA and invite interested proposers to Operations & Maintenance facility

i.   Evaluate proposals and prepare recommendation to Board of Directors

j.   Bring project recommendation before Board of Directors for approval

k. Award contract and Issue Notice to Proceed

l.   Develop project time line with assigned responsibilities (LTA, MV Transportation, selected 3rd Party vendor, others TBD)

Subtasks:

       i.   Identify initial meeting date(s)

      ii. Location (O&M facility or administrative offices)

     iii. Fixed route operations fleet requirement (vehicle numbers, vehicle specifications, schematics, etc.)

     iv. Facility requirements (storage space, revenue collection space, computers, probes, internet connections, etc.)

      v. LTA project requirements (space plan, reporting, billing, etc.)

     vi. MV Transportation requirements (advanced notice of equipment installs, facility access, system information materials, etc.)

     vii. Vendor requirements (access, space, time to install, testing, etc.)

    viii. Develop outreach and education plan for Fixed Route and Intercounty passengers

     ix. Develop customer service plan for new fare collection system

      x. Develop LTA data reporting plan

     xi. Introduce standing project meeting

m. Hold initial meeting prior to project start (LTA staff, MV Transportation staff, 3rd Party representatives, others TBD)

n. All parties agree on project time frame, requirements, installation, and other responsibilities

o. All parties to agree to go-live date

p. Begin standing project meetings

q. Begin project status updates

r. Prepare rider notices, press release, website notice, and social media notice and release

s. All parties to agree on electronic fare revenue collection system training dates and attendees (MV Transportation drivers, supervisors, dispatchers, managers, LTA staff, others TBD)

t. Installation of electronic fare revenue collection system

u. Required training sessions performed

v. Electronic fare revenue collection system soft launch (not more than one week)

w. Electronic fare revenue collection system go-live

Estimated project time frame:
8-10 months from confirmation of funding and Notice to Proceed

5. Next Bus Arrival Displays at County Express
Fixed Route and Intercounty Bus Stops
5.A. Solar Power Next Bus Arrival Sign Option   **(New**
3rd Party
Vendor)

Estimated cost:
(**Electric option**)   **One-Time** - $80,000 (assumes 9 signs)
                         Annual - $7,300
(**Solar option**)   **One-Time** - $73,000 (assumes 9 signs)
                         Annual - $8,300

Participating Parties:
- LTA Staff (Lead)
- 3rd Party sales representative, field technicians, account or project manager
- MV Transportation senior management
- Local jurisdiction representatives (Cities, County)
- 3rd Party consultant to LTA (TBD)

Tasks:
a. Identify funding source
b. Factor time for application for funds
c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
d. Prepare formal solicitation for qualified next bus arrival display proposals, inviting proposals for all solar and all electric solutions
   Subtasks:
   i. Require breakdown of individual cost components (installation, equipment required, set-up, maintenance, customer service, other ongoing costs, etc.)
   ii. Solicit cost for adding or moving signs
   iii. Solicit information on electrical and software requirements
   iv. Solicit information on connection and software requirements for solar signs
   v. Solicit information on AVL data feed requirements
   vi. Include optional request for ongoing maintenance support
   vii. Require listing of spare parts needed and associated cost
   viii. Require information on software upgrades
   ix. Require detailing list of system and parts warranty

e. Develop solicitation timeline

Subtasks:
  i. Include due date for proposal questions
  ii. Identify pre-proposal meeting date
  iii. Proposal due date
  iv. Identify evaluation panel members
  v. Tentative evaluation panel review dates
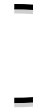 vi. Outreach to successful/unsuccessful proposers
  vii. LTA Board of Directors Action
  viii. Award and Notice to Proceed

f. Develop list of qualified firms to forward proposals to
g. Release solicitation and advertise project solicitation
h. Hold pre-proposal meeting at LTA
i. Evaluate proposals and prepare recommendation to Board of Directors
j. Bring project recommendation before Board of Directors for approval
k. Award contract and Issue Notice to Proceed
l. Develop project time line with assigned responsibilities (LTA, selected 3rd Party vendor, others TBD)
  Subtasks:
  i. Identify initial meeting date(s)
  ii. Location
  iii. Bus stop requirements
  iv. Develop plan for information to be displayed
  v. LTA project requirements (space plan, reporting, billing, etc.)
  vi. Vendor requirements (BSIP information, time to install, testing, etc.)
  vii. Develop installation plan
  viii. Introduce standing project meeting

m. Hold initial meeting prior to project start (LTA staff, MV Transportation staff, 3rd Party representatives, local jurisdictions, others TBD)
n. All parties agree on project time frame, requirements, installation, and other responsibilities
o. All parties to agree to go-live date
p. Begin standing project meetings
q. Begin project status updates
r. Prepare rider notices, press release, website notice, and social media notice and release
s. All parties to agree on next bus arrival display overview dates and attendees (MV Transportation senior management, LTA staff, local jurisdictions, others TBD)
t. Installation of next bus arrival displays
u. Required overview sessions performed
v. Next bus arrival display soft launch (not more than one week)
w. Next bus arrival displays go-live

Estimated project time frame:
6-8 months from confirmation of funding and Notice to Proceed

Table 4. Estimated BSIP & Next Bus Sign Costs

	Fixed Route Bus Stops	BSIP ID No.	BSIP Estimated Cost	Real Time Sign
1	4th Street and San Benito (in shelter)	Stop ID# 29	$3,045	+ $5,000 (electric) +$6,500 (solar)
2	San Benito High School (stand alone)	Stop ID# 53	$28,000	+ $3,500 (electric) +$5,000 (solar)
3	Mission Oaks (stand alone)	Stop ID# 18	$35,000	+ $3,500 (electric) +$5,000 (solar)
4	Mabie Northside (in shelter)	Stop ID# 79	$4,500	+ $5,000 (electric) +$6,500 (solar)
5	K-Mart (stand alone)	Stop ID# 67	$18,000	+ $3,500 (electric) +$6,500 (solar)

	Intercounty Bus Stops	BSIP ID No.	BSIP Estimated Cost	Real Time Sign
1	Veteran's Park on Memorial (in shelter)	Stop ID# 72	$4,500	+ $5,000 (electric) +$6,500 (solar)
2	Gavilan College (in shelter)	Stop ID# 85	$1,050	+ $5,000 (electric) +$6,500 (solar)
3	Caltrain/Greyhound (Gilroy Transit Station) (stand alone)	Stop ID# 84	Unknown	+ $3,500 (electric) +$6,500 (solar)
4	Abbe Park (stand alone)	Stop ID# 87	Completed	+ $3,500 (electric) +$6,500 (solar)

6. Automated Passenger Counting System on County Express Fixed Route and Intercounty Vehicles (New 3rd Party Vendor)

Estimated cost:
One-Time - $61,000 - $75,000
Annual - $6,000 - $8,500

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- 3rd Party sales representative, field technicians, account or project manager
- MV Transportation general manager, operations manager, supervisors
- 3rd Party consultant to LTA (TBD)

Tasks:
If project not implemented as part of automated fixed route scheduling management system project – proceed as follows:

a. Identify funding source
b. Factor time for application for funds
c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
d. Prepare formal solicitation for qualified automated passenger counting system proposals
   Subtasks:
   i. Require breakdown of individual cost components are (vehicle installation time, equipment required for each vehicle, set-up, customer service, training, other ongoing costs, etc.)
   ii. Solicit information on hardware and software requirements
   iii. Solicit optional information and cost to integrate APC and AVL systems
   iv. Require listing of spare parts needed and associated cost
   v. Require detailing list of system and parts warranty
   vi. Require information on software upgrades
   vii. Require service and operations manuals

e. Develop solicitation timeline
   Subtasks:
   i. Include due date for proposal questions
   ii. Identify pre-proposal meeting date
   iii. Proposal due date
   iv. Identify evaluation panel members
   v. Tentative evaluation panel review dates
   vi. Outreach to successful/unsuccessful proposers

      vii. LTA Board of Directors Action

      viii. Award and Notice to Proceed

f.   Develop list of qualified firms to forward proposals to

g. Release solicitation and advertise project solicitation

h. Hold pre-proposal meeting at LTA and invite interested proposers to Operations & Maintenance facility

i.   Evaluate proposals and prepare recommendation to Board of Directors

j.   Bring project recommendation before Board of Directors for approval

k. Award contract and Issue Notice to Proceed

l.   Develop project time line with assigned responsibilities (LTA, MV Transportation, selected 3rd Party vendor)
Subtasks:

      i.   Identify initial meeting date(s)

      ii. Location (O&M facility or administrative offices)

      iii. Fixed route operations fleet requirement (vehicle numbers, vehicle specifications, schematics, etc.)

      iv. Facility requirements (computers, hardware, etc.)

      v.   LTA project requirements (reporting, billing, etc.)

      vi. MV Transportation requirements (advanced notice of equipment installs, facility access, etc.)

      vii. Vendor requirements (access, time to install, testing, etc.)

      viii. Develop LTA data reporting plan

      ix. Introduce standing project meeting

m. Hold initial meeting prior to project start (LTA staff, MV Transportation staff, 3rd Party representatives, others TBD)

n. All parties agree on project time frame, requirements, installation, and other responsibilities

o. All parties to agree to go-live date

p. Begin standing project meetings

q. Begin project status updates

r.   All parties to agree on automated passenger counting system training dates and attendees (MV Transportation drivers, supervisors, dispatchers, managers, LTA staff, others TBD)

s.   Installation of automated passenger counting system

t.   Required training sessions performed

u. Automated passenger counting system go-live

Estimated project time frame:
6-8 months from confirmation of funding and Notice to Proceed

7. Electronic Maintenance Systems for County Express Bus Fleet (New 3rd Party Vendor)

Estimated cost:
One-Time - $30,000 - $60,000
Annual - $5,000 - $10,000

Participating Parties:
- LTA Staff (Lead) – including Maintenance Function
- 3rd Party sales representative, field technicians, account or project manager
- MV Transportation senior managers
- 3rd Party consultant to LTA (TBD)

Tasks:
a. Identify funding source
b. Factor time for application for funds
c. Internal decision on staff resources to apply to project and/or 3rd Party assistance
d. Prepare formal solicitation for qualified electronic maintenance system proposals
    Subtasks:
e. Require breakdown of individual cost components are (installation, equipment required, set-up, customer service, training, other ongoing costs, etc.)
f. Solicit information hardware and software requirements
g. Require detailing list of system warranty
h. Require information on software upgrades
i. Require operations manual

j. Develop solicitation timeline
    Subtasks:
    i. Include due date for proposal questions
    ii. Identify pre-proposal meeting date
    iii. Proposal due date
    iv. Identify evaluation panel members
    v. Tentative evaluation panel review dates
    vi. Outreach to successful/unsuccessful proposers
    vii. LTA Board of Directors Action
    viii. Award and Notice to Proceed

k. Develop list of qualified firms to forward proposals to

l. Release solicitation and advertise project solicitation
m. Hold pre-proposal meeting at LTA and invite interested proposers to Operations & Maintenance facility
n. Evaluate proposals and prepare recommendation to Board of Directors
o. Bring project recommendation before Board of Directors for approval
p. Award contract and Issue Notice to Proceed
q. Develop project time line with assigned responsibilities (LTA, selected 3rd Party vendor)
    Subtasks:
    i.   Identify initial meeting date(s)
    ii.   Location (O&M facility)
    iii. County Express fleet requirement (vehicle make, model, numbers, etc.)
    iv.   Facility requirements (computers, hardware, internet connections, etc.)
    v.   LTA project requirements (reporting, billing, etc.)
    vi.   Vendor requirements (information to populate, access, time to install, testing, etc.)
    vii. Develop LTA data reporting plan
    viii. Introduce standing project meeting

r. Hold initial meeting prior to project start (LTA staff, MV Transportation staff, 3rd Party representatives, others TBD)
s. All parties agree on project time line, requirements, installation, and other responsibilities
t. All parties to agree to go-live date
u. Begin standing project meetings
v. Begin project status updates
w. All parties to agree on electronic maintenance system training dates and attendees (LTA staff, others TBD)
x. Installation of electronic maintenance system
y. Required training sessions performed
z. Electronic maintenance system go-live

Estimated project time frame:
4-6 months from confirmation of funding and Notice to Proceed

Needs Assessment Report and Implementation Plan – ITS Plan

Appendix A

Document Review

1. 2016 Short Range Transit Plan/Long Range Transit Plan

    1a. Future Horizons for San Benito County LTA Short Range and Long Range Transit Plan

    1b. Supplemental Working Paper: Strategic Workshop Summary

2. 2007 Central Coast Intelligent Transportation System Implementation Plan

3. 2013 Monterey Bay Area Coordinated Pubic Transit-Human Services Transportation Plan

4. 2010 San Benito County Local Transportation Authority Design Guidelines

5. County of San Benito 2035 General Plan

6. 2012 San Benito County Local Transportation Authority Passenger Survey Analysis

7. 2016 San Benito County Bus Stop Improvement Plan and Rider Survey

8. RouteMatch© System Design Document for Demand Agencies

9. RouteMatch© Software Budget Proposal – Mobile Data System

    9a. RouteMatch© SLSA Exhibit B – Software License and Services Agreement

10. 2008 Hollister Downtown Strategic Plan

11. Council of San Benito County Governments – 2013 Unmet Transit Needs

12. 2016 Revised San Benito County Regional Transportation Improvement Program

Needs Assessment Report and Implementation Plan – ITS Plan

Appendix B

Public Participation Plan

2016 Onboard Passenger Survey

San Benito ITS On-board Survey Results
October 2016

INTRODUCTION
The San Benito Local County Transportation Authority (LTA) conducted an assessment to examine the feasibility of pursing Intelligent Transportation System (ITS) improvements to enhance system performance and possibly increase ridership on LTA's County Express bus routes. As part of the study, an on-board survey of passengers on all routes was undertaken over a two-day period. Cooperation by the service provider staff and drivers was excellent and very helpful for the surveyors.

All County Express routes were surveyed and a surveyor was also positioned at LTA's main administrative office during various times throughout the two days to talk to riders who came there to purchase monthly fare media.

The participation by riders was high with 148 riders agreeing to participate yielding approximately one third of LTA's highest daily ridership.

RESULTS
The following sections are the detailed results of the onboard survey.

Frequency of Use
The greatest majority of survey participants are riding County Express services 3-5 days a week. Close to half of the surveyed riders are riding 5 days a week or more, but with a considerable percentage also riding 3 to 4 days a week. Since the trip purposes (see next section) are predominantly for work and school trips, this would validate the frequency of travel.

Frequency of Use
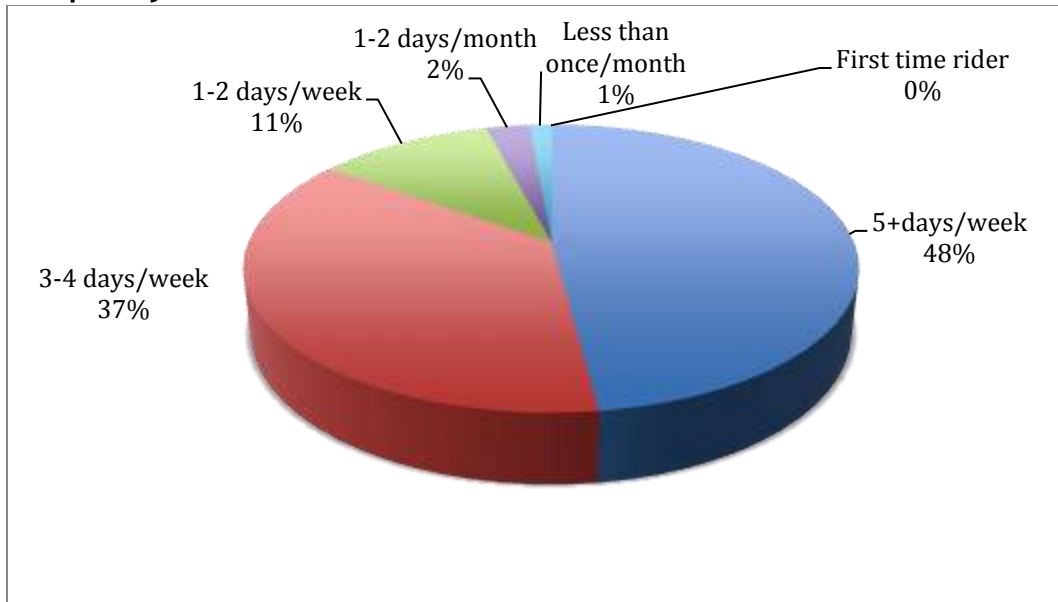
Trip Purpose

By far, school trips are the dominant purpose for riding County Express by survey participants. The next closest trip purpose is for work.

Trip Purpose
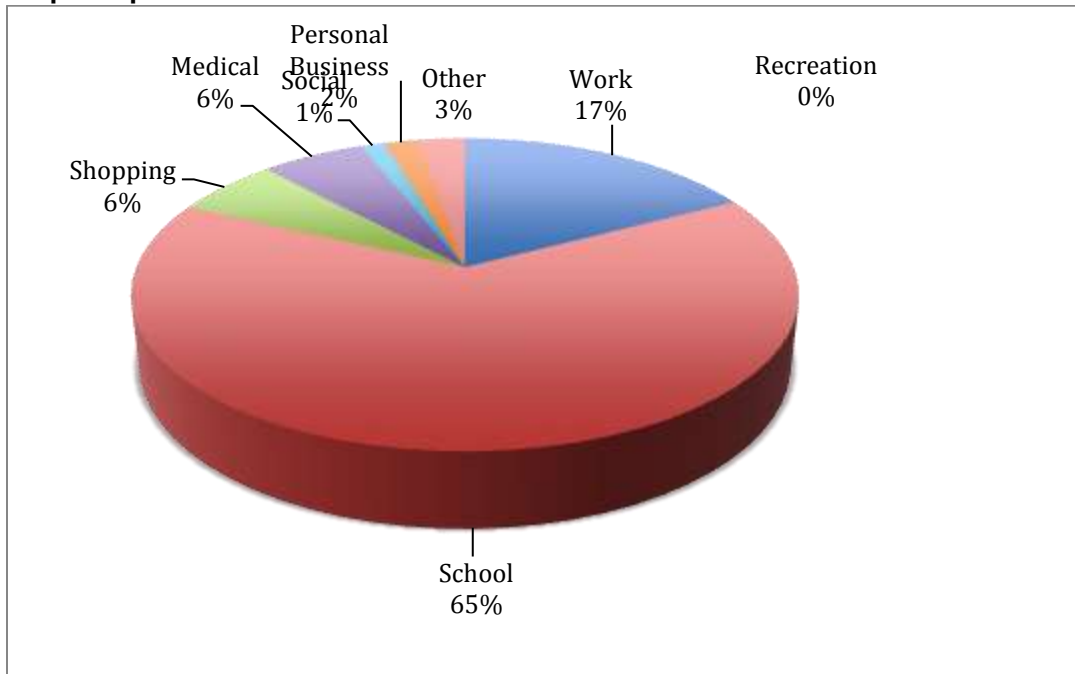
Devices

Over half of the participants have a smart phone, but another 41% indicated they also have other devices in addition to a smart phone. With this information it is safe to assume 93% of all participants have a smart phone.

Devices
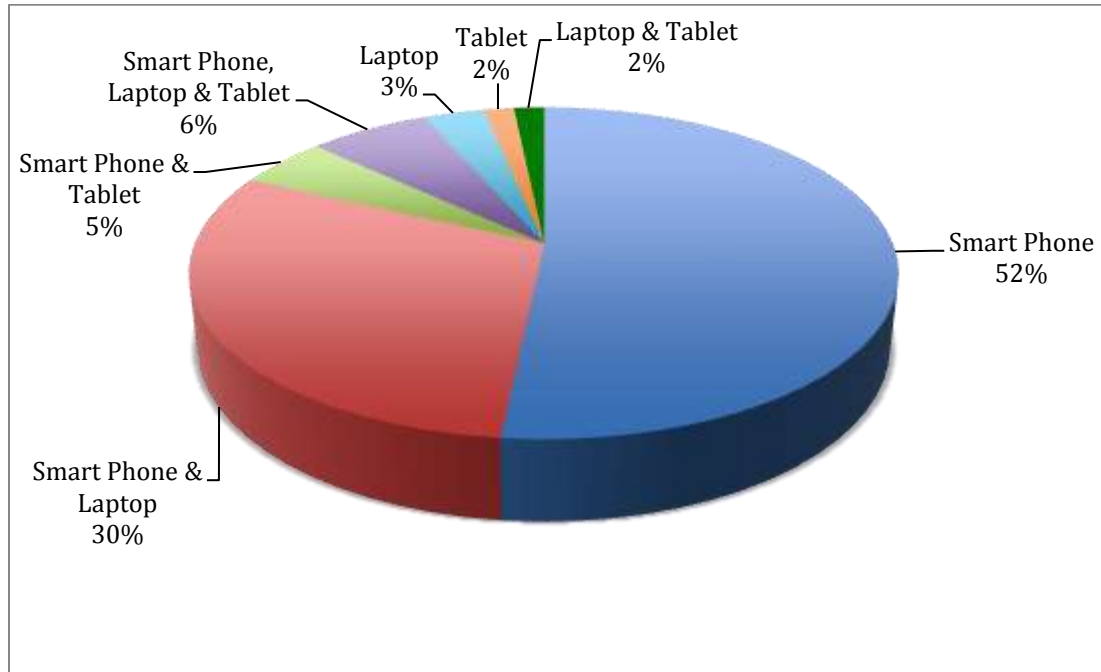
Technology Choices

In the on-board survey, surveyed riders were given a list of new technologies from which they could indicate their interest level.   There were a total of 11 choices. Surveyed riders were first asked just to indicate interest and could therefore choose more than one option.   Each choice had some level of interest, but a few clearly had higher levels of interest than others. Having access to "wifi on the bus" was the most popular choice by a wide margin, with almost a third (28%) of the surveyed riders indicating interest. The next closest item at 11% was the "availability of real time arrival/departure information at the bus stops and online." There were three other items that all tied at 9%, just under the second most popular choice and interestingly, they all had something to do with fares. These were: the "ability to buy fare media online", the "ability to pay fares electronically" and "having more places to buy fare media."

Level of Interest

Pie chart — Level of Interest:
- Buy fares on line 9%
- Electronic bus fare 9%
- Voice annuciation 6%
- Real time electronic arrival/departure information at tbus stops & online 11%
- Electronic fare transfer to other transit systems 4%
- Wifi on buses 28%
- Interactive information machines at major transfer points 7%
- Electronic information inside buses 4%
- More places to buy passes & tickets 9%
- Mobile web applications 7%
- Receive automated route changes or other pertinent rider informaation 6%

Technological Preferences

The next question in the survey dealt with which items the rider felt were the most beneficial to improving bus service. Surveyed riders were asked to rank their preference by their first and second choices. Again, "wifi on buses" had the greatest number of first and second choices. Ranking of the other choices was a little different than the interest question. "Electronic fare payment" was the first choice after access to "wifi on buses," but only slightly. "Real time arrival/departure information at bus stops and online" was just slightly behind it and when first and second choices are both ranked, the two items are tied. "More places to buy passes and tickets" did not receive many first preference votes, but received a large amount of second preference votes and actually surpassed "electronic fare payment" and "real time arrival/departure information at bus stops and online choices" by a fraction.

Ranking of Technological Preferences
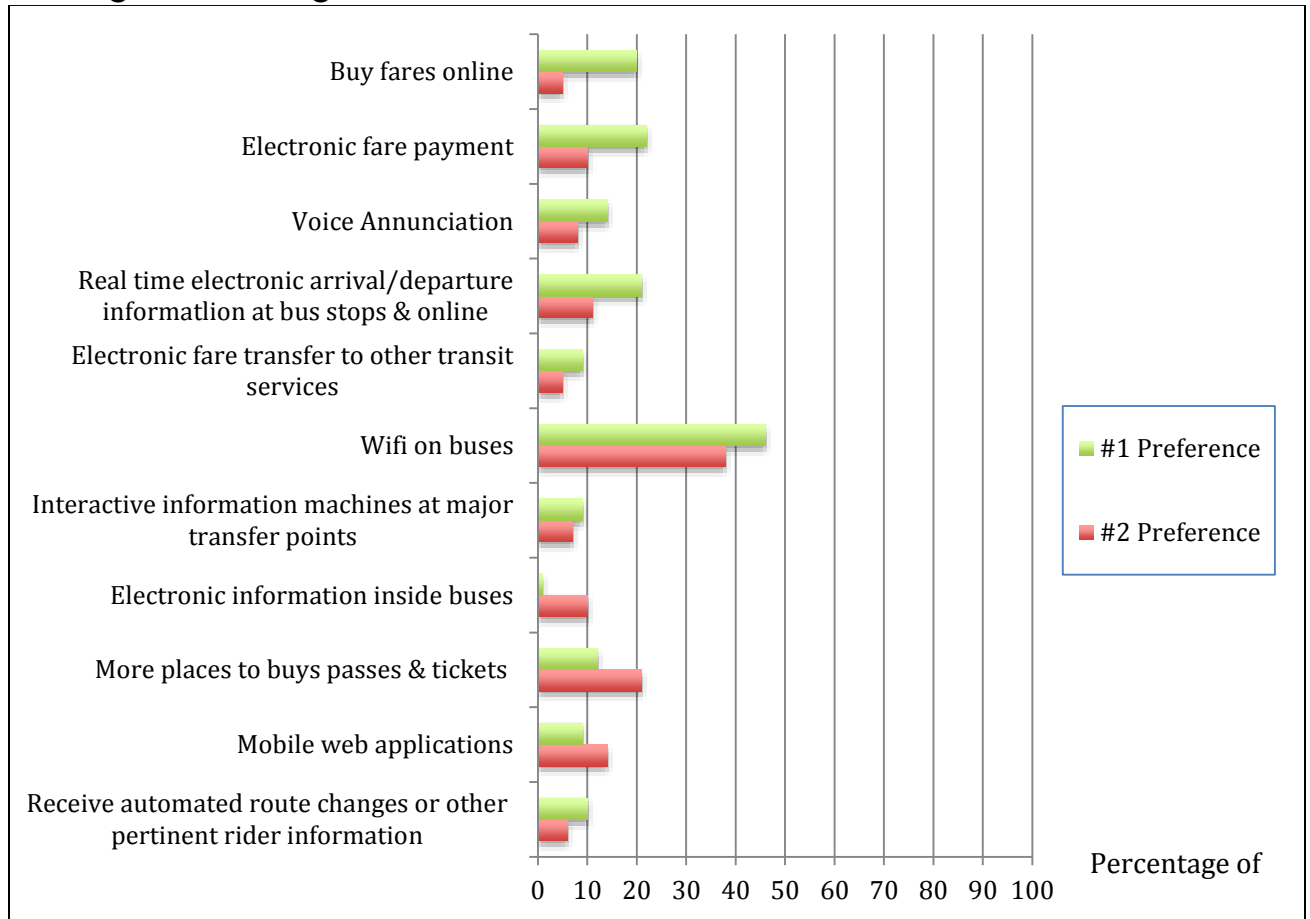
Demographics

The following section contains a demographic summary of the survey participants.

Gender

There is an even 50-50 split between male and female survey participants riding the buses.

Age

With school trips being the dominant trip purpose, the surveyed riders skew much younger than in many other transit locations around the United States. This suggests there is more openness to trial and acceptance of new technology. It also suggests that there are greater expectations for new and better technology to be adapted to make the riding experience easier.

Age

Less than 18 — 45%
18-24 — 34%
25-34 — 5%
35-44 — 6%
45-54 — 5%
55-64 — 4%
Over 65 — 1%
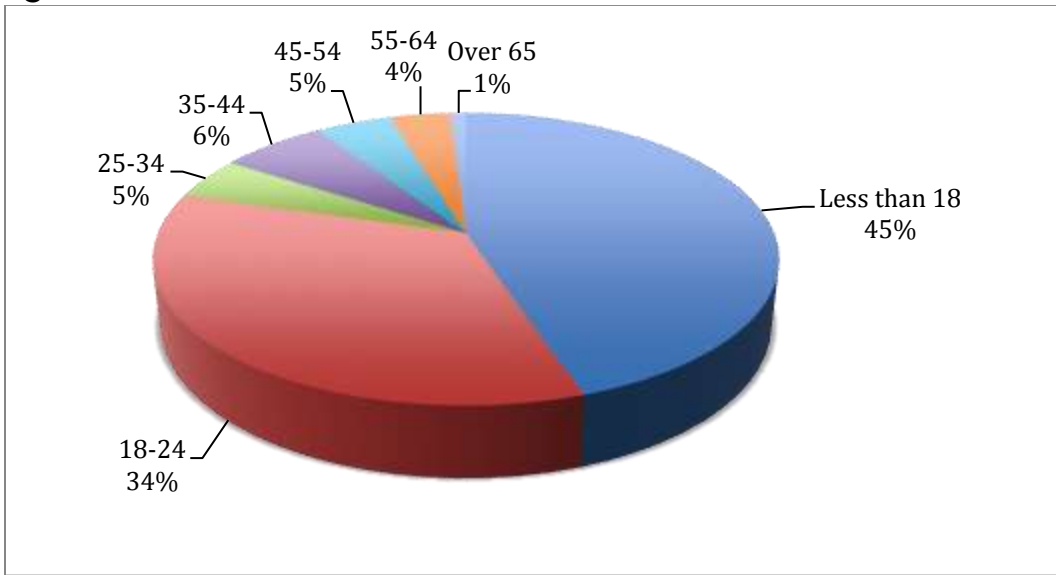
Ethnicity
The largest majority of surveyed riders are Latino by over 50%.

Ethnicity

White/Caucasian — 18%
Other — 2%
Asian Amerian — 3%
Black/African American — 4%
Native American — 3%
Latino — 70%
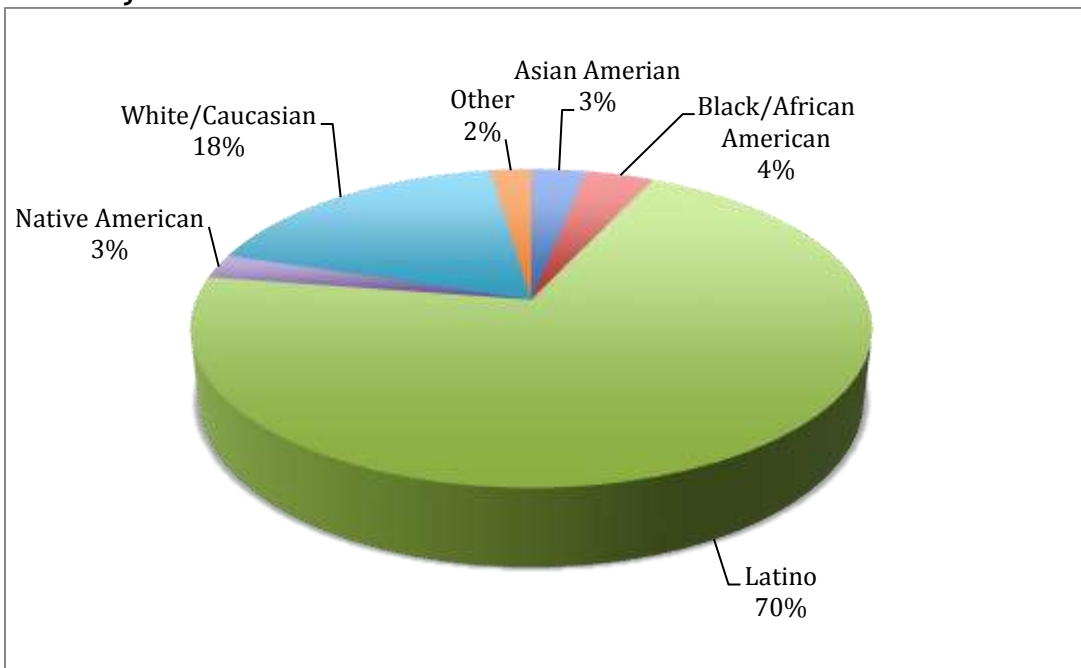
Income
Over 40% of the surveyed riders chose not to provide their income. Part of this resistance is the usual reluctance to share this type of information and part likely has to do with the numbers of young students who may not have access to such information. In this case, we included the non-responses in

the totals. Even with the non-responses included, there is still a significant number (over 25%) of surveyed riders with incomes under $20,000 annually.

Income
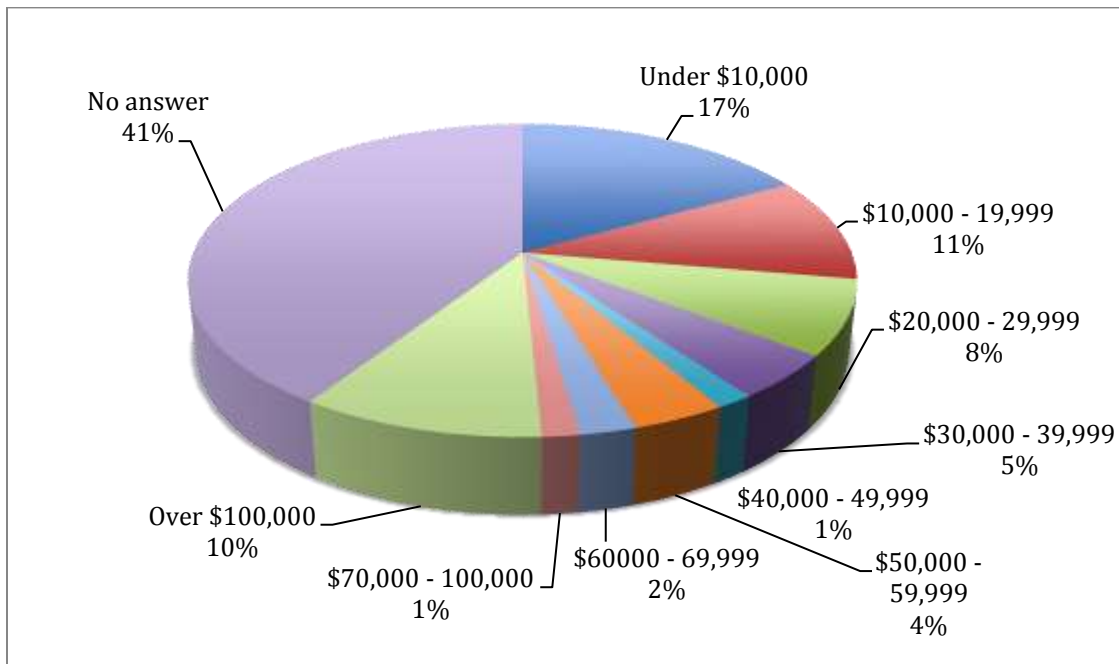
Appendix

Surveys were provided in both English and Spanish. A copy of the on-board survey is provided as an appendix on the following pages.

2016 San Benito Rider Survey

County Express is considering investing in technologies to improve bus service and would like your opinion. Please fill out this important survey. All responses will be kept anonymous.

1. What route are you riding?
   - ○ Red Line
   - ○ Blue Line
   - ○ Green Line
   - ○ Gavilan College
   - ○ CALTRAIN

2. How often do you usually ride this route?
   - ○ 5 or more days a week
   - ○ 3–4 days a week
   - ○ 1 or 2 days a week
   - ○ 1–2 days a month
   - ○ Less than once a month
   - ○ First time I have ridden

3. What is the main purpose of your trip today?
   - ○ Work or work related
   - ○ School
   - ○ Shopping
   - ○ Medical
   - ○ Social
   - ○ Personal business
   - ○ Recreational
   - ○ Other

4. Do you have any of the following items?
   - ○ Smart Phone
   - ○ Tablet
   - ○ Laptop Computer
   - ○ Other device

5. The transit system is considering several new technologies to improve the bus service. Listed below are the possibilities. **Which of the following technologies interest you? Please check all that apply.**

   - ○ Buy Fares On-Line
   - ○ Electronic Bus Fare (Automated Fare Payment Using Items Like Debit/Bank Cards)
   - ○ Automated Voice Bus Stop Announcements on Bus
   - ○ Real Time Electronic Arrival/Departure Information at Bus Stops and Online
   - ○ Electronic Fare Transfer to other Transit Services (MST, VTA)
   - ○ WiFi on Buses
   - ○ Interactive Information Machines (maps, schedules, etc) at Major Transfer Points
   - ○ Electronic Information inside Buses
   - ○ More Places to Buy Passes & Tickets
   - ○ Mobile Web Applications
   - ○ Receive automated route changes or other pertinent rider information

6. In the previous question, you identified the technologies that interested you. Now please choose the two items you think would be the **most** beneficial to improving bus service. **Place a number 1 by the item that you think would be most beneficial and a number 2 by your second choice.**

	1 or 2
Buy Fares On-Line	
Electronic Bus Fare (Automated Fare Payment Using Items Like Debit/Bank Cards)	
Automated Voice Bus Stop Announcements on Bus	
Real Time Electronic Arrival/Departure Information at Bus Stops	
Electronic Fare Transfer to other Transit Services (MST, VTA)	
WiFi on Buses	
Interactive Information Machines (maps, schedules, etc) at Major Transfer Points	
Electronic Information inside Buses	
More Places to Buy Passes & Tickets	
Mobile Web Applications	
Receive automated route changes or other pertinent rider information	

7. Are there any other technical advancements that you think would help improve service? **If yes, please tell us what they are:**

   _____
   _____
   _____

8. Are you:
   - ○ Male
   - ○ Female

9. **What is your age?** _____

10. Do you consider yourself:
    - ○ Asian American/ Pacific Islander
    - ○ Black/African American
    - ○ Latino
    - ○ Native American
    - ○ White/Caucasian
    - ○ Other _____

11. What was the total combined income of every person living in your household over the past 12 months?
    - ○ Less than $10,000
    - ○ $10,000 to $19,999
    - ○ $20,000 to $29,999
    - ○ $30,000 to $39,999
    - ○ $40,000 to $49,999
    - ○ $50,000 to $59,999
    - ○ $60,000 to $69,999
    - ○ $70,000 to $100,000
    - ○ More than $100,000

Encuesta para pasajeros San Benito 2016

County Express está pensando en invertir en tecnologías para mejorar el servicio de autobuses y quisiera saber su opinión. Complete esta encuesta importante. Todas las respuestas se mantendrán anónimas.

1. ¿Qué ruta utiliza?

   ○ Línea Roja/Red Line   ○ Gavilan College
   ○ Línea Azul/Blue Line   ○ CALTRAIN
   ○ Línea Verde/Green Line

2. ¿Con qué frecuencia utiliza esta ruta?

   ○ 5 o más días a la semana
   ○ 3–4 días a la semana
   ○ 1 o 2 días a la semana
   ○ 1–2 días al mes
   ○ Menos de una vez al mes
   ○ Primera vez que uso

3. ¿Cuál es el propósito principal de su viaje hoy?

   ○ Trabajo/asunto de trabajo
   ○ Escuela
   ○ Compras
   ○ Médico
   ○ Social
   ○ Asuntos personales
   ○ Recreativo
   ○ Otro

4. ¿Tiene alguno de los siguientes dispositivos?

   ○ Smartphone
   ○ Tableta
   ○ Equipo portátil
   ○ Otro dispositivo

5. El sistema de transporte está considerando varias tecnologías nuevas para mejorar el servicio de autobuses. A continuación se indican las posibilidades. **¿Cuáles de las siguientes tecnologías le interesan? Seleccione todas las que apliquen.**

   ○ Comprar los boletos en línea
   ○ Pasaje de autobús electrónico (Pago automático del pasaje. Usar como un tipo de tarjeta bancaria o de débito)
   ○ Anuncio de las paradas con voz automatizada en el autobús
   ○ Información electrónica en tiempo real de las llegadas y salidas en las paradas de autobús y en línea
   ○ Transferencia electrónica del pasaje a otros servicios de tránsito (MST, VTA)
   ○ WiFi en los autobuses
   ○ Máquinas con información interactiva (mapas, horarios, etc.) en los puntos de transferencia principales
   ○ Información electrónica dentro de los autobuses
   ○ Más lugares para comprar pases y pasajes
   ○ Aplicaciones web móviles
   ○ Recibir automáticamente cambios de ruta u otra información relevante para los viajeros

6. En la pregunta anterior, identificó las tecnologías que le interesan. Ahora, seleccione las dos cosas que cree que serían más convenientes para mejorar el servicio de autobuses. **Coloque el número 1 para lo que piense que sería más conveniente y el número 2 por su segunda opción.**

	1 or 2
Comprar los boletos en línea	
Pasaje de autobús electrónico (Pago automático del pasaje. Usar como un tipo de tarjeta bancaria o de débito)	
Anuncio de las paradas con voz automatizada en el autobús	
Información electrónica en tiempo real de las llegadas y salidas en las paradas de autobús y en línea	
Transferencia electrónica del pasaje a otros servicios de tránsito (MST, VTA)	
WiFi en los autobuses	
Máquinas con información interactiva (mapas, horarios, etc.) en los puntos de transferencia principales	
Información electrónica dentro de los autobuses	
Más lugares para comprar pases y pasajes	
Aplicaciones web móviles	
Recibir automáticamente cambios de ruta u otra información relevante para los viajeros	

7. ¿Hay otros avances tecnológicos que conozca que podrían ayudar a mejorar el servicio? **En caso afirmativo, díganos cuáles:**

   _____
   _____

8. ¿Cuál es su género?

   ○ Hombre   ○ Mujer

9. ¿Cuántos años tiene? _____

10. Se considera:

   ○ Asiático-americano/ Isleño del Pacífico
   ○ Negro/ Afroamericano
   ○ Latino
   ○ Nativo-americano
   ○ Blanco/caucásico
   ○ Otro _____

11. ¿Cuál fue el ingreso total combinado de todas las personas que viven en su hogar en los últimos 12 meses?

   ○ Menos de $10,000
   ○ $10,000 a $19,999
   ○ $20,000 a $29,999
   ○ $30,000 a $39,999
   ○ $40,000 a $49,999
   ○ $50,000 a $59,999
   ○ $60,000 a $69,999
   ○ $70,000 a $100,000
   ○ Más de $100,000

Needs Assessment Report and Implementation Plan – ITS Plan

Appendix C

Public Participation Plan

January 26, 2017 Workshop

Informational Flyers

¡ACOMPÁÑENOS!
JUEVES
26 DE ENERO 2017

TALLER
3:30 PM – 4:30 PM
HOLLISTER COMMUNITY CENTER
300 WEST STREET
HOLLISTER CA

330 Tres Pinos Road, C7
Hollister, CA 95023

regina@sanbenitocog.org

831.637.7665, Ext. 205
Español Ext. 200 / 201

JUEVES, 26 DE ENERO 2017

COMENTARIO SOBRE LAS RECOMENDACIONES TECNOLOGÍAS

¡Queremos oír de usted!

Descubra la fascinante tecnología recomendaciones previstas para **County Express**.

Se ha programado un taller comunitario. Las recomendaciones de tecnología se desarrollaron como parte del Plan de Sistemas de Transporte Inteligente (ITS) de la Autoridad Local de Transporte del Condado de San Benito.

SAN BENITO COUNTY LOCAL TRANSPORTATION AUTHORITY (LTA)
330 Tres Pinos Road, C7
Hollister, CA 95023

SanBenitoCountyExpress.org

Needs Assessment Report and Implementation Plan – ITS Plan

Appendix D

Public Participation Plan

Social Services Transportation Advisory Council

**COUNCIL OF SAN BENITO COUNTY
GOVERNMENTS
SOCIAL SERVICES TRANSPORTATION
ADVISORY COUNCIL
MEETING AGENDA**

DATE: Friday, January 27, 2017

LOCATION: **Council of San Benito County Governments**
                  Conference Room
                  **330 Tres Pinos Road, Suite C-7
                  Hollister, CA 95023**

MEMBERS: Esther Alva, Mary Margaret Bilich, Clay Kempf, Caroline Medina,
                  Jim Parker, Ann Ross and Pauline Valdivia

9:30 A.M.   **CALL TO ORDER**

A) **ACKNOWLEDGE** Certificate of Posting

B) **ELECT** SSTAC Chairperson for 2017

C) **ELECT** SSTAC Vice Chairperson for 2017

D) Public Comment. *(Opportunity to address the Council on items of interest not appearing on the agenda. No action may be taken unless provided by Govt. Code Sec. 56954.2.* **Speakers are limited to 3 minutes.**

E) Member Announcements

F) Executive Director's Report

CONSENT AGENDA:
(These matters shall be considered as a whole and without discussion unless a particular item is removed from the consent agenda. A member of the public should seek recognition by the Chair if comment is desired. Approval of a consent item means approval of recommended as specified on the Staff Report.)

1) **APPROVE** SSTAC Special Meeting Minutes dated September 23, 2016 – Gomez

2) **RECEIVE** Operations Performance Report for the 1st Quarter of Fiscal Year 2016/2017 – Valentine

REGULAR AGENDA:

3) **RECEIVE** Presentation on the Mapping Intelligent Transportation System (ITS) Technology for the 21st Century (Transit ITS) Plan Draft Recommendations – Valentine

4) **RECEIVE** Presentation on Options for County Express Commuter Rail Service to Gilroy – Valentine

Council of San Benito County Governments ♦ Measure A Authority
Airport Land Use Commission ♦ Service Authority for Freeways and Expressways
330 Tres Pinos Road, Suite C7, Hollister, CA 95023 ♦ Ph: (831) 637-7665 ♦ Fax: (831) 636-4160 www.SanBenitoCOG.org

Needs Assessment Report   96   David Rzepinski & Associates

Needs Assessment Report and Implementation Plan – ITS Plan

Appendix E

Existing Conditions Report

San Benito County
Local Transportation Authority

Mapping Intelligent Transportation Systems for the 21st Century
Inventory of Existing County Express ITS Systems
December 2016

Table of Contents

Section 1. Introduction

The following report is the first of two reports that will comprise the San Benito County Local Transportation Authority's (LTA) Intelligent Transportation System (ITS) Plan. This report details the agency's existing ITS equipment, infrastructure, and software investment being used on the County Express fixed route and paratransit system.

This report is also intended to assist LTA in its long-range capital program planning as future ITS improvements are considered for the County Express family of services. Incorporated into the report are ITS items identified in the recently adopted San Benito County Short and Long Range Transit Plan (SRTP/LRTP) and other planning documents. In addition, this report builds upon the 2007 Central Coast ITS Implementation Plan (CCIIP), of which LTA was a partner transit provider. Once the ITS Plan is completed, it should also assist the LTA's regional planning partner agency, the Council of San Benito County Governments (SBtCOG), by presenting longer term and strategic ITS investment considerations beyond those currently in place.

In keeping with the definitions used in the CCIIP, ITS improvements are defined as systems, equipment, and infrastructure including, but not limited to, advanced computer, wireless, and wire line communications-based information, and electronic technologies used within transit infrastructure. ITS improvements, when planned in advance and comprehensively, should assist in improving public safety, enhancing transit system productivity, and increasing the efficiency of a region's transportation network.

One of LTA's primary mandates, according to the Executive Director, Mary Gilbert, is "to ensure that LTA is effective and efficient in the delivery of its daily service." Looking critically and methodically at ITS improvements through this Plan should support the agency's goal. Much to the credit of LTA and its Board of Directors, initial steps have already been made into bringing ITS improvements to the County Express transit system. The opportunity exists for continued methodical long-term further investment into ITS technology for LTA and its riders to take advantage of. Also for an agency that competitively contracts its service as LTA does, ITS technology provides a resource to assist in overseeing and managing the daily transit service provided by its contracted providers. The challenge for LTA in considering which ITS improvements to pursue, given that transit resources are limited, is having to weigh the one-time capital costs and ongoing operational costs associated with these improvements against the other funding needs of the County Express services.

Section 2. The Central Coast ITS Implementation Plan

In 2006 and 2007, a multi-jurisdictional transportation planning effort collaboratively examined the existing ITS investments made amongst the Central Coast's transportation providers and it forecasted the future needs of each provider. This culminated in the adoption of the Central Coast ITS Implementation Plan in late 2007. The CCIIP was intended and has served as a blueprint for coordinated and comprehensive ITS improvements. There were 12 regional transportation network participants, which included the Central Coast's five Regional Transportation Planning Agencies (RTPAs) and three of the public transit providers: Monterey-Salinas Transit, Santa Cruz Metropolitan Transportation District, and LTA. The CCIIP's final report inventoried ITS investments in place at the time and recommended improvements for the participants, including those specifically for the transit provider such as on-board equipment, dispatch communication improvements, introduction of electronic fare media, and facility improvements.

The CCIIP had several short and long term transportation network improvement recommendations for each county such as local road and highway enhancements/improvements. In addition, there was a series of ITS recommendations specific to the transit providers, which are listed in summary below in Table 1. Also included in Table 1 is the progress made to date by LTA in implementing these ITS recommendations.

Table 1 – Central Coast ITS Implementation Plan Recommended Improvements

CCIIP ITS Recommended Items	County Express Implementation Status
Transit Automated Vehicle Location (AVL) System	Upgraded radio system allows limited GPS vehicle location
Transit Electronic Fare Collection System	Currently being examined as part of this ITS Plan
Automated Route/Schedule Management (Fixed Route services)	Procured Paratransit software with capacity to add fixed route
Automated Dispatching Information (Demand Response)	Procured Paratransit software with capacity to add automated dispatching software
Automated Passenger Counting	Currently being examined as part of this ITS Plan
Video Surveillance (Transit Security)	Currently being examined as part of this ITS Plan
Voice/Data Communication (Safety/Security)	Upgraded radio system has emergency alert & dispatch audio monitoring functions
Electronic Maintenance Systems	Currently being examined as part of this ITS Plan
Static Transit Route/Schedule Information	Improved LTA website provides static information & trip planning
Real-Time Transit Schedule Information	Currently being examined as part of this ITS Plan
Real-Time Information at Stations and Bus Stops	Currently being examined as part of this ITS Plan

As illustrated in Table 1, LTA has implemented or is proceeding forward with several of the CCIIP recommendations. However, of those ITS improvements not in place, LTA is in the advantageous position to be able to carefully consider its next ITS investments and shall analyze these as part of this ITS Plan.

Section 3. LTA's County Express Service

Currently, County Express provides local and regional intercounty fixed route services, paratransit services, services for the elderly, and a general public Dial-a-Ride (DAR) that supports the entire system. The local fixed route service consists of three routes, the Blue, Green, and Red lines which allows for transfer between these routes serving major destinations throughout the City of Hollister. The Intercounty services the cities of Hollister, San Juan Bautista, and Gilroy in adjacent Santa Clara County, via the Gavilan College, Caltrain, and Greyhound routes.

County Express services are operated with a 21-vehicle fleet that consists of minivans, 14 passenger, 28 passenger, and 32 passenger vehicles. These vehicles are Americans with Disability Act (ADA) compliant and equipped with wheelchair lifts/ramps. The newest fleet vehicles are also equipped with electronic destination signs on the front and sides of the vehicle and are programmed to display all County Express route information and other preprogrammed messaging (i.e. out of service, training bus, etc.). Each destination sign is activated manually by the operator prior to the start of service and at the end of service.

The services are operated on behalf of the agency by a private transportation firm, MV Transportation, utilizing the LTA owned equipment and operating out of LTA's Operating and Maintenance facility located on 3240 Southside Road, Hollister. The Operations and Maintenance facility is a well-situated space that minimizes non-revenue service between the County Express service area and the facility. Additionally, the facility is appropriately spaced for the daily functions, maintenance, and garaging of the County Express operations. There is sufficient room at the facility to accommodate potential future expansion of ITS improvements such as server closet space, accommodation of addition network wiring and cabling, and space for other smaller hardware. Attention and careful space planning would be needed if larger ITS improvements/expansions were to be considered, such as additional computer/video monitors and equipment for dispatch or an electric farebox and revenue collection system.

Section 4. LTA's Existing ITS Inventory

LTA currently uses its existing ITS infrastructure (equipment and software) in several different ways, which include: partnering for provision of multimodal transportation information, provision of route, fare, schedule, and planning information to existing and potential riders, communication between operators and dispatch, and scheduling and managing special needs passenger trips.

As referenced earlier, the ITS definitions and improvement categories created in the CCIIP were used in inventorying LTA's existing ITS infrastructure. The items provided in Table 1 were recommended to the partner participants and these were aggregated into distinct categories. For the purposes of LTA's inventory, only those relevant ITS categories from the CCIIP were used and are broken down into six categories: Traffic Management and Safety; Transit Demand Management; Transit Management and Electronic Payment; Emergency Management; Traveler Information, and Other ITS Applications.

1.Traffic Management and Safety

This CCIIP category reflects the importance of the larger county transportation network including local roads, highways, and includes transit, as it reduces single occupancy automobiles from streets and promotes public safety. While an integrated traffic network can require a significant capital investment and multijurisdictional coordination, there are comprehensive ITS investments made by local jurisdictions that promote multimodal methods to travel to and from school, work, and recreational trips. The example that best fits this for San Benito County, which LTA directly benefits from, comes from the regional transportation planning entity and funding provider to LTA, the Council of San Benito Governments (SBtCOG).

A. SBtCOG Website

This website has regional significance as it serves as an interactive single resource for the general public to access multi-modal traveler information and services within the county and surrounding jurisdictions. The site is simple to navigate and is currently managed by a third party website firm. The SBtCOG website is not currently formatted specifically for viewing on mobile devices.

The SBtCOG website provides access to the records of and information from the SBtCOG Board of Directors and several Committees of the Board. It is aggregated into the following seven informational areas:

- About SBtCOG – Provision of organization information about the agency (i.e. contact, staffing, budget, etc.) and links to other partner agency websites
- Meetings – Provides access to SBtCOG meetings/minutes/agendas and access to affiliated partner agencies meeting agendas/minutes/meeting schedules
- Projects – Access to ongoing and completed transportation capital project information
- Planning – Access to ongoing and completed transportation planning project information
- San Benito Rideshare– Access to the interactive ridesharing website and its programs
- Library – Access to a comprehensive collection of current and historical reports and studies

- Public Transit – Direct link to the websites for County Express and Jovenes de Antaño services for seniors

B. San Benito Rideshare Website

While the SBtCOG website provides a link to the San Benito Rideshare site, it is important to highlight this equally important and regionally significant website. This transportation demand management tool extensively promotes alternative travel modes to driving such as car and van pooling, bicycling, walking, and taking public transit. The site is comprehensive and simple to navigate. As with the SBtCOG site, the San Benito Rideshare website is not specifically formatted for viewing on mobile devices.

2. Travel Demand Management

Under this ITS category, the improvements that specifically address alternatives to driving a single occupancy vehicle such as using public transit can be found. The participants in the CCIIP looked to this category to provide mode specific information such as providing static program information (i.e. transit route and schedule information). An exceptional example within LTA's existing inventory of such an ITS improvement is LTA's County Express website.

A. County Express Website

This website provides information for existing as well as potential riders about the agency and the County Express services. This includes route maps, current schedules, fare information, and other useful information (Tips for Riding). The website is in full compliance with Federal Transit Administration (FTA) requirements as it allows for Spanish language translation, provides riders with information on and instructions for filing Title VI (Civil Rights Act) claims, and provides application forms for those eligible for the paratransit services. In addition, the site provides notices and alerts for riders regarding upcoming service changes and impacts.

As one of the principal areas with which to access County Express system information, the website would benefit significantly from a retooling/updating, such as mobile device formatting, real time information, and more interactive features. Possible improvements to the website will be explored further in the ITS Plan's second report, the Needs Assessment.

B. Trip Planning Functions

LTA's existing ITS inventory includes another application that falls under this ITS category, which is an automated trip planning function. In addition to the items and functions described above regarding LTA's County Express website, the site also includes a trip planning feature (found in lower right segment of the website image above) available to the general public. Transit agencies nationally have been working closely with Google© to pair their proprietary mapping capabilities with a transit

agency's detailed service information in Google Trip Planner. LTA, by providing its individual bus stop latitude and longitude data to Google, is able to offer their riders this tool to navigate travel to a desired location using County Express services.

3. Transit Management and Electronic Payment

For transit agencies and riders, this type of ITS improvement is more prevalent today than at the time the CCIIP was being worked on due to the rapid growth of technology improvements to mobile banking and financial applications. More transit agencies have electronic fare media and payment systems in place or are pursuing this technology to improve their operational efficiency, reduce fare invasion, improve rider transaction times, improve data collection, and to eliminate cash and paper transactions. There are several aspects to the automated management of passenger fares and revenue collection, which are presented below.

A. Electronic Fare Payment

Electronic fare payment begins first with the type of electronic media used. The CCIIP recommended that participants pursue the implementation of "Smart Card" transit fare applications into their systems. These cards come in two forms, magnetic stripe or "contactless" cards. Magnetic stripe cards traditionally store or imbed fare information in a card's magnetic stripe, allowing for the capability of reading stored information only. In the case of contactless Radio Frequency (RF) cards, the fare information is imbedded on a computer chip that is built into the card. This technology allows for far greater functionality as data can be read but also can be "written" into the imbedded computer chip using an RF network. As part of LTA's ongoing planning efforts, in 2012 a passenger survey and analysis revealed that one of the top preferred and needed service amenities for the County Express system was a "reloadable electronic fare card."

Currently LTA is the only Central Coast transit agency not utilizing some form of electronic fare media. However in 2009, the agency began taking steps toward such automated functionality while also reducing its dependence on cash fare payment when fare tokens were introduced. The tokens ensure exact fare payment for County Express rides, reduce fraud, and reduce bank deposit transactions.

The ITS Plan's second report, the Needs Assessment, will expand on electric fare payment further.

B. Electronic Fare Collection

The next item needed in order to accept electronic fare media payment is a system in which to verify and collect this media as fare payment. The most prevalent systems are onboard electronic fareboxes with built in readers that process electronic fare cards. An electronic registering farebox further minimizes fare evasion and improves the quality of fare/passenger data collection. However, this ITS investment is costly in one-time capital funds (approximately $10,000 per farebox and $40,000-60,000 for the ancillary equipment necessary to support the system) and does require an ongoing capital investment. Additionally, it is necessary to add to a base electronic farebox the features and/or software necessary to accept electronic fare media, which also increases the per unit cost of the farebox.

LTA does not have such an automated electronic fare collection system. County Express riders currently deposit their fares into secure metal drop style fareboxes onboard each fleet vehicle. Drivers visually validate each fare transaction and manually record each transaction, which is later reported to LTA in a detailed report. The farebox revenue is collected at the end of each day by the contractor, sorted, counted, and deposited on behalf of LTA.

The ITS Plan's Needs Assessment report will expand on electronic fare collection further.

C. Fare Media Sales

As on-line banking continues to become increasingly more accessible, the public transit industry has had to respond, in turn, by automating portions of the purchase process (electronic forms available or email notification) or offering complete online purchases through an agency's website. This ITS category was not a recommendation from the CCIIP. Instead, it has been included for this project to illustrate the growing demand for such passenger conveniences and as a reflection of input received from another of LTA's planning efforts, the recently SRTP and LRTP. In the *Supplemental Working Paper: Strategic Workshop Summary* of the SRTP/LRTP, a key finding was that the, "Location to purchase tokens and monthly passes makes it a challenge for riders to purchase tokens and monthly passes due to the limited number of pass sale outlets/options."

County Express riders are currently able to purchase fare media at LTA's main administrative offices at 330 Tres Pinos Road, Hollister (which is where the majority is sold) and at LTA's Operation and Maintenance facility on Southside Road, Hollister. The demographic base of the County Express ridership appears to be students (Local

and Intercounty routes) and commute riders (Intercounty routes). This would support the SRTP/LRTP finding that demand supports the need for more fare media sale options as well as considering on-line sales of fare media.

As with the other two ITS categories under Transit Management and Electronic Payment, fare media sales will also be expanded upon in the ITS Plan's Needs Assessment Report.

4. Transit Operations and Management

The daily operations and management of transit services is the "backbone" of a transit agency and this ITS improvement category recognized the need in the CCIIP to automate these crucial functions where possible. In this area, LTA had the foresight to make one of its most significant ITS investments - automating daily trip assignment on the Paratransit service.

A. Automated Route/Scheduling Management - Paratransit Software

In 2013, LTA purchased passenger trip scheduling software for the County Express Paratransit and General Public Dial-A-Ride (DAR) service from RouteMatch[©]. The licensed software system, called RouteMatch Demand[©], consists of 14 integrated modules designed to allow LTA's contract operation staff to assign and manage both the ADA-eligible client trips and the General Public DAR trips.

The service levels on the County Express Paratransit and DAR services warranted this ITS investment with approximately 300 daily trips and up to as many as 50 same day trips being provided. LTA's contract reservationists and dispatch personnel utilizing 10 of the fleet vehicles input Paratransit and DAR trip requests daily into RouteMatch Demand[©]. The system allows for the management of the trips requested in advance as well as same day requests, manage vehicle assignments, and assign the drivers to perform each trip. In addition to managing trips, this system also helps to ensure that the Paratransit operation adheres to all established LTA Paratransit policies and the federal ADA-mandated requirements.

The RouteMatch Demand[©] software suite procured by LTA consists of the following individually licensed modules, which are described in more detail in Appendix A of this report.

- Paratransit Data Management Module
- Administration/Settings Module
- Funding Sources Module

- Addresses Module
- Trips Module
- Scheduling Module
- Dispatching Module
- Services Module
- Billing Module
- Verification Module
- Reporting Module
- Drivers Module
- Vehicles Module

Later this fiscal year, as part of LTA's ongoing capital campaign, the Paratransit automated scheduling system with be further expanded. The RouteMatch Demand© system will be augmented with individual onboard Mobile Data Tablets (MDT) for the drivers. This expansion will allow the drivers to access electronically the information generated from the RouteMatch© system. This includes displaying on the MDT's an operators daily scheduled trips, individual client trip information (requested pick-up and drop off locations, and requested time window), access to directional maps (if necessary), and eliminating the need for the paper manifests currently used by drivers. In addition, the tablets will allow LTA and the contractor to automate the recording and reporting of key operating data such as on-time performance, client activity, and the results from operator daily pre and post-trip vehicle inspections.

The procurement of this system was definitely in keeping with LTA's participation in the CCIIP. However, it also was in support of a recommendation received during the agency's FY 2010-2012 Transportation Development Act Triennial Performance Audit. The audit recommendation was to, "Enhance [County Express] dispatch control to effectively manage service operations and respond to changes on a real time basis." The Triennial Performance Audit recommendation also encouraged LTA, "To maximize the use of new dispatching software and research its potential for integrating various functions such as tracking maintenance, customer service, vehicle location and on-time performance."

The ITS Plan's Needs Assessment Report will explore other ITS expansion considerations with the RouteMatch© product.

B. Automated Dispatching Information

Automated dispatching functionality, under this CCIIP category, is traditionally provided through a Computer Automated Dispatch (CAD) system. These systems are also commonly integrated with an Automated Vehicle Location (AVL) system and used primarily in fixed route applications and secondarily in Paratransit. They are designed

to provide dispatch and operating personnel the ability to "see" where fleet vehicles are in real time and be able to communicate with drivers through the same system in voice and data formats.

LTA does not currently have a CAD system in place. However, the previously referenced RouteMatch© software does provide dispatch and operating personnel the ability to manage Paratransit trip assignments and communicate to operators via LTA's radio system. Once the MDT's are installed in the County Express Paratransit fleet as part of the next phase of RouteMatch Demand© implementation, dispatch personnel will then have integrated AVL functionality that allows for real time dispatching of Paratransit equipment.

RouteMatch© does offer licensed route and schedule modules for fixed route operations as well as a CAD/AVL system that integrates all these components together, which will be discussed further in the ITS Plan's Needs Assessment Report.

C. Voice/Data Communication

A critical ITS improvement and CCIIP category, voice and data communication between drivers and dispatch, is another area were LTA has proactively invested resources for the County Express services. In 2013, LTA upgraded its voice communications with a new radio system. This system included new dedicated VHF digital mobile radios and enhanced communication abilities. For example, the system has a paging with alert feature that takes advantage of a voice data storage feature allowing play back of prerecorded messages. Another feature of the new system is an emergency call alert through the radio system. To activate this feature, a "panic button" was installed on LTA's fleet to allow drivers easy access to notify dispatch of any emergencies while in service.

In addition to new mobile radios being installed on each vehicle, the installation also included a VHF repeater system that expanded the radio coverage area, an IT server rack for the Operations and Maintenance facility IT closet, and new stationary radio units for the dispatch center (see Appendix B for radio communication system details). Another benefit to LTA from the radio system upgrade was the proprietary software provided by the radio manufacture Kenwood, called Fleetsync Nexedge®. This software resulted in enhancements such as digital and analog messaging capabilities and a graphical interface creating an opportunity for LTA to experience some data communication though its radio system. One of the more significant of these enhancements is the ability to "see" where County Express vehicles are in near real time located while in operations, which will be discussed below.

D. Automated Vehicle Location (AVL) System

At the time the CCIIP was being conducted, AVL technology was being implemented in transit systems across the country. Since the CCIIP was completed, mobile technology has continued to rapidly evolve resulting in data modem equipment becoming more durable, smaller, and more economical. This technology is either used in parallel with Global Position Satellite (GPS) technology or more recently associated with cellular vehicle location technology. This latter innovation (as found in cell phones and other mobile devices) has resulted in transit agencies having to work to keep pace with demand by introducing AVL systems more and more through onboard equipment such as mobile data terminals and network routers.

With respect to real time fleet vehicle location, LTA's recent ITS improvements allow the agency to have some of this function. The County Express fleet, as part of its radio system upgrade, now has vehicle location capabilities in both its fixed route and paratransit fleet. The Fleetsync Nexedge® software allows for limited data communication that transmits GPS coordinates, which can be viewed on mapping software. This enhancement does not allow for frequent real time GPS data "polling" as with a dedicated AVL system. Also, the GPS data interface cannot be configured to allow the general public to access this data. However, LTA's dispatch and operating personnel now has the ability to view the transit fleet's general location while in operation.

As mentioned above in Section 4.B., once the RouteMatch© MDT's are fully installed, LTA's dispatch personnel will have AVL functionality for the Paratransit and DAR services in real time.

E. Automated Passenger Counting (APC) System

This CCIIP category reflects the importance of data communications and the ability to capture automated key performance data such as ridership information. While these systems are almost exclusively stand alone systems, more and more transit agencies are integrating these with AVL systems to provide real time passenger load (seated/standing capacity) along with stop-by-stop and total passenger counts.

LTA's contract provider currently collects County Express ridership data manually on a daily basis. Automated passenger counting will be included in ITS Plan's Needs Assessment Report.

5. Traveler Information

The CCIIP effort recognized that the ability to access and disseminate real time information was becoming a necessity as ITS technology advances allowed for this, and in response to increasing expectations of existing passengers, especially with the surge of mobile devices and web applications. In fixed route applications riders seek up to date schedule information. Paratransit and DAR riders are most interested in receiving real time pick up notice. These next two ITS categories reflect this demand.

A. Real-Time Transit Schedule Information

This ITS category applies to the provision of route and schedule information to a public interface such as an agency's website or through a regional transportation network. In order to provide passengers with this real-time information, an ITS foundation must be in place that captures this data and allows for the automated management and transmission of this data. For example, in a transit application that has integrated ITS route and schedule software, an operations software platform also exists that combines and communicate each system's data (i.e. CAD, AVL, APC, etc.) between systems. This operations software platform could also push/pull data to a system that allows for a public interface.

While the County Express fixed route services do not currently use automated fixed route scheduling software, the Paratransit services, as discussed in Section 4.A., do have this functionality. Once the MDT's installation is complete, LTA will be closer to being able to provide real time schedule information to Paratransit and DAR riders.

The considerations for automating route and schedule of the County Express fixed route services and expanding the paratransit software suite further to allow for a public interface will be explored in the ITS Plan's Needs Assessment Report.

B. Real-Time Information at Stations and Bus Stops

The primary distinction between this ITS category and the previous one is in how the real time data interface occurs, which in this case is in the form of stationary signage and/or displays at designated transit facilities and bus stops. This "next" bus interface is becoming increasing common in larger urban areas, especially as more AVL systems come on-line.

There are currently no such real-time bus stop signs within the County Express system. However, given the timeliness of LTA's Bus Stop Improvement Plan (BSIP) which was

adopted on June 16, 2016, this would be an opportune time to consider future real-time information signage. The BSIP carefully analyzed and inventoried the 87 individual bus stop locations throughout the County Express system, including bus stop signs and posts, sidewalks constructed with wheelchair access, ramps, bicycle racks, trash bins, benches, and shelters. Additionally, the BSIP presented improvement recommendations and possible costs for these improvements for consideration in future capital planning. This effort could be augmented to consider real time ITS improvements and the costs associated with these improvements

As part of the ITS Plan's Needs Assessment Report, the BSIP and SRTP/LRTP findings and recommendations will be examined, as well as the most heavily utilized local and regional bus stops in the system, as possible candidates for aforementioned ITS improvements.

6. Other ITS Applications

A. Electronic Maintenance Systems

Increasingly transit agencies have been turning to ITS improvements such as automated fleet maintenance software systems as a means to improve the efficiency of another important aspect of daily transit operations – maintenance. These automated systems are designed to retain all fleet related maintenance records in an effort to ensure the timely preventative maintenance scheduling of a fleet, documenting of fleet usage and trends, and the proper management of all equipment and vehicle part warranties.

At this time, LTA does not currently use an electronic maintenance system for the County Express fleet maintenance program.

B. Video Surveillance

In order to support public safety throughout the Central Coast's transportation network, the CCIIP recommended that participants consider the inclusion of video cameras onboard all fleet vehicles, at transit facilities, and at operating and maintenance facilities. The benefits of these systems are that they allow for ongoing safety video monitoring and recording of activities on a system. The challenges for smaller transit agencies are that these surveillance systems can be costly and require integration with law enforcement or private security for the regular monitoring and data storage of the video feeds.

As part of the contract with LTA to provide County Express service, MV Transportation at its own expense has retrofitted the LTA fleet with an onboard driver

safety camera system (see image below).

This system, called DriveCam©, is mounted behind each vehicle's rear view mirror and is able to capture video images of driver performance with an interior cabin facing camera and exterior street view camera. DriveCam is designed as driver performance enhancement and safety tool. While the system does not continuously capture live video feeds, it is designed to record only the time lapsed before and after a "risky" driving situation when embedded sensors measure forces exerted on the vehicle, such as abrupt start/stops, sudden turns, accelerations/ decelerations, speeding and collisions. The event video and data is uploaded, via a cellular network, to a central security location established by MV Transportation where data from all of their clients with the DriveCam system are reviewed.

LTA does not have an onboard security video system independent of the contractor's system that monitors the daily activities of the County Express fleet, passengers, and drivers as promoted in the CCIIP. In addition, LTA does not currently have a stationary security video surveillance system installed at the Operation and Maintenance facility.

Exhibit A – County Express Paratransit Scheduling Software (RouteMatch Demand©)

The following is a listing of the RouteMatch Demand © data management modules that LTA has secured license to use on the County Express Paratransit and DAR. Included is a description of each module's function.

Data Management Module	Description
Administration/Settings	Within this module the administrative settings for how LTA's "users" are defined and how permission is granted to access operating information within the system are established. In addition, other important operational parameters (i.e. revenue definitions) are set up here.
Customers	This module is where all LTA Paratransit and DAR information is input, tracked, and maintained including eligibility status, service needs, medical needs, and other important data.
Funding Sources	Funding sources are configured here to correspond to which third parties pay or subsidize trips for clients, such as sources city/county governments, Medicaid, or privately funded organizations (schools, hospitals, etc.).
Addresses	Client addresses are input and stored in this module along with pickup/drop-off addresses, LTA's facility pullout/pull-in, and stop points for fixed route.
Trips	This module is where the contractor, on behalf of LTA, enters and manages client trip requests.
Scheduling	Once Paratransit and DAR trips are requested, they are assigned and managed here.
Dispatching	The Dispatching function allows the contractor to track all information regarding the trips performed by date, vehicle, or run.
Services	Within this module, users can view, add, modify, or delete services. Services consist of the following elements: a client name, any trip length restrictions, trip length, and other trip "factors."

Billing	This module allows for LTA's billing rules to be managed and applied to clients throughout the system, including calculating client fare amounts, calculating individual trip costs, and calculating run level charges.
Verification	Users can validate trip data on previous service days by vehicle or run, confirm which trips were completed, and ensure billing has been calculated correctly.
Reporting	From this module standard RouteMatch© reports and any custom designed reports are generated. These reports include driver directions, driver manifest, detailed invoicing, operating statistics, vehicle productivity, run productivity, no shows/cancellations, and scheduled trip summaries.
Drivers	This module is where driver information is maintained including information such as hiring information, termination information, and service information such as daily schedule and availability.

The module below is not currently configured in LTA's system, however, when the RouteMatch Demand© expansion that introduces MDT's to the system this module will added.

Data Management Module	Description
Mobile Data System	This module will allow for electronic operator manifests, AVL data, messaging, real-time data capture, turn-by-turn voice annunciated directions, automated odometer / mileage collection, fare collection, passenger counting, and estimated arrival times to the scheduled pick-up/drop-off.

Exhibit B - County Express Radio Communication System Detail

The table below provides the equipment and other associated costs associated with LTA's 2013 radio communication system purchase. This communication system was solicited competitively and awarded to Emergency Vehicle Specialists.

Quantity Purchased	Model/Part No.	Equipment/Item Purchased	Purchase Price
21	NX700HK	Kenwood 50 watt/512 channel VHF mobile radios	$11,445.00
21	GPS15XL-W	Garmin GPS radio receiver boards for each radio	$1,885.80
21	GA25MCX	Garmin GPS Antennas for each vehicle	$898.38
21	VGS-1	Voice guide and storage for "beeper"	$1,267.77
18	ST221SF1SUFF	Sinclair Mobile Omni Transit Bus Antenna	$5,202.00
21	INSTKT	Vehicle installation kits	$420.00
3	NX700K	Kenwood 30 watt/512 channel VHF base radio units (dispatch)	$1,395.00
3	CPLBMB8	VHF conventional mobile antenna	$177.00
1	KASI0	Fleetsync Nexedge talkgroup software	$299.50
1	NXR700K	Kenwood VHF repeater system	$3,840.00
1	KSGO2P1B	6 Cavity high frequency Bp Br repeater duplexer	$1,950.00
1	KSGMRCK3	17 RU 3 foot aluminum rack with NXR700K, hardware, cabling, and wiring management	$832.80
1	KSGA211R	110 Watt continous duty radio frequency amplifier and power supply	$1,959.00
Equipment/Item Purchase Cost			**$31,572.25**
Installation and Labor Cost			**$6,361.25**
Taxes and Other Costs			**$2,671.77**
Radio Communication System Total Cost			**$40,605.27**