Solano Transportation Authority

I-80 / I-680 / I-780 / State Route 12 Transit Corridor

Final Study

4-05

Final |June 16, 2014

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Executive Summary

The Solano County Transit Corridor Study assesses the current "intercity" bus services operating in Solano County— those routes that connect Solano County cities and connect the county to other counties—and branded as SolanoExpress.

Vision

Solano Express is a regional express bus transportation service that is fast, comfortable, safe, reliable and frequent, delivered through a partnership by Solano's transit operators and STA at costs that are affordable to the residents of Solano.

Accordingly, the study recommends a more focused and frequent core system primarily operating along the I-80 and I-680 freeway corridors.

Proposal

The proposed routing alternative – referred to as Alternative B in the Study – consists of three all-day, frequent routes, designated by color:

- Green Line – Operating from Sacramento and Davis via Interstate 80 and Interstate 680 to the Walnut Creek BART Station.
- Blue Line – Operating from Suisun City via Highway 12, Interstate 80, Highway 37 and then Mare Island Way and Curtola Parkway to Interstate 80 and the El Cerrito del Norte BART Station.
- Red Line – Operating from the Vallejo Ferry Terminal via Curtola Parkway, Interstate 780, Military (Benicia) and then via Interstate 680 to the Walnut Creek BART Station.

A peak period only route – the Navy Line – provides additional express service from Fairfield and Vacaville to Sacramento.

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Figure 1: Recommended SolanoExpress Route Network

Key Features

Service Design

- BART-like service design
- Ability to travel from Solano County city to Solano County city quickly, primarily on the freeway.
- Good connections to Vallejo Ferry and BART.
- Access to Sacramento, UCDavis and local colleges.
- Frequent service throughout the day and into the evening.
- Minimum 35 mph operation.

Key Stations and Stop

- Creates new freeway station between Interstate 80 and Suisun Parkway at Kaiser Drive – provides access to Solano College and business park from Green and Blue Lines.
- Upgrades to Fairfield Transportation Center and Curtola Park and Ride, as well as new freeway-adjacent stops in Benicia, and on I-680.

Finances

- Phased in program to maintain overall subsidy level at $4 million annually.
- Anticipated ridership growth funds additional service increases through fare revenue increases.
- Incremental program focused on transit improvements as programmed freeway improvements are planned and designed.

Background

Over the last 25 years, SolanoExpress services have evolved and grown from a single route operated by Vallejo Transit to a seven route system that carries about 4,400 passengers daily. These services are operated by Fairfield and Suisun Transit (FAST) and Solano County Transit (SolTrans) with management and oversight provided by the Solano Transportation Authority (STA). Most of the passengers connect to BART service at El Cerrito del Norte and some passengers travel to the Pleasant Hill and the Walnut Creek BART Station stations.

The system grew initially through the county operators initiating service and recently by operators and STA seizing opportunities for expanded regional funding and coordinating broader partnership among local agencies. These opportunities were entrepreneurial and created pilots and tests of services, many of which were successful and led to today's service.

However, as in a system built on expedience and opportunity, the current system is not clear or legible, it has areas of duplication and except for Route 80 service frequencies are below standard. In addition, connections between Solano cities are slow or infrequent.

Goals and performance metrics are presented in the Study to guide an improved service design. Changes are expected to be deliberate and incremental, but should follow an overall plan and an expected outcome. As population and ridership growth continues – and the Solano Napa model forecasts 37 percent transit growth over the next 30 years – service can be changed bit-by-bit as demand and finances allow.

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1 Purpose of Study

The purpose of the I-80/I-680/I-780 Transit Corridor Study is to recommend a regional transit service design that responds to changes in the market and technology. The service design delivers a regional/intercity transit service within and connecting into Solano County and aligns regional/intercity transit services with:

- The core principles of the Solano Intercity Transit Funding Agreement focusing on stability, efficiency and flexibility
- Demographic changes that have occurred over the last decade
- Forecast changes in land use and density resulting from state mandates and the Bay Area's Sustainable Communities Strategy – *Plan Bay Area*.
- Advancements in regional bus transit best practices and transit facilities design
- Recognition of the current financial environment.
- The ability to effectively conceive of, develop and compete for capital projects, obtain regional consensus on projects, identify and obtain funding to deliver the capital program.

During the course of the Study, after considering anticipated demographic and population changes and discussing alternatives, STA developed the following Vision for the Solano Express service:

Solano Express is a regional express bus transportation service that is fast, comfortable, safe, reliable and frequent, delivered through a partnership by Solano's transit operators and STA at costs that are affordable to the residents of Solano.

This vision leads to the development of a simple, legible routing system that, by design, seeks to focus on effectiveness – passengers per bus hour and positive impacts on land use – and efficiency – high farebox recovery and lower subsidy – to develop an attractive, well-used and sustainable SolanoExpress service.

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2 History of SolanoExpress/Intercity Transit Services Purpose of Study

SolanoExpress service can be traced back to the initial services provided by Vallejo Transit to link that city with the Bay Area Rapid Transit (BART) system.

Vallejo Transit instituted the *Baylink Route 80* in Fall 1987 operating along a route essentially the same as the current route. Three years later buses operated every 15 minutes in the peak period between El Cerrito and Vallejo, with some trips extended to the Solano College campus in the city of Fairfield (replacing a local route). In 1990, ridership was about 1,200 passengers each weekday. Subsidy costs were split between Vallejo, Fairfield, the county and MTC.

By 1993 Intercity/Regional bus services were divided into three routes, all operated by Vallejo Transit – Route 80 reverted to its previous Vallejo to El Cerrito route, Route 85 provided the connections between cities within the county and to Solano Community College, and a new Route 90 provided express service from Fairfield to the BART connection in El Cerrito. Route 80 operated as frequently as every 10 minutes in the peak and every 30 minutes in the midday, while Route 85 operated every 30 minutes in the peak and 60 minutes midday. The new Route 90 (initiated in summer 1992) operated by Vallejo Transit serviced Fairfield (with some trips to Suisun) every 30 minutes with 120 minute midday service frequencies. It was funded by Caltrans as a mitigation measure during the construction of HOV lanes on Interstate 80 in Contra Costa and Alameda Counties.

During the early 1990's, Vallejo Transit operated the Intercity/Regional services with a variety of 40 foot urban/suburban buses. The Intercity/Regional services had high farebox recoveries (about 50%) and the balance of funding (other than Route 90) was provided with 3% funding provided in Regional Measure 1 (toll bridge funds).

The Vallejo FY 1994-2003 Short Range Transit Plan identified the following service deficiencies for the Intercity/Regional bus routes:

- Inadequate peak period bus capacity (all routes)
- Limited park and ride availability
- Undesirable midday service levels (all routes)
- Limited bus availability and bus capacity
- Unreliable operations due to I-80 freeway congestion

In addition, the FY 1994-2003 SRTP identified a Vallejo/Benicia to Central Contra Costa market as a potential transit market. Within just a few months Benicia began to operate the precursor to the current Route 78.

Service between Fairfield and Vacaville started in 1990 connecting the county administrative complex in Fairfield, the Solano Mall and the Vacaville local transit center with hourly service. FAST designated the service as Route 20 – a

year later, Route 30 began to operate between Fairfield, Vacaville and the UC Davis campus. In 1998, the service was transferred from Fairfield to Yolo Bus, which had CNG vehicles to operate the service. In 2000, STA transferred the Route 30 service back to Fairfield. Route 30 frequencies were similar to current services. In 2003, Route 30 extended to Sacramento. Route 30 was funded through Yolo-Solano Air Quality Management District Clean Air Funds and managed by STA on behalf of Fairfield in order to obtain the funding for the route.

Route 40 began service as a FAST route and by 2003 was operating 18 trips daily and carrying about 120 passengers daily.

In the early 2000s, MTC's express bus program provided funding for "over-the-road" coaches with better amenities and more comfort for longer suburban commutes. Both Routes 80 and 90 began to use these vehicles. In addition, reliability improved as the new HOV lanes provided better and more consistent travel times for Solano bus operations.

2.1 Major Transit Service Modifications since 2004

2.1.1 Background to Inter-City Service Modifications

The creation of the SolanoLinks Intercity Transit Consortium, SolanoExpress, and the Intercity Funding Agreement serve as background for implementing intercity services in the corridor (and modifying them since 2004):

- In 1997, the SolanoLinks Intercity Transit Consortium was formed by the seven Solano transit operators, Solano Napa Commuter Information and the STA to coordinate intercity service that goes through Solano County from Sacramento County, Yolo County, Napa County and Contra Costa County. It also functions as a consensus-building advisory body to the Technical Advisory Committee (TAC) and STA Board on matters pertaining to planning and implementation of intercity transit including:
    - Long-range intercity transit plans;
    - Five-year transit development plans;
    - Review and prioritization of transit funds that become available subject to final recommendations by the TAC and approval of the STA Board; and
    - Other transit issues that may arise such as studies of transit and alternative modes.
- Prior to 2005, funding for Solano County's intercity routes, collectively called SolanoExpress, was shared among local jurisdictions through various understandings and informal year-to-year funding agreements. In FY2005-06, at the request of Vallejo Transit and Fairfield and Suisun Transit (FAST), STA along with the transit operators developed a countywide cost-sharing method to provide funding stability for intercity operators and an equitable and predictable cost sharing formula for the funding partners.

- As a result, the Intercity Transit Funding Working Group (ITFWG) was formed, comprised of representatives from STA, Solano County, and each participating city in Solano County. Initially, this included the Cities of Benicia, Dixon, Fairfield, Suisun City, Rio Vista, Vacaville, Vallejo, and the County. Eventually, Rio Vista opted to drop out. The first countywide Intercity Transit Funding Agreement was established for FY2006-07. To be included in this Agreement, a route must meet all five of the following criteria:
    - Operates between two cities (except between Fairfield and Suisun City where local service is provided by Fairfield and Suisun Transit);
    - Carries at least 2,000 riders per month;
    - Operates at least 5 days per week;
    - Has been operating for at least a year and is not scheduled for deletion within the fiscal year; and
    - Maintains service that meets at least one of the performance standards identified in the Coordinated SRTP (i.e., service productivity, cost efficiency, and cost effectiveness).

2.1.2 Major Transit Service Modifications since 2004

Based on discussions with the operators, the major service modifications within the corridor between 2004 and 2012 are summarized year-by-year in the tables below. The passage by Bay Area voters of Regional Measure 2 (RM 2) and successful lobbying by STA in shaping the RM 2 expenditure plan provided new annual operating funds, helped fund the start-up of Route 78 and avoid service cuts to 40, 80, and 90. Among the service changes, the major changes that occurred included:

- Discontinuing Route 91 in 2006 due to low ridership and poor farebox ;
- Discontinuing Route 92 during FY2007-08 due to low ridership and poor farebox;
- Replacing Route 75 with a more robust and productive Route 78 in FY 2008-09 and transferring the service from Benicia to Vallejo;
- Fare modifications implemented in 2006 by both FAST and Vallejo.
- Transfer of Route 90 from Vallejo to Fast in fiscal year 2006-07;
- Adoption of the SolTrans JPA in 2010 by Benicia, Vallejo and STA resulted in SolTrans resulted in SolTrans assuming operation of Routes 78, 80 and 85 from Vallejo in July 2011.

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Operator	Route #	Notes
Benicia Breeze	75	No major change.
Rio Vista Delta Breeze	50	ITFWG agreed on April 10, 2008 that Routes 50 and 92 would be "zeroed-out" (omitted) from FY2006-07 Intercity Funding Plan as they didn't meet performance criteria.
Vallejo Transit	80	No major change.
	85	No major change.
	90	Route 90 was transferred from Vallejo Transit to FAST on October 1, 2006.
	91	Route 91 was discontinued on October 1, 2006; services merged into Route 90, operated by FAST.
	92	ITFWG agreed on April 10, 2008 that Routes 50 and 92 would be "zeroed-out" (omitted) from FY2006-07 reconciliation.
FAST	20	No major change.
	30	No major change.
	40	No major change.
	90	Route 90 was transferred from Vallejo Transit to FAST on October 1, 2006.

Notes:
[A] FY2006-07 was the first year of formal "Intercity" operations. Per footnote in reconciliation file, Q1 of FY2006-07 had no service changes from service offered in FY2005-06 for any Intercity routes.
[B] Vallejo increased fares on Aug 1, 2006.
[C] Service changes on Oct 1, 2006 were accompanied by FAST fare changes.

Table 1: FY2006-07 Status of Intercity Routes

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Operator	Route #	Notes
Benicia Breeze	75	No major change.
Rio Vista Delta Breeze	50	Route 50 did not meet the criteria to be designated as an Intercity Route; it was no longer considered eligible for the funding agreement.
Vallejo Transit	80	No major change.
	85	No major change.
	92	Route 92 was discontinued due to low ridership; exact date not available, but the Route is not shown in Vallejo Transit's year-end results for FY2007-08. RM2 funds for the route were transferred to other Solano routes.
FAST	20	No major change.
	30	No major change.
	40	Route 40 had a large drop in total hours from the prior year, but with more total miles. It is unclear whether this is due to a change in routing, or a different allocation methodology. The peak vehicle allocation remains unchanged.
	90	Route 90 had a sizeable increase in both hours and miles from the prior year, with a modest increase in peak vehicle allocation. This is probably due to Route 90's first full year of operation as a merged route, compared to FY2006-07, which only included 9 months of merged operations.

Notes:

[A] During FY2007-08, the Intercity Funding Group discussed various proposals to begin a new Route 70, operated by Vallejo Transit, to replace some or all of Benicia's Route 75. Service was supposed to begin in Spring 2008.

[B] Vallejo increased fares on Aug 1, 2006.

[C] Service changes on Oct 1, 2006 were accompanied by FAST fare changes.

Table 2: FY2007-08 Status of Intercity Routes

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Operator	Route #	Notes
Benicia Breeze	75	Route 75 was eventually replaced by Route 78 (aka Route 70) in the Intercity Funding Agreement. Benicia may have operated Route 75 with its own funding after Route 78 began operations, but Route 75 was no longer part of the cost-sharing & reconciliation.
Vallejo Transit	78	Route 78 began service on Oct 1, 2008, following a complex transition involving Benicia's Route 75. When the route was first proposed it was called Route 70. Some files show it as Route 70, prior to its renaming as Route 78.
	80	Vallejo Transit made additional changes to Route 80. The route now runs less frequently, starting at 8:30AM and ending at 2:00PM every 30 minutes.
	85	Route 85 had fewer hours and fewer miles compared to the prior year, but no explanation is given in any of the financial files. This was possibly due to system-wide service reductions at Vallejo Transit.
FAST	20	No major change.
	30	Major additions on Route 30 were initiated sometime during FY2008-09, including an additional morning/evening run due to AM overcrowding and new Lifeline-funded Saturday service, as approved by the Intercity operators.
	40	Route 40 showed an increase in total hours and decrease in miles from prior year, returning close to FY2006-07 levels for both.
	90	No major change.

Table 3: FY2008-09 Status of Intercity Routes

Operator	Route #	Notes
Benicia Breeze	75	Route 75 transitioned to Route 78 during FY2009-10. Route 78 was operated by Vallejo Transit; Benicia no longer operated any intercity routes.
Vallejo Transit	78	Route 78 had increased hours over the prior year, most likely due to Route 78's first full year of operations compared to the inclusion of 9 months of operation in the prior year.
	80	No major change.
	85	No major change.
FAST	20	No major change.
	30	Route 30 service quantities (hours, miles) were somewhat reduced from the prior year, though they have not entirely returned to FY2007-08 levels.
	40	Route 40 had reduced hours, but stable miles versus the prior year. Service was operating at a faster average speed.
	90	Route 90 had an increase in peak vehicle allocation compared to the prior year.

Table 4: FY2009-10 Status of Intercity Routes

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Operator	Route #	Notes
Vallejo Transit	78	No major change.
	80	No major change.
	85	No major change.
FAST	20	No major change.
	30	No major change.
	40	No major change.
	90	Route 90 had a decrease in peak vehicle allocation, essentially reverting to FY2009-10 levels.

Table 5: FY2010-11 Status of Intercity Routes

Operator	Route #	Notes
Vallejo Transit	78	No major change.
	80	Route 80 had fewer hours compared to prior year.
	85	No major change.
FAST	20	No major change.
	30	FAST Route 30 was adjusted to improve efficiency and reliability. For instance, the stop was relocated from the Davis Street Park-and-Ride to the Vacaville Transportation Center and the Saturday schedule was adjusted to shorten layover time in Davis. In addition, changes were made to one of the early morning buses returning from UC Davis in an effort to provide earlier service to the westbound commuters from Dixon and Vacaville.
	40	FAST Route 40 was adjusted by reducing service hours per day, without affecting the number of trips. The Vacaville Street Park-and-Ride was relocated to the Vacaville Transportation Center to facilitate enhanced local and regional connectivity.
	90	No major change.

Table 6: FY2011-12 Forecasted Status of Intercity Routes

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Operator	Route #	Notes
SolTrans	78	Routes 78 & 85 had decreases in service hours and miles compared to the prior year.
	80	Route 80 had increased miles and minor increase in hours compared to the prior year.
	85	Routes 78 & 85 had decreases in service hours and miles compared to the prior year.
FAST	20	No major change.
	30	No major change.
	40	Route 40 had decreased hours and peak vehicle allocation compared to the prior year.
	90	No major change.

Table 7: FY2012-13 Forecast Status of Intercity Routes

2.2 Existing Intercity and Regional Transit Services

2.2.1 Existing Solano Express Services

Solano County has a broad, multimodal mix of public transportation services that serve people traveling between Solano County cities and between Solano County and Contra Costa, Alameda, Santa Clara, Yolo, and Sacramento Counties. Connections are also made to BART and other regional transit services.

SolanoExpress provides intercity (also called regional) service between Solano County cities (intercity) and regional connections between cities in Solano County and neighboring counties, and regional connections to BART, the Vallejo Baylink Ferry, and Amtrak Capitol Corridor Rail Service.

Two transit operators – FAST and SolTrans – provide SolanoExpress service outside the county to BART stations and other destinations outside the county on seven bus routes in accordance with the Intercity Transit Funding Agreement; in addition, Route 85 provides intercity service exclusively within the county. Four of the seven intercity routes provide service to the El Cerrito del Norte, Pleasant Hill or the Walnut Creek BART Station stations from the cities of Benicia, Fairfield, Suisun City, Vacaville, and Vallejo. These routes include Route 40, 78, 80 (80S), and 90. About 250 weekday vehicle hours of service are provided on the seven routes covered by the Intercity Transit Funding Agreement.

In addition to the noted routes, Rio Vista operates two deviated fixed route intercity transit services between Antioch and the Pittsburg/Bay Point BART Station (with Route 52) and from Isleton to the Fairfield/Suisun Amtrak Station (with Route 50).

Figure 2 illustrates the existing SolanoExpress and Intercity routes and Table 9 gives details on the service levels of the routes including peak headways, service vehicles required, and indication of funding agreement.

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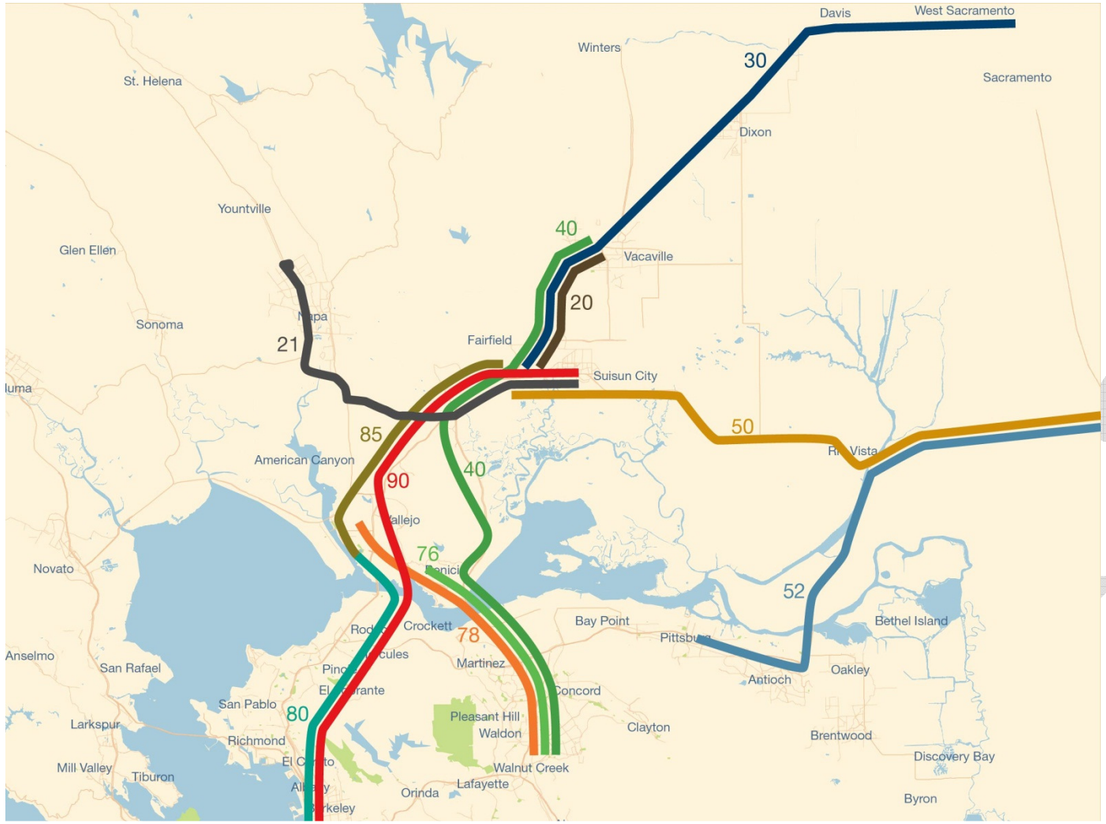

Figure 2: Existing SolanoExpress and Intercity Routes

Route #	Operator	Cities Served	Weekday Peak Headways	Peak Vehicles Required	Funded by Intercity Transit Funding Agreement
20	FAST	Fairfield – Vacaville	Every hour	1	✓
30	FAST	Fairfield – Vacaville – Dixon – UC Davis – Sacramento	5 daily round trips	3	✓
40	FAST	Vacaville – Fairfield – the Walnut Creek BART Station	6 daily round trips	3	✓
50	Rio Vista Delta Breeze	Isleton – Rio Vista – Fairfield	6 daily round trips	1	
52	Rio Vista Delta Breeze	Rio Vista – Isleton – Antioch – Pittsburg/Bay Point BART	1 daily round trip	1	
76	SolTrans	Vallejo Transit Center – Benicia – Diablo Valley College	1 daily round trip	1	
78	SolTrans	Vallejo Transit Center – Benicia – the Walnut Creek BART Station	30 minutes	3	✓
80	SolTrans	Vallejo Transit Center – the El Cerrito del Norte BART Station	15 minutes	7	✓
80S	SolTrans	Vallejo – Benicia – the Walnut Creek BART Station	Sunday only	-	
85	SolTrans	Vallejo Ferry Terminal – Solano Community College, Fairfield	Every hour	2	✓
90	FAST	Fairfield – the El Cerrito del Norte BART Station	20 minutes	8	✓

Source:
Intercity Transit Funding Agreement, Solano Transporation Authority. (October 1, 2012).
City of Rio Vista. Rio Vista Delta Breeze website – www.deltabreeze.org. (July 2, 2012).

Table 8: SolanoExpress Routes and Service Levels

2.2.2 Other Service Providers

2.2.2.1 Capitol Corridor Amtrak Service

The Capitol Corridor, operated by Amtrak and managed by BART, provides 15 weekday intercity train round trips (11 on Saturdays and Sundays) through Solano County with service at Suisun-Fairfield, and operates to Sacramento, Oakland/Emeryville and San Jose (on limited trips). Travel time from Suisun to Sacramento is about 40 minutes, and that from Suisun City to Oakland is about 70 minutes.

2.2.2.2 WETA Vallejo Ferry

The WETA Vallejo Ferry is a water transportation service provided by the Water Emergency Transportation Authority, and operated by the Blue & Gold Fleet. Ten round trips weekdays are provided, along with three round trips on weekends. Service is provided with 300 passenger, high-speed ferries, and the sailing time between Vallejo and San Francisco is about one hour. In addition, Route 200 express buses supplement the ferry schedule, filling in schedule gaps in the Vallejo to San Francisco service with six round trips daily.

2.2.2.3 Yolobus (Davis/Sacramento)

Yolobus operates Route 220, providing one morning, one mid-day, and one afternoon round trip, Monday-Saturday, between Davis, Winters, and Vacaville. Route 220 connects with SolanoExpress Route 30 in Davis and SolanoExpress Route 20, 30 and 40 in Vacaville at the Vacaville Transportation Center. In addition, Route 30 also connects with Yolobus Route 42A, an intercity loop service operating clockwise, starting in downtown Sacramento, through West Sacramento, Davis, Woodland, Sacramento International Airport, and ending back in downtown Sacramento.

2.2.2.4 Napa Vine

Napa Vine Route 10 provides service from Downtown Calistoga to the Vallejo Transit Center for connecting service to San Francisco via the WETA Vallejo Ferry. The VINE 29 Commuter Express runs between Calistoga and the El Cerrito del Norte BART Station with stops in St. Helena, Yountville, Napa, American Canyon, and the Vallejo Ferry Terminal. Route 21, which connects Napa with Fairfield and Suisun via Highway 12 provides seven round trips each weekday and started service July 1, 2013.

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2.2.2.5 Greyhound

Greyhound operates service from Suisun City to Oakland, San Francisco and Sacramento – three trips in each direction are provided. In addition, Greyhound contracts with Delta Breeze to operate feeder service from Fairfield and Rio Vista to the Greyhound mainline services in Suisun City.

2.3 Existing Solano Express Governance

2.3.1 SolanoExpress Intercity Transit Consortium and Funding Agreement

The SolanoExpress Intercity Transit Consortium consists of eight members representing five transit operators, SNCI, STA, and County of Solano. Prior to 2006, the SolanoExpress was known as SolanoLinks.

In late 2012, the STA Board approved a new Intercity Transit Funding Agreement for SolanoExpress Routes for Fiscal Year (FY) 2012-13 and 2013-14. Under the revised agreement, SolTrans, Dixon, FAST, Vacaville, County of Solano and STA contribute to the SolanoExpress network and as a result, make most policy recommendations to the STA Board on the service. The service continues to be operated by SolTrans and FAST. The agreement focuses on three principles – stability, efficiency and flexibility – as follows:

- To provide certainty to intercity transit operators and funding partners, and to establish a consistent method and an agreement for sharing subsidies for all intercity transit routes by Solano intercity transit operators based on a consensus of the participating jurisdictions.
- To focus limited financial resources and deliver productive intercity transit service and to develop a cost effective and affordable intercity route structure that will: (i) be implemented with the agreed upon subsidy sharing agreement; (ii) meet the policy/coverage requirements agreed upon; and (iii) be marketed jointly.
- To develop strategies to consistently evaluate, modify, and market intercity transit services.

Included in the agreement is a list of service design standards and performance metrics that will be used to design and then evaluate the intercity services. This evaluation occurs in the SRTP and will also be considered in the Corridor Plan.

2.3.2 Funding Structure and Cost-Sharing Arrangements

As noted, seven of the SolanoExpress routes are funded through an Intercity Transit Funding Agreement. To be included in this Agreement, a route must meet all five of the following criteria:

- Operates between two cities (except between Fairfield and Suisun City where local service is provided by FAST);

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- Carries at least 2,000 riders per month;
- Operates at least 5 days per week;
- Has been operating for at least a year and is not scheduled for deletion within the fiscal year; and
- Maintains service that meets at least one of the performance standards identified in the Coordinated SRTP (i.e., service productivity, cost efficiency, and cost effectiveness).

Intercity transit costs are shared among jurisdictions using a formula that is based on two factors: ridership by residence and population. This shared funding is for the cost of these routes after farebox and other non-local revenue are taken into account. The County's share is negotiated annually and is based on either the proportion of the County's population share, or by increasing the County's share from the previous year using the Consumer Price Index. The resulting net cost is shared among the participating jurisdictions based on 20% of their population share and 80% of ridership by residence. The subsidy amounts provided by each jurisdiction will be included in the annual TDA matrix prepared by STA and submitted to MTC. The table below presents the results of the FY 2012-13 intercity cost sharing formula calculations, including reconciled amounts for FY 2010-11, net of other subsidies:

SOLANO TRANSPORTATION AUTHORITY
SOLANO EXPRESS COST SHARING
RECONCILIATION OF FY 10-11 SUBSIDIES BY JURISDICTION PLUS AMOUNT OWED FOR 12-13
SUMMARY

	Amount Owed to FAST					Amount Owed to SolTrans			
	for Rt 20	**for Rt 30**	**for Rt 40**	**for Rt 90**	**TOTAL**	**for Rt 78**	**for Rt 80**	**for Rt 85**	**TOTAL**
Benicia	4,715	7,025	9,677	10,921	**32,338**	140,694	26,794	-1,136	**166,352**
Dixon	3,171	76,582	11,817	12,102	**103,672**	3,275	6,770	-403	**9,642**
Fairfield	124,999	149,422	173,362	365,585	**813,368**	25,060	66,955	-14,821	**77,194**
Rio Vista	0	0	0	0	**0**	0	0	0	**0**
Suisun City	26,221	32,439	81,508	119,867	**260,036**	9,484	17,274	-2,341	**24,417**
Vacaville	151,264	167,761	99,068	131,250	**549,341**	20,172	43,588	-3,535	**60,225**
Vallejo	27,391	69,697	32,428	42,259	**171,775**	164,458	574,290	-24,338	**714,410**
Balance of County	17,522	25,539	20,683	36,816	**100,561**	13,945	31,517	-4,139	**41,322**
TOTAL	**355,282**	**528,466**	**428,543**	**718,799**	**2,031,091**	**377,087**	**767,188**	**-50,712**	**1,093,563**

Source: Intercity Transit Funding Agreement for SolanoExpress Routes for Fiscal Year (FY) 2012-13 and 2013-14 Memo, Solano Transportation Authority. (October 10, 2012).

Table 9: Intercity Cost Sharing (FY2012-2013)

3 Previous Solano County Planning Studies

3.1 Regional Transit Studies

3.1.1 MTC Transit Sustainability Project 2012

The MTC Transit Sustainability Project (TSP) was initiated to focus attention on the imperative for better public transit as land uses become more intense, as considered in Plan Bay Area. Among the major concerns were the high rate of increase in the unit cost of transit, and the need to provide more transit service to serve dense land uses. There were several work streams in the study, including finance and institutional, and also a consideration of more streamlined regional transit service.

Both efficiency and effectiveness were considered in the TSP. Efficiency is the cost to provide the service, and effectiveness is the use of the service provided. Issues common to all Bay Area sub regions included unit costs that increased faster than inflation (except for the Bay Area Rapid Transit District – BART), and an increase in the hours of service provided without a corresponding increase in the number of passengers carried. Some of the issues uncovered were delay to buses, which resulted in more unproductive service hours and longer travel times for riders, and in some cases transit service to transit-unfriendly areas resulting in low use.

In the regional service plan work stream, 11 corridors were studied. Within Solano County, these corridors include the I-80 Corridor from Solano County to San Francisco, the I-680 Corridor (north) from Solano County to Central Contra Costa County, and the Highway 12 Corridor from Fairfield to Napa and Marin. The TSP recommended increased service on the I-80 and I-680 corridors, but did not recommend service expansion in the Highway 12 corridor due to low overall travel volumes and the corridor's dispersed travel. The horizon year was 2025, a relatively short time which effectively limited supportive transit capital improvements to those that had already been programmed.

Demographic information for the TSP was also developed including MTC's latest forecasts and a new tool, the Transit Competitiveness Index (TCI) developed by Cambridge Systematics. The TCI measures demographic and land use conditions that influence how well transit could serve the market. Any TCI above 100 is suitable for transit service. In Solano County, which has largely auto-oriented land uses, individual TCI's tended to be low, but when linked with strong-transit supportive destinations (such as large downtowns or universities) some travel areas could be identified as transit competitive (for example, Fairfield to San Francisco).

MTC TSP: I-80 Corridor

The TSP vision for I-80 simplified transit routes, increased speed and provided consistent and frequent service in the corridor from Vacaville to San Francisco. Current service design is characterized by multiple express services focused on either San Francisco or BART entering the freeway corridors at varying points along the

corridor. Express services from Solano County to BART El Cerrito del Norte Station (Routes 80 and 90) have good performance, with farebox recovery between 45%-60%. Route 80 (from Vallejo) features 15 minute service in the peak periods and 30 minutes midday. Route 90 (from Fairfield) operates every 15 minutes in the peak and every 60 minutes mid-day.

These services are joined by WestCat's Lynx route from Hercules to San Francisco and AC Transit's Route LA from Richmond Parkway to San Francisco. Both of these services operate at 15-20 minute service frequencies in the peak, and the Lynx operates some midday trips. Other AC Transit peak only Transbay services also operate in the corridor from El Cerrito, Richmond, Albany, Berkeley and Emeryville.

As a result, the corridor has many bus trips, generally uncoordinated, and all focused on either San Francisco or BART. Destinations along the corridor, such as West Berkeley or Emeryville, which are removed from the BART corridors, lack high-quality, all-day, frequent direct region transit service even though the areas are region destinations. The existing regional service, primarily provided by AC Transit, is focused on San Francisco and as a result, transit between cities other than San Francisco is limited.

Travel demand in the corridor is expected to increase from 15%- 20% by 2025. As urban areas land uses increase in density, they would become more transit competitive. The TSP concept for I-80 service envisioned high-speed, frequent bus service essentially extending the regional transit high-capacity network to Solano County via buses and freeway improvements.

The TSP considered "transit concepts," which were visions for a transit system that could support future land uses and would be cost-effective. In the I-80 corridor, the TSP express bus program considered in-line freeway stops at key locations such as Vacaville, North Texas, Solano Mall, Fairfield Transportation Center, Solano Community College, Hercules, and Richmond Parkway connecting with a new BART station at I-80/ MacDonald Avenue in Richmond. These stations allow buses to remain on the freeway, which, in turn allows:

Buses and passengers to go faster;

Suburb to suburb transit trips; and

More direct service into West Berkeley and Emeryville (with additional on-line stations at Central and near University Avenue) before continuing to San Francisco.

Buses would operate faster, buses would operate more frequently, and more destinations would be served. The 2025 routing concept proposes the following:

Route 80 – Route 80 would be extended from El Cerrito to San Francisco and replace AC Transit's LA, F and J buses (all of which operate in the corridor). The Hercules Lynx bus would continue to operate in the peak period only, until a dedicated transit right-of-way was developed in West Berkeley and Emeryville. Under this scenario, Route 80 would operate every 15 minutes daily carrying passengers from Solano County to a new BART station near I-80 in Richmond and further on along I-80 into West Berkeley and Emeryville

(linking Solano County to about 30,000 current jobs and 50,000 future jobs). Route 80 would also provide service for Richmond, Berkeley and Emeryville residents to San Francisco.

Route 90 – Route 90 would be extended to Vacaville and to Travis Air Force Base (AFB) (alternative trips). Route 90 would continue to terminate at the El Cerrito del Norte BART Station.

Collectively in the I-80 Corridor, the fast and frequent bus service, along with identifiable on-line stations and strong branding would be envisioned as the "rapid transit" for the County.

MTC TSP: I-680 Corridor

The I-680 Corridor stretches from Vacaville to San Jose and includes four counties, Solano, Contra Costa, Alameda, and Santa Clara counties. Currently, Solano based transit services in this corridor are FAST Route 40 and SolTrans Routes 76 and 78, which serve Walnut Creek and Pleasant Hill BART stations. MTC's 2011 models, using the Current Regional Plan Scenario (prepared as an first step in the development of the Plan Bay Area process), forecast significant job and population growth in the counties connected by the 680 Corridor – specifically Alameda, Contra Costa, Santa Clara, and Solano counties. Corridor jobs are expected to grow by more than 20%, while population would increases by more than 15% by 2025.

A gaps analysis was undertaken. Among other issues, the gap analysis found that regional bus services from Solano County connect poorly with CCCTA and LAVTA regional bus services to the Tri-Valley at the Walnut Creek BART Station. This was made worse because the Pleasant Hill station is an interim stop, which delays passengers wanting to make the CCCTA connection. Also, freeway access to the Walnut Creek BART Station is more direct than access to the Pleasant Hill BART Station.

The I-680 service concept considered increased peak service to improve the attractiveness and convenience of this service and focusing Solano County service to the Walnut Creek BART Station. Recommended enhancements include operating one regional all-day (RAD) service between Vallejo-Benicia-the Walnut Creek BART Station and two regional commute (RC) services between Vacaville-Fairfield-the Walnut Creek BART Station and Benicia-Sun Valley-Diablo Valley College. It is noted that these proposed services mimic existing routes, albeit with more frequent service and/or longer operating hours. To enhance bus connectivity to services heading to the Tri-Valley area, the Walnut Creek BART Station would become the primary regional bus hub for Solano County services in the area (currently it is Pleasant Hill BART) – local buses to Concord and Pleasant Hill would be relocated to Walnut Creek as well to maintain sub-regional service.

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3.1.2 MTC TSP: Transit Competitiveness Index

Another element of the TSP was the development of the TCI[1] as noted earlier in Section 3.1.1. The TCI is a computer program that evaluates the marketability of transit service based on demographic and land use factors (a "score" of 100 or more indicates transit competiveness). For example, as density increases and car ownership decreases, the competitiveness of transit increases (meaning it is likely that people would use a transit service). Highway congestion and transit speed relative to highway also contribute to the index, as do household income, parking costs and other factors.

For this survey, the consultant team used the TCI's developed for the TSP, adjusted the demographic information to approximate the Plan Bay Area assumptions, and then ran the program with the new assumptions (TCIs were also developed for the TSP, but were based on 2005 land uses and demographics).

The consultant team found that TCI outputs are generally competitive between downtown Vacaville and Fairfield and between Fairfield/Vacaville and downtown Oakland and San Francisco. For example:

> From Vacaville to San Francisco the TCI ranges from about 150 to 600, while from Fairfield to San Francisco, the TCI ranges from about 400 to 600.
>
> From Vacaville to downtown Oakland, the TCI ranges from about 150 to 400.
>
> Trips from Benicia to either downtown San Francisco or Oakland are also judged to be competitive.
>
> Trips from Vallejo to San Francisco score above 500, while trips to downtown Oakland score above 300 and downtown Berkeley and Walnut Creek are above the 100 threshold.

TCI scores were also studied from Fairfield and Vacaville to central Contra Costa County and from Vallejo to west Berkeley and Emeryville. In these markets TCI scores registered below the 100 threshold and were considered to be non-transit competitive. TCI scores were unavailable for either Davis or Sacramento, as those areas are outside of the MTC region.

[1] Cambridge Systematics, San Francisco Bay Area Transit Competitiveness Index, 2012.

3.1.3 I-80/I-680/I-780 Transit Corridor Study (2004)

This STA study[2] was completed in mid-2004 and represents a short- and long-range multimodal inter-city transportation plan for the corridor to meet expected growth as well as congestion at that time. The plan also identifies the need to develop and shape services that maximize future use of high occupancy vehicle (HOV) lanes in the corridor. Study recommendations focused on service improvements, highway interface improvements, park-and-ride improvements, and bus equipment and support facilities. High-level details for each of these components are as follows:

Service Improvements - Service improvements were developed within a corridor express bus service plan that calls for a total of eleven (11) bus routes focusing on three key regional transportation hubs - the El Cerrito del Norte BART Station (five routes), the Vallejo Ferry Terminal (four routes), and the Pleasant Hill BART Station (three routes). At the time of the study, eight routes were operating to these three hubs. The study calls for extension of some routes into areas distant from the freeway, and also several new routes. The study recommends these service improvements be implemented in three phases - by 2005, by 2010, and after 2015 - with the goal of addressing service weakness first, then maximizing new HOV facilities, and finally market growth.

Highway Interface Improvements - This set of strategies focuses on improving access to the planned HOV lanes on I-80 through Vallejo and I-80 from SR-12 West to Air Base Parkway. Direct HOV connector ramps were proposed to and from I-80 east to and from I-680 south. Access enhancements to the Fairfield Transportation Center are proposed including modifying traffic control at the eastbound I-80 off-ramp and Auto Mall Drive, widening the westbound approach lane on Oliver Road at the West Texas Street intersection at I-80, and signalizing the right-turn movement off the eastbound I-80 off-ramp.

Park-and-Ride Improvements - The study recommends improving several existing facilities, including capacity expansion at the Curtola Parkway Park-and-Ride lot, improvement of the I-80 Hiddenbrooke Parkway Park-and-Ride lot, expansion of the Fairfield Transportation Center facility, and development of 10 additional park-and-ride lots.

Bus Equipment and Support Facility Plans - The proposed service strategy would require 150 over a 30 year period from 2004 to 2030. These vehicles, in turn, would require expansions of several storage and maintenance facilities including the Vallejo transit garage. The study also calls for the relocation of the FAST garage to another location.

Estimated costs are summarized below:

[2] Wilbur Smith for STA, *I-80,I-680, I-80 Transit Corridor Study*, 2004

Cost Items	Cost	Assumptions / Notes
Bus O&M Cost and Subsidy Requirements	$19 million/ year (by 2030)	2003 O&M annual costs are at $4.6 million; includes new routes and increased service.
New Vehicles	$60 million	150 vehicles purchased over 30 year period
Maintenance Facility Expansion	$10 million	$125,000 per new vehicle
Transit Center and Park-and-Ride Access Improvements	$108 million	For three HOV connector ramps
	$1 million	For Fairfield Transportation Center access improvements
	$84 million	For Local access improvements
Transit Center and Park-and-Ride Improvements	$55 million	For near-, mid-, and long-term projects.
Source: I-80 / I-680 / I-780 Transit Corridor Study, Solano Transportation Authority, July 14, 2004.		

Table 10: Estimated Costs 2004

3.1.4 State Route 12 Corridor Transit Study (2006)

The State Route 12 Corridor Transit Study[3] developed service plan alternatives to address expected growth and congestion in the corridor between 2005 and 2030. During this time, Rio Vista is expected to grow more than 200% to about 23,000 residents, with Fairfield and Suisun experiencing 40% population growth. The study recommends three phases of transit service improvements:

Phase 1 - Limited mid-day commuter service between Suisun City Amtrak Station and the Napa VINE Transportation Center.

Phase 2 - Service between Suisun City Amtrak Station, Fairfield Transportation Center, and Rio Vista.

Phase 3 - Peak and off-peak period service between Rio Vista, Suisun City, Fairfield, and Napa.

The majority of this service would be between 5:00AM and 8:00PM, with more intense service in the peak commute hours. These service improvements seek to: (i) provide direct connections to major worksites and intermodal transfer locations during the peak and to connect other uses during the mid-day; and (ii) utilize current transit hubs such as the Fairfield Transportation Center and the Suisun Amtrak Station to maximize transfer opportunities. The study also recommended a revised fare structure.

Capital recommendations include the purchase or lease of three heavy-duty buses, improvements to shared bus stops and shelters, and three new bus stop locations.

[3] Urbitran Associates, for Solano Transportation Authority/Napa County Transportation Planning Agency, *State Route 12 Corridor Transit Study*, January 2006

3.1.5 Solano Express Intercity Ridership Study (2012)

This Solano Express Intercity Ridership Study[4] documented daily ridership (weekday, Saturday and Sunday) and surveyed ridership for socio-economic and other demographic information. The table below presents the daily and annual ridership.

		Boardings			
#	Route	Weekday	Saturday	Sunday	Estimated Annual
SolTrans 80	Vallejo to El Cerrito del Norte Station BART Station	1,728	773	448	504,000
FAST 90	Fairfield to El Cerrito the El Cerrito del Norte BART Station	953			243,000
SolTrans 85	Fairfield to Vallejo Ferry	633	158	129	176,000
SolTrans 78	Vallejo/Benicia to the Walnut Creek BART Station	455	119		122,000
FAST 30	Sacramento to Fairfield	286	13		74,000
FAST 20	Vacaville to Fairfield	213	84		59,000
FAST 40	Vacaville/Fairfield to the Walnut Creek BART Station	173			44,000
	TOTAL	4,441	1,185	299	1,222,000
Source: Quantum Market Research, Solano Express Intercity Ridership Study, 2012.					

Table 11: Solano Express Intercity Boardings by Route (2012)

Key findings are as follows:

- 70% of riders ride at least three days per week.
- More than half of the riders have one or no automobiles available.
- Ridership is highly peaked, and highly oriented from home to work. Reverse commute trips have few riders.
- Route 80 peak period trips operate every 15 minutes and are close to capacity (several trips have more than 50 passengers). Route 90 peak period trips carry somewhere in the range of 30-40 passengers. Route 30 from Sacramento exceeds 50 passengers on the afternoon peak trip.
- Of the Intercity routes, about 3,300 are traveling to BART stations (or about 75% of the total).

[4] Quantum Market Research, *Solano Express Intercity Ridership Study*, 2012

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3.1.6 Solano County Transit Consolidation Study

The Solano County Transit Consolidation Study[5] involved a multi-year effort to identify the best opportunities to streamline and simplify transit services in the County. The initial criteria for the outcomes included:

- Cost-effectiveness
- Efficient use of resources -equipment, facilities, and personnel
- Service efficiency
- Improved governance (and thus accountability to the public and community)
- Streamlined decision-making
- Ridership and productivity
- Service coordination
- Local community needs and priorities
- Protect local transit service
- Flexibility to meet local needs

In assessing the impact of consolidation on regional (intercity) transit service, the study noted the following advantages and disadvantages:

Potential Advantages	• Interregional coordination improvements • Direct oversight by board • Optimized interregional routing responsiveness • Dedicated TDA/STA funding through agreement • Suisun City and Solano County representation
Potential Disadvantages	• Unavailability of other revenue sources outside of transit • Resolution of consolidation issues such as fares, facilities, equipment, and contracts • No reduction in number of operators • No change in regional representation

By 2009, the consolidation effort had resulted in a multi-faceted recommendation for next steps, including:

- Consolidation of Benicia and Vallejo transit services.
- Decentralization of intercity paratransit service to local transit operators.
- Continued study of consolidation of interregional Solano transit services under one operator to be selected by the STA Board.

In 2011, SolTrans was created from the merger of Benicia Breeze and Vallejo Transit. Analysis continues on the other two study recommendations.

[5] DKS Associates, Solano Transportation Authority, *Solano Transit Consolidation Study*, 2007.

3.1.7 Solano County Safe Routes to Transit Plan

The Solano County Safe Routes to Transit Plan[6] considered improvements to transit facilities that are of regional significance. The plan considered passenger rail lines, and all passenger train stations, ferry terminals, bus stations providing service to destinations outside Solano County or between two or more cities in Solano County with peak hour headways of 1 hour or less, and highway interchanges that provide access to rail, bus stations and ferry terminals.

Among the recommendations of the study were:

Fairfield Transportation Center: New sidewalks, additional bicycle lanes and paths, additional automobile parking, and a new crossing of the canal to the south.

Suisun Capitol Corridor Amtrak Station: Improvements to bus circulation, additional automobile parking, streetscape and bicycle improvements and safety and security improvements.

Vacaville Transit Center: New sidewalks, intersection improvements, and bicycle lanes.

Vallejo Transit Center (Downtown): Intersection improvements, road diets and bicycle lanes (note – this is a new facility).

Vallejo Transportation Center (Curtola): Lighting and passenger amenities, additional automobile parking, bicycle lanes, intersection improvements and new sidewalks.

3.1.8 MTC Lifeline Transit Network Report

In 2001, MTC's Lifeline Transportation Network Report[7] identified transit needs in economically disadvantaged communities throughout the San Francisco Bay Area. The analysis identified a series of routes considered critical to meeting the needs of low-income communities because they:

- Provide direct service to a neighborhood with high concentration of CalWORKs households;
- Provide service directly to areas with high concentrations of essential destinations;
- Provide core trunkline service as identified by the transit operator; or
- Provide a key regional link.

The analysis found that within Solano County, the largest concentration of low-income persons in Solano County is in Vallejo. Vacaville, Fairfield, and Suisun City all have smaller concentrations of low-income persons. In each of the cities, all of which operate local city-based transit systems, low-income households are spread

[6] Fehr & Peers Associates, *Solano County Safe Routes to Transit Plan*, December 2011
[7] Metropolitan Transportation Commission, *Lifeline Transportation Network Report: 2001 Regional Transportation Plan for the San Francisco Bay Area*, December 2001.

widely throughout the city. This led MTC to identify most of the local bus routes operating in each city as Lifeline Transportation Network routes.

Spatial gaps were identified within the County. The analysis noted that Benicia Breeze, Fairfield/Suisun Transit, Vacaville City Coach, and Vallejo Transit provide far-reaching geographic coverage of the county including service to concentrations of low-income persons and concentrations of essential destinations. One exception is the Benicia Industrial Park, an area with a large number of employers, but no transit service.

Temporal gaps were also noted. Lack of Sunday service was a key finding. Only one route in the County operated on Sundays (and that was the Napa VINE Route 10). In addition, span-of-service concerns were noted, as most Lifeline Transportation Network routes in Vacaville, Fairfield, and Suisun City stop operations before 7:00PM on weekdays and before 6:00PM on Saturdays.

In terms of regional linkages, the report noted that the Benicia-Vallejo BART route provides a key regional link between Benicia and the Pleasant Hill BART station in Contra Costa County. Routes 80 and 90 serve as key regional links between cities in Solano County including Vacaville, Fairfield, Suisun City, and Vallejo, and the El Cerrito del Norte BART Station in Contra Costa County. Finally, Napa VINE Route 10 is a key regional link between Vallejo and Napa County.

3.1.9 Community-Based Transportation Plans

MTC's Lifeline Transportation Network Report identified transit needs in economically disadvantaged communities. The Environmental Justice Report for the 2001 RTP identified the need for MTC to support local planning efforts in low-income communities throughout the region. These identifications evolved into "Communities of Concern", which MTC describes as communities where 25% of households live at or below the poverty line. In response, MTC began funding Community Based Transportation Plans (CBTP). These plans use a collaborative process to identify transportation gaps, propose and prioritize strategies to address the gaps, and identify potential funding sources and project leads for implementation. This process enhances the low-income population directly affected by the transportation plan to guide the process.

STA has completed five CBTPs, including the Fairfield/Cordelia Project Area CBTP, the East Fairfield CBTP, the Dixon CBTP, the Vallejo CBTP and the Vacaville CBTP.

3.1.10 Cordelia Project Area CBTP (2008)

Cordelia, a neighborhood of Fairfield, was one of three Solano communities that MTC originally identified as a "Community of Concern." The study area[8] included Cordelia (southeast of I-80/I-680), and portions of Fairfield and Suisun City south of

[8] Valerie Brock Consulting, *Community-Based Transportation Plan for Cordelia/Fairfield/Suisun Project Area,* July 2008

Travis Boulevard and bounded by Chadbourne Road in the west and Sunset Avenue in the east.

As part of a public process, the following transportation gaps in the project area were identified (edited to focus on those relevant to regional trips):

- Low-income residents are unable to get to jobs and other destinations due to lack of service on Sundays.
- Low-income residents whose start or end work shifts outside of existing transit service hours (e.g. swing or night shift) have difficulties commuting.
- Low-income residents need help understanding and feeling comfortable using transit.
- Infrequent transit service leads to long wait times and expired transfers.
- The cost of transit is a hardship for the low-income population.

3.1.11 East Fairfield CBTP (2012)

In partnership with the MTC and the City of Fairfield, STA developed a CBTP for East Fairfield[9]. The Plan aimed to identify the transportation needs of residents of low-income neighborhoods of East Fairfield and to develop strategies to meet those needs.

While the East Fairfield CBTP did not specifically cite intercity needs, it noted that improved transit services would benefit East Fairfield residents. Furthermore, more direct and less circuitous and faster transit routings were desired by residents. The CBTP recommended that STA provide "mobility management" services to the area.

3.1.12 Dixon CBTP (2004)

The Dixon CBTP[10] identified several transportation gaps for Dixon (at the time, with a population of 16,000) and noted that given "the city's relatively small size, many major health and social service facilities are located some distance from Dixon, including Fairfield, Vacaville, Yolo County and the Sacramento area."

Accordingly, the CBTP suggested a mid-term improvement to Route 30, including the evaluation of the "potential for AM westbound stop at Dixon and other daytime stops currently omitted from I-80 express service…"

3.1.13 Vacaville CBTP (2010)

The Vacaville CBTP[11] covered the entire 90,000 resident city. A survey was conducted gauging transportation needs and patterns. Key findings include:

[9] Nelson Nygaard, *East Fairfield Community-Based Transportation Plan – Final Report*, 2012.
[10] DKS/IBI Group, *Community-Based Transportation Planning for Dixon*, 2004
[11] Nelson Nygaard, *Vacaville Community-Based Transportation Plan*, 2010.

- The most difficult destinations to reach are grocery stores, medical facilities, and jobs.
- The issue of most concern for those who rode the bus was the frequency of service (22%).

In a series of public meeting, transit concerns relevant to regional services included:

Transit Connections – Intra-county and inter-county service were noted to require multiple transfers. Specifically, travel from Vacaville to Vallejo requires a transfer in Fairfield. Some report missing welfare appointments and monthly reports in Fairfield due to lack of transportation options. (Note – the problems may lie with the transfer from the intercity service to the local service).

Span of Service – Area bus service stops at 6:00PM. This was stated to be a significant problem for youth programs, low-income youth and workers who get off the evening work shift. It was noted that the bus going to Fairfield stops at 4:30PM. It was also noted that students are discouraged from taking night classes at Solano Community College due to lack of bus service.

Recommended Transit Strategies included:

Tier 1

- Increase the span of service and operate evening service
- Increase the frequency of transit service

Tier 2

- Connect to other transit systems
- Reduce the number of transfers to travel outside Vacaville

3.1.14 Vallejo CBTP (2008)

In Vallejo[12], the CBTP outreach included an online survey among low-income college students, guided interviews, focus groups and stakeholder interviews. The following summarizes the regional transit needs identified in the community outreach process:

- Recent transit service cuts have significantly reduced the mobility of the low-income, transit dependent population in Vallejo.
- Low-income residents are unable to travel to jobs and other destinations due to limited transit service on Saturday and Sunday.
- The new Solano Community College campus in Vallejo is not conveniently served by transit, and parking is at capacity.
- The cost of transit is a hardship for the low-income population in Vallejo.

[12] Valerie Brock Consulting, *Community Based Transportation Plan for Vallejo*, 2008

In a second series of stakeholder meetings, the following improvements were identified (these relate to regional services):

- Improve transit route coverage, frequencies, and span of service throughout Vallejo.
- Provide more weekend Vallejo Transit service.
- Extend Vallejo Transit route coverage to Solano Community College-Vallejo.

3.1.15 Solano Transportation Study for Seniors and People with Disabilities 2011

In 2011, STA updated the Solano Transportation Study for Seniors and People with Disabilities[13] to address the mobility needs of senior and disabled population in the County, which includes a disproportionate number of people on fixed-incomes, in addition to disabled veterans and other traditionally disenfranchised groups.

The study found that while the current population of Solano County is about the same as the state (11% aged 65 and over), by 2035 the proportion of the County's population aged 65 and over is expected to almost double. Among this older population, the proportion of those with driver's licenses drops significantly as people age – in 2000 only 50% of men over 85 years of age in the County and 21% of women in this age group held driver's licenses, compared to 80% - 90% in the younger age cohorts.

Given the significant auto dependence in the largely low density areas of Solano County, these statistics indicate a substantial lack of mobility among the older population. This is also true of people with disabilities and others who are dependent on the transit network in the County.

The 2011 update found progress on recommendations from the 2004 study including:

Deployment of low-floor buses

Additional peak period service on Route 30

The 2011 Update included additional key recommendations related to regional transit service included:

Medium-Term Strategies

- Create 30 minute midday base service frequencies
- Improve span-of-service for transit services

Long-Term Strategies

- Increase Saturday service
- Establish Sunday transit and paratransit service

[13] Nelson Nygaard, Solano Transportation Authority, *Solano Transportation Study for Seniors and People with Disabilities*, September 2011.

3.1.16 Capitol Corridor (Rail) Business Plan

The Capitol Corridor Business Plan[14] identifies the history and near-term plans for the Capitol Corridor transit service. The Capitol Corridor Joint Powers Authority (JPA) and Amtrak provide intercity rail service in the I-80 and I-880 corridors, as well as inter-regional service. Trains operate from Auburn/Sacramento to San Jose/Gilroy/Morgan Hill via the Union Pacific Railroad (UPRR). There is one station in Solano County, located in downtown Suisun City. From 2006 to 2012, the Capitol Corridor has operated 32 weekday trains between Sacramento and Oakland (16 in each direction), with 14 of these trains continuing onto San Jose. Currently, 5,500 to 6,000 passengers use the train daily between Sacramento and San Jose.

The Business Plan proposes to reduce service by eliminating an early-morning train that currently operates primarily for positioning purposes. As a result, the service would provide 15 round trips, rather than 16. However, the Business Plan notes a high ridership growth historically. Service is anticipated to be stable for the horizon of the Business Plan.

A new station is planned in Solano County at the Vacaville-Fairfield border on Peabody Road at Vanden Road, near Travis AFB.

Station	County	Distance from Previous Station (Miles)
Oakland – Jack London Square	Alameda	0
Emeryville	Alameda	6
Berkeley	Alameda	1
Richmond	Contra Costa	6
Martinez	Contra Costa	20
Suisun City	Solano	17
Proposed Vacaville/Peabody Rd	*Solano*	*5*
Davis	Yolo	26
Sacramento	Sacramento	14
Source: Capitol Corridor Joint Powers Authority, *Capitol Corridor Intercity Passenger Rail Service Business Plan Update*, FY 2012-13, Final, March 2012		

Table 12: Capitol Corridor Stations Oakland – Sacramento

[14] Capitol Corridor Joint Powers Authority, *Capitol Corridor Intercity Passenger Rail Service Business Plan Update*, FY 2012-13, Final, March 2012

3.1.17 Water Emergency Transportation Authority (WETA) Transition Plan/Water Transit Authority Implementation and Operations Plan

In 1999, the State Legislature created the San Francisco Bay Area Water Transit Authority (WTA) to plan new and expanded environmentally friendly ferry service and related landside facilities. An Implementation and Operation Plan[15] (IOP) delivered four years later by the WTA identified seven new potential ferry routes, in addition to existing service from several East Bay cities to San Francisco, including Vallejo to San Francisco.

The IOP noted that the Vallejo service carried 2,500 weekday passengers on 22 trips. Vallejo service was projected to increase to 4,200 weekday passengers by 2025, with a farebox recovery of about 80%.

The Transition Plan mandated by SB 1093, which passed in 2008, renamed the agency Water Emergency Transit Authority (WETA). The Plan required that the transfer of the boats, terminals and other equipment and facilities to WETA be negotiated between the agency and those cities; that it be subject to public hearings and review; and that a transition plan laying out WETA's plans for operating and financing current and expanded ferry service be developed and adopted by the Board of Directors.

The Transition Plan was completed in 2009 and made the following observations on the Vallejo Ferry:

> Vallejo Baylink has the second largest ferry transit ridership in the Bay Area. Baylink patronage has increased over the past ten years from 613,080 passengers in FY 1998/99 to 743,480 passengers in FY 2007/08. Baylink ridership dropped almost 20% in the first half of FY 2008/09, likely due to the large fare increase instituted in June 2008 and overall travel reductions associated with the recession. Baylink's FY 2008/09 operating budget is $14.66 million, funded 47% with fares.

The Transition Plan assumed that service and costs for the Vallejo Ferry would continue to be stable for five years (currently there are 20 weekday trips between Vallejo and San Francisco) and fares would continue to provide about 45% of the operating budget. In addition, certain assets were to be transferred from the City of Vallejo to WETA, including vessels and maintenance facilities, while WETA would lease ferry terminals.

[15] Water Emergency Transportation Authority (WETA), *Final Transition Plan*, 2009.

3.1.18 Napa Highway 29 Gateway Corridor Improvement Plan [16]

Begun in 2012, the Napa County Transportation and Planning Agency is undertaking a process to develop a community-driven improvement strategy for the portion of California State Route 29 that runs between the City of Napa and the City of Vallejo via American Canyon and unincorporated Napa County. This route is one of the most significant transportation corridors in Napa County and serves as the main thoroughfare in American Canyon. The program of projects resulting from the study is intended to address congestion and operational issues along the SR29 corridor while also considering linkages to the Vallejo Transit Center/Ferry Terminal. The plan also incorporates input from the Sonoma Boulevard corridor (SR29) in the City of Vallejo. The plan was envisioned to consider all transportation modes in developing a long range "Vision" and "Implementation" program of projects, including auto, bus, truck, bike and pedestrian.

The "Vision" plan includes a number of general objectives and guiding principles including considering improvements to reduce vehicle congestion and delay, reducing motorists' need to use highway 29 by managing demand, and promoting convenient and reliable transit through improvements such as Bus Rapid Transit. The plan also considers the character of the highway in developing roadway improvements that would encourage the use of alternative modes, including portions of the highway that would be designated as "Parkway, "Boulevard," or "rural highway." The resultant "Draft Vision Plan" includes broad recommendations as well as specific projects to realize the objectives and principles. For example, it is recommended that NCTPA examine methods to speed bus service to and from the Vallejo Ferry and consider a park and ride transit node near the convergence of Highway 29 and 37 and at the Napa Airport.

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[16] Dyett & Bhatia/Fehr & Peers, *Highway 29 Gateway Corridor Improvement Plan Draft Emerging Vision*, Guiding Principles and Objectives, March 2013

4 Regional Planning Context and Best Practices

4.1 Plan Bay Area

MTC and ABAG recently approved the Bay Area's version of a state-mandated Sustainable Communities Strategy (SCS), branded as *Plan Bay Area*. As required by State law, the Strategy seeks to coordinate transportation investments with land use with the end goal of reducing greenhouse gas emissions. Plan Bay Area seeks to accommodate another 2.1 million residents and 1.1 million jobs by 2040 in the nine-county Bay Area, as consistent with regional forecasts. Just to meet the housing demand, the region needs to produce another 660,000 residential units over the next 30 years. Solano County is designated to accommodate 27,000 residential units over 30 years (about 4% of the Bay Area total) and about 47,500 new jobs (a bit more than 4% of the Bay Area total).

4.2 Regional Transportation Funding Process

MTC is the Bay Area's statutorily created regional transit and funding agency. MTC is also the federally designated Metropolitan Planning Organization for the region. Every three to four years MTC develops the Regional Transportation Plan (RTP) that outlines how transportation funds will be spent in the region. A project must be included in the RTP to be funded from regional, state or federal funds. SB 375 changed the relationship between the RTP process and land use plans and Plan Bay Area is the region's Sustainable Communities Strategy.

Plan Bay Area includes SB 375's three requirements:

- a land use component that identifies how the region could house the entire population of the region over the next eight and 25 years;
- a discussion of resource and farmland areas to be protected; and
- a demonstration of how the development pattern and the transportation network can work together to reduce GHG emissions.

Plan Bay Area coordinates the region's Regional Transportation Plan (RTP) with ABAG's preferred Land Use Strategy and the Regional Housing Need Allocation (RHNA).

To achieve state and regional policy goals, MTC and ABAG created Priority Development Areas (PDA) and Priority Conservation Areas (PCA). PDAs are identified by MTC/ABAG as locations where much of the region's new development occurs (about 80% of new housing and two-thirds of the new jobs are to be located in PDAs). PDAs are designed as primarily urban, mixed use areas that may include employment and that support the needs of residents and contribute to a pedestrian and-transit friendly environment. Local jurisdictions define the character of their PDAs according to existing conditions and future expectations as regional centers, city centers, suburban centers, transit town centers or rural centers, among other place types.

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In Solano County, PDAs are designated at the following locations:

- Vallejo Ferry Terminal
- Fairfield/W Texas Transportation Center
- Fairfield Downtown South/Jefferson-Texas
- Fairfield North Texas/Airbase Parkway
- Vacaville/Fairfield Train Station (Peabody Road)
- Suisun City Waterfront-Fairfield/Suisun Train Station
- Vacaville Davis/I-80
- Vacaville Allison Policy Plan Area

MTC is favoring grant and funding requests from projects located within PDAs and has also created PDA-specific funding categories.

4.3 Best Practices

The challenges that Solano County faces are significant but not unique. As an exurban/suburban county primarily dependent on automobile travel using a mature highway network, the Study considered best examples from other peer areas and best practices in freeway design and operation to inform this study and stimulate discussion among stakeholders and decision makers. Ultimately, this research and discussion inform the recommended service design and strategy.

Peer exurban/suburban counties that were investigated are located in metropolitan Seattle, the New York City metro area, as well as Denver and Houston. All of these areas have extensive suburban express bus systems and demographics similarities to Solano County.

The most recent freeway design research is encompassed in Transit Cooperative Research Program (TCRP) Report 145[17] which investigates new concepts for the Interstate system as it reaches the end of its useful life and begins to be rebuilt. The peer counties selected are outside the Bay Area and include the New York metro area, Los Angeles and Seattle.

4.3.1 TCRP Report 145 - Reinventing the Urban Interstate: A New Paradigm for Multimodal Corridors

TCRP Report 145, issued in 2011, considers the next evolution of the interstate highway system. Experts at UC Berkeley and Bay Area consulting firms participated extensively in this study. Report 145's objectives were to: (i) evaluate the ability to develop multimodal transportation facilities through the evolution and rehabilitation of the limited access highway system, especially in urban; and (ii) develop strategies to plan and implement these facilities. The concept allows freeway corridors to be

[17] Transit Cooperative Research Program, *Reinventing the Urban Interstate: A New Paradigm for Multimodal Corridors, TCRP Report 145*, 2011

better used, if the facilities offered passenger mobility by multiple modes and were better integrated into communities.

The report suggests building transit lines and providing supporting pedestrian and bicycle facilities within these freeway corridors with the following goals:

- Enhancing corridor transportation capacity and performance without adding freeway capacity, by building and operating transit lines (including bus rapid transit, light rail, heavy rail, and commuter rail);
- Building and operating successful transit systems in multimodal corridors that attract high transit ridership and encourage livability and environmental sustainability; and
- Transforming a corridor's land uses and activities to a more transit-oriented pattern.

These "new paradigm" multimodal corridors would take one of three forms:

- Transit-oriented multimodal corridors, which are designed to give transit a performance advantage in serving short- and medium-length trips, while the freeway is given a performance advantage for serving long-haul corridor trips.
- Park-and-ride access multimodal corridors, which are designed to provide high levels of automobile access within, and high transit speeds through, less developed and more auto oriented portions of a corridor.
- Transit-optimized/freeway-constrained multimodal corridors, which are designed to give transit a performance advantage in the corridor by constraining the capacity and performance of the freeway.

Design is a key consideration and transit, especially attractive architectural and functional design for access. These issues are given a full chapter in the report. According to the report, key design considerations are:

- Identifying separate travel markets – The "new paradigm" recommends segmenting the market in the freeway corridor among different modes. As an example, a freeway with many entrances/exits should have an overlapping transit service that provides an express function (a local example is Highway 24 between Orinda and Walnut Creek, which has six on/off ramps and only three BART stations). Factors involved in this service and physical design include a transit-receptive travel market, clustered destinations and employment centers, a favorable jobs/housing distribution, and corridor-wide parking pricing and supply management.
- Redevelopment of station areas – The identified transit station areas are designed to promote transit and non-motorized access modes. Planning and design concepts such as transit-oriented land use planning and urban design, coordinated transit and freeway access designs, and non-motorized station access tools are employed.

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TCRP Report 145 describes how transit station space could work in a multimodal approach to freeway corridors:

Transit Oriented Corridor Qualities	Park-and-Ride Access Corridor Qualities	Transit-Optimized / Freeway Constrained Corridor Qualities
Either adjacent or offset from freeway stations	Either in-median or adjacent stations	Upstream (non-CBD) side of freeway bottleneck: stations either adjacent or in median
		Downstream (CBD) side of freeway bottleneck: stations either adjacent or offset
Source: Transit Cooperative Research Program, Reinventing the Urban Interstate: A New Paradigm for Multimodal Corridors, TCRP Report 145, 2011		

Table 13: Station Location New Paradigm Characteristics

Transit Oriented Corridor Qualities	Park-and-Ride Access Corridor Qualities	Transit-Optimized / Freeway Constrained Corridor Qualities
Short station spacings	Long station spacings	Upstream (non-CBD) side of freeway bottleneck: Supplementary or complementary coordination
High density of stations for maximum corridor area coverage	Low density of stations for maximum transit speeds	Low density of stations for maximum transit speeds
Short station spacings combined with long interchange spacings (transit-oriented complementary coordination)	Long station spacings combined with short interchange spacings (automobile-oriented complementary coordination)	Long station spacings Downstream (CBD) side of freeway bottleneck Short station spacings High density of stations for maximum corridor area coverage Short station spacings combined with long interchange spacings (transit-oriented complementary coordination
Source: Transit Cooperative Research Program, Reinventing the Urban Interstate: A New Paradigm for Multimodal Corridors, TCRP Report 145, 2011		

Table 14: Station Spacing New Paradigm Characteristics

A basic concept included in the study is to keep the transit vehicles moving fast by keeping them on the freeway corridor and reducing or eliminating on and off ramps, and also using HOV and express lanes to the maximum extent. Station locations (on-line, meaning within the freeway corridor) are recommended to be flexible and could be in the median (not optimal) or along the side of the freeway. This pattern speeds up the bus, allows suburb to suburb travel, creates a simple and easily understandable system, allows for increases in service frequency and provides the opportunity to create a transit branding and recognition at important suburban locations.

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4.3.2 Best Practice in Counties Similar to Solano

Counties have been selected for comparison with Solano because:

- Suburban/exurban land uses predominate;
- Extensive freeway facilities exist, with minimal fixed guideway transit infrastructure;
- Express bus operations are robust;
- The metro area has a vibrant central city business district; and
- The county is distant from that central city.

4.3.2.1 Seattle Metropolitan Area, Washington

Seattle's suburban bus operations are guided by Sound Transit – the regional agency that contracts for all services – as well as suburban transit operators who operate the service both under Sound Transit contract and as a directly managed service. Snohomish County is the closest peer county to Solano and was selected for study.

Regional Bus System Policy

Sound Transit is the regional transit operator in Metro Seattle, and covers three counties on the east side of Puget Sound (King, where Seattle is located; Pierce, whose largest city is Tacoma; and Snohomish, where Everett is located) . While King County is urban, much of Snohomish and Pierce are suburban and exurban.

The Sound Transit 2005 Regional Transit Long-Range Plan provides for an expansive BRT system that encompasses not only urban arterials but also freeways and dedicated busways[18]. The Regional Long Range Plan notes that:

> Sound Transit's BRT services differ by their operating environment and level of priority over other traffic. Arterial BRT operates predominantly along arterials with priority provided by semi exclusive lanes and/or signal priority. HOV BRT operates predominately along limited access freeways on semi-exclusive high-occupancy vehicle (HOV) lanes and access facilities. Busway BRT operates predominantly on fully exclusive transitways with priority over other traffic at intersections. Rail-convertible BRT operates like busway BRT, but on transitway facilities that are constructed to be converted later to rail. Sound Transit BRT routes may operate through corridors that feature varying levels of priority treatment.

All BRT services that Sound Transit provides share these attributes:

1. Provide limited-stop service;
2. Connect to at least one designated urban center in the Puget Sound Regional Council's adopted regional growth management and transportation strategy;
3. Operate with priority over general purpose traffic over much of the route length;
4. Operate frequently throughout the day;
5. Operate in both directions throughout the day; and
6. Provide for regional, long-distance trips.

In addition, supporting technologies and enhancements to increase customer convenience and accessibility, such as rapid or off-vehicle fare collection, low-floor buses, raised curbs and level platforms, and real-time schedule and arrival information, may be offered.

BRT routes would serve and connect major regional centers and destinations and be integrated with other local and regional transit services. The BRT system creates new

[18] Sound Transit, *Regional Transit Long-Range Plan* Page, July 2005

links between suburban centers serving our region's fastest growing areas with fast, efficient transportation options.

BRT could be operated in a variety of rights-of-way to provide fast and reliable service at the lowest cost, appropriate to transit demand and corridor conditions, including (*edited*):

- **Busway BRT**. Busways are dedicated roadways for transit only, providing complete separation from traffic and priority over other traffic at intersections. Busway BRT routes would offer high-speed, frequent two-way service throughout the day in the region's most congested corridors, operating in rights-of-way that are protected from general-purpose traffic congestion. These services would be characterized by infrequent stops and stations that have customer amenities similar to rail systems. Where practical, busways should be built to accommodate future conversion to light rail transit.
- **HOV BRT**. Sound Transit may operate BRT in HOV lanes managed to maintain fast and reliable travel times needed for bus rapid transit. The HOV BRT system would be developed through a partnership between Sound Transit and WSDOT to complete the State's Core HOV network and adapt it to meet the needs of high capacity transit service. Direct access ramps, in-line stations and access facilities would allow buses to use HOV lanes and make intermediate stops without crossing traffic lanes, benefiting both transit and general purpose traffic. HOV BRT services could also include customer convenience features and amenities as well as transit priority measures. The reliability of HOV BRT services would depend in large part on the development of a continuous HOV lane network and on effective management of the HOV lane system by WSDOT to meet adopted HOV speed and reliability policies.

Community Transit (Snohomish County) Case Study

Community Transit, the public transit operator in Snohomish County, Washington (the county north of King County/Seattle and within the Sound Transit jurisdiction) operates a well-used regional transit service that links the county to downtown Seattle and the University of Washington, just north of Seattle (some service is provided under contract to the Sound Transit). Community Transit's Draft Transit Development Plan 2012-2017 and the Long Range Transit Plan note the following:

- Transit service area population is about 520,000;
- Interstate 5 Express Bus ridership exceeds 23,000 daily weekday trips; and
- Commute Services (including I-5) use 124 buses and operate about 110,000 annual vehicle hours.

The Long Range Transit Plan notes that in "1994 there were 10,000 boardings per day on Community Transit's King County commuter services. At that time, there were 4,000 parking spaces available at park & rides in Snohomish County. By 2008, combined Community Transit and Sound Transit ridership for this market had increased 130% to 23,000 boardings per day. For the same period, Snohomish County park & ride capacity increased 75% from 4,000 to 7,000 spaces."

A key component of successful freeway-oriented transit service is a unified "look and feel" of the service, achieved through efficient freeway in-line stops and a dedicated express bus fleet. The Long Range Plan notes that Freeway Flyer Stops (on-line stops) provide "fast, efficient, direct access for pedestrians to board freeway-based bus service without requiring the bus to leave the freeway corridor. Good examples include the South Everett Freeway Station at 112th St and I-5 (median station) and the freeway station at 145th and I-5 in north Seattle (right lanes)."

Figure 3: Community Transit Double Deck Bus at Freeway Station

The look and feel extends to the vehicles. Community Transit uses a fleet of 23 double deckers (branded "Double Talls") to provide I-5 HOV BRT service on more than 60 weekday trips. The double decker buses are low-floor, 42 feet long and 14 feet tall. They seat 77 passengers – 49 upstairs, 28 downstairs – plus have designated standing room. The total cost was $19 million, or about $830,000 per bus.

4.3.2.2 Rockland County, New York

Rockland County is a suburban/exurban county in the New York-New Jersey Metro Area located on the west side of the Hudson River. Distance to midtown Manhattan is about 32 miles. The county's total population is about 300,000, and those residents are spread across five towns and 19 incorporated villages. Residential density is 1,800 people per square mile. The most populated "place" has about 33,000 residents.

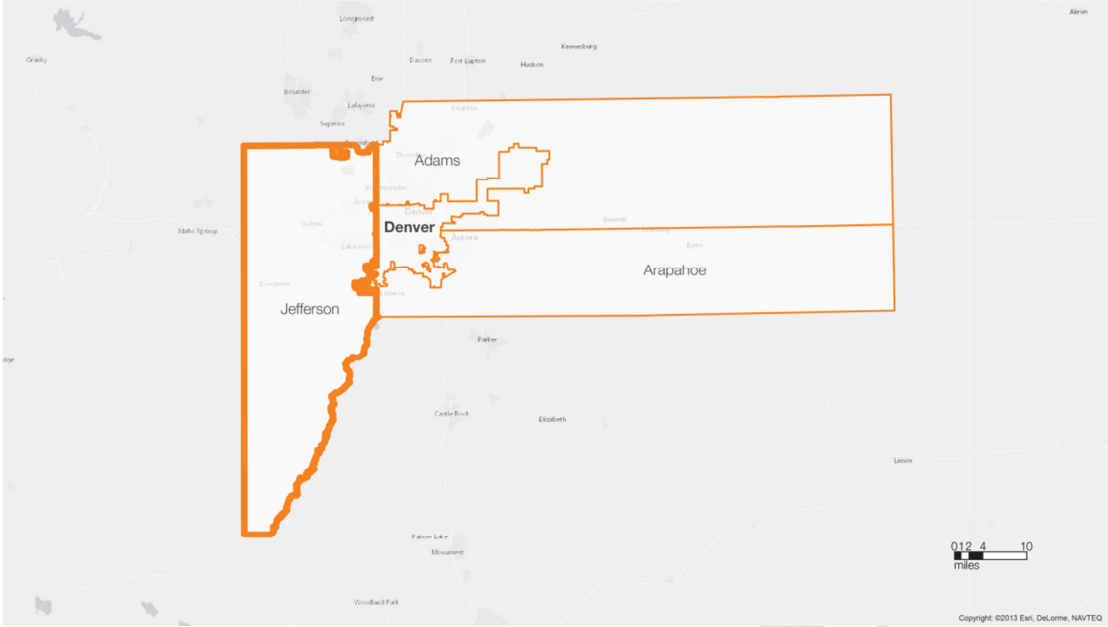
Of the county's 300,000 residents, about 17,000 commute into Manhattan daily. Due to the poor transit connections in Rockland, more than 50 percent drive to Manhattan. Another 12,000 people commute to Westchester County, on the east side of the Hudson, and almost all of these people drive.

The bridge connecting Rockland with Westchester (and into Manhattan) has reached the end of its useful life. As part of the process to build a replace the bridge, transit – either rail or bus – was studied. The principle rationales were quality-of-life and economic development. Many of the region's high paying jobs are in Manhattan, and the auto connections into midtown are slow, congestion and expensive. Auto travel times range from 50 minutes to 90 minutes, and tolls are up to $13 per trip. Transit is often slow, with the most direct commuter rail route takes about 90 minutes.

Elected officials in Rockland County perceive better transit connections to be vital to increasing wealth in the county. They believe that if Rockland County residents could travel to Manhattan faster and with less disruption, more people would be willing to live in Rockland and work in Manhattan, increase wealth in the county. The current average per capita income in Rockland County is $33,200, while Westchester County (with direct train service into Manhattan that takes less than 45 minutes) has an average income of about $45,500 and Manhattan residents have an average income of $56,500.

This desire to provide additional transit service is continuing during the final design of the new bridge.

4.3.2.3 Jefferson County, Colorado

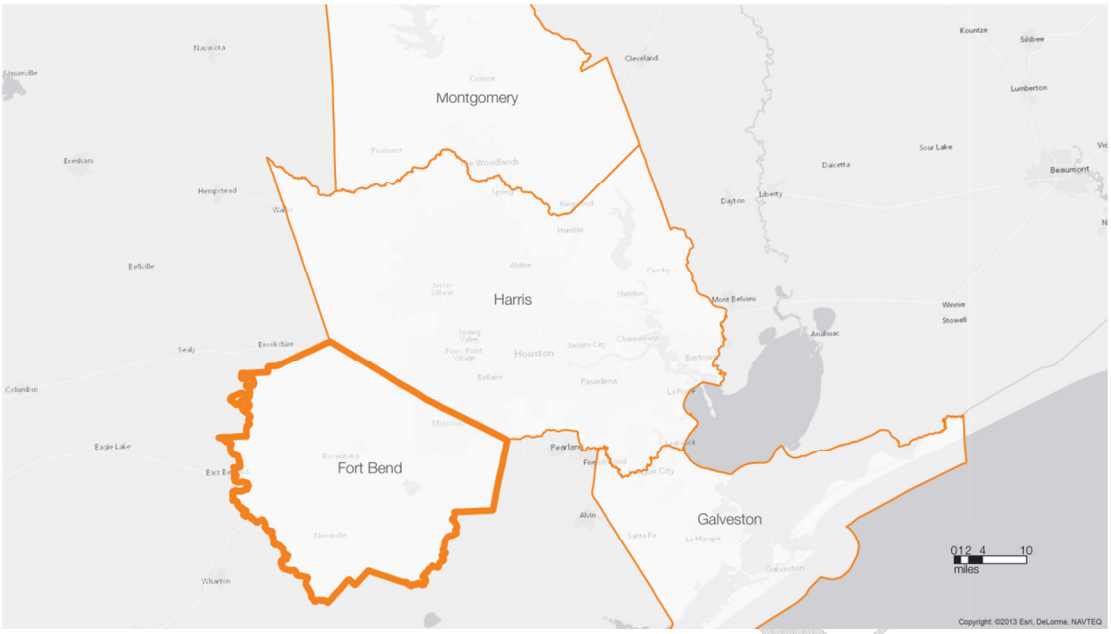


Jefferson County, Colorado is a suburban county about 10-15 miles west of Denver. The county is relatively low density and suburban, with about 550,000 residents. The county is fairly wealthy, with about half the poverty level of Denver and a median household income of about $64,000.

Residents primarily drive (about 79% percent drive alone rates) and Interstate 70 is the main transportation artery through the county. However, the local transit agency (the Regional Transportation District) recently initiated light rail service between downtown Denver 12 miles into Jefferson County, with frequent service and an end-to-end travel time of about 40 minutes; about 16,000 weekday passengers use the LRT route. In addition, six express bus routes directly connect into downtown Denver's remodeled Union Station, and serve about 5,000 passengers daily.

Besides the new light rail service, RTD manages six other park and ride lots in the county with about 1,500 total spaces.

4.3.2.4 Fort Bend County, Texas



Fort Bend County is a suburban county located about 25 to 30 miles from downtown Houston. The county population is about 650,000, and the area is fairly wealthy, with a low poverty rate and a median household income of about $84,000. About half the population is African American or Hispanic.

As in other suburban counties, residents primarily drive to work (82% drive alone rates) and US 59-Southwest Freeway is the main link to Houston and other Texas cities. As in other suburban areas, however, the local transit agency has some success in developing service. The Southwest Freeway has full HOV (buffered) HOV lanes directly into Houston; in Fort Bend County the HOV are bi-directional. However as the freeway approaches Houston, the HOV lane is a single, reversible lane (and the system converts to HOT operation).

As a result of the HOV facilities, bus travel times are competitive with automobiles and the county operates three express bus routes with a fleet of 16 buses from three county park and ride lots to three destinations in Houston: Texas Medical Center, Galleria and Greenway Plaza. About 1,000 daily passengers use the service and travel about 20 miles from home to work.

4.3.2.5 Metro ExpressLanes/Metro Silver Line, Los Angeles

Although Los Angeles County is not comparable to Solano in the same way as Snohomish, Rockland, Jefferson, or Fort Bend Counties, its bus express lanes on freeways demonstrate the effectiveness of high-speed, high-capacity, in-line bus stops on major roads.

As part of initial implementation of high occupancy toll lanes in Los Angeles County (also known as ExpressLanes), the local transit operator/congestion management agency/sales tax authority – LA Metro – developed a comprehensive highway and transit corridor plan for the initial ExpressLane segments on the Harbor and San Bernardino Freeways.[19]

Overall Program

The agency notes that Metro ExpressLanes is a pilot, one-year demonstration program overseen by Metro, Caltrans and several other mobility partners to improve traffic flow and provide enhanced travel options on the I-10 and I-110 Freeways in Los Angeles County. The program includes the: (i) introduction of congestion pricing by converting High Occupancy Vehicle (HOV) lanes to High Occupancy Toll (HOT) lanes; (ii) improvement of transit service (the Silver Line) and other alternatives to driving; and (iii) update of transit facilities; and (iv) improvement of parking in downtown Los Angeles. Metro ExpressLanes are primarily funded with a $210 million congestion reduction demonstration grant from the U.S. Department of Transportation. Tolling began on November 10, 2012 on the Harbor Freeway (I-110) and will extend to I-10 in early 2013.

Metro ExpressLanes features include:

- Conversion of the I-10 El Monte Busway HOV lanes (I-605 to Alameda St) to HOT lanes
- Conversion of the I-110 Harbor Transitway HOV lanes (Harbor Gateway Transit Center (formerly Artesia Transit Center) to Adams Blvd.) to HOT lanes
- Metrolink Pomona Station Expansion
- Transit Signal Priority Expanded in Downtown LA
- New expansion bicycle lockers at the Harbor Gateway Transit Center (formerly Artesia Transit Center) & bicycle station at El Monte Station
- LA Express Park

[19] http://www.metro.net/projects/expresslanes/, accessed December 5, 2012

Silver Line

Figure 4: Silver Line On-Line Station

The Metro Silver Line[20] began service in December 2009, connecting the South Bay and San Gabriel Valley to Downtown Los Angeles. The new Silver Line combines several separate routes with uncoordinated schedules into a single, direct, through-service spanning about 30 miles with better service frequencies and a 21 hour span-of-service. Silver Line buses run every 5 to 10 minutes in the peak and every 15 minutes midday between the Artesia Transit Center and the El Monte Station via the Harbor Transitway on the Harbor Freeway and the El Monte Busway on the San Bernardino Freeway.

Service features in-line, on-line stations along the Harbor Freeway at Artesia, Rosecrans, Harbor-Century-Green Line, Manchester, Slauson, 37th/USC and in-line, off-line stations at USC/County Medical Center, Cal State LA, and El Monte.

The on-line stations at USC/County Medical Center, Cal State LA, and El Monte have been among the system's most successful, with high ridership and activity. These stations have a physical presence and are generally open, accessible and directly connected to major activity centers. On the other hand, the stations that were built on I-105 are in the freeway median and are usually accessed from under the freeway, creating a less welcoming entrance. As a result, ridership at these stations is somewhat limited.

Silver Line improvements include:

- Improved transit stations at Artesia, 37th St/USC, Slauson, Manchester and Rosecrans
- 41 CNG (Compressed Natural Gas) – powered 45-foot buses for the Silver Line.
- Transit signal priority in Los Angeles.
- El Monte Station Expansion including new and improved passenger amenities and wayfinding, more bus berths, and a bike station.

[20] http://www.metro.net/projects/silverline/enhancements/, accessed December 5, 2012

Scheduled for 2014: Metro Silver Line will connect to Union Station's Patsaouras Transit Plaza in Downtown Los Angeles via an island stop on the El Monte Busway.

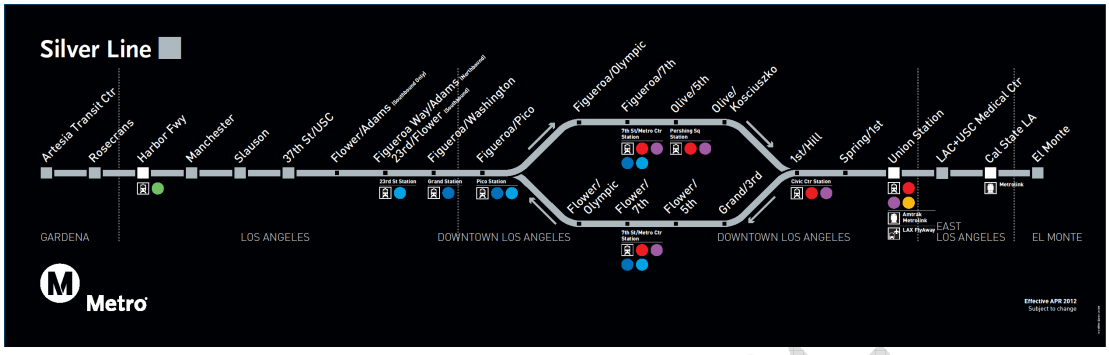


Figure 5: Silver Line Schematic

4.3.3 Common and Emerging Practices Among Peer Counties

The four peer counties identified – Snohomish in Washington, Rockland in New York, Jefferson in Colorado and Fort Bend in Houston – along with the experience in Los Angeles, suggest the following best practices:

- All day use of HOV/HOT lanes with frequent transit service (Snohomish, Rockland, Los Angeles)
- All day use of park and ride facilities and transit centers (Snohomish, Rockland, and Los Angeles)
- Operation of bus services in a rail-like service pattern, with the ability to compete for trips suburb-to-suburb and not just suburb-to-CBD (Seattle, Rockland, Los Angeles)
- Connections to activity centers directly (Rockland, Los Angeles).

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5 Market Assessment and Travel Market Forecasts

5.1 Existing Travel Patterns, Solano County

The vast majority of Solano County travel is local – the Solano-Napa travel model identifies about one million intra-Solano trips, of which about two-thirds are purely local – starting and ending in the same city. However, there are still about 224,000 Solano city-to-city trips, plus more than 150,000 daily trips out of the county.

Solano to:	Total Daily Trips 2012	Percent Share
Internal, within Solano cities	670,000	63%
Intra-Solano, non-local	224,000	21%
Sacramento	39,200	4%
Contra Costa	57,500	5%
Alameda	24,600	2%
Napa	25,600	2%
San Francisco	17,900	2%

Table 15: Existing Trip Patterns

5.2 Solano County Demographic Comparisons

As part of the research for this study, Solano County demographics were identified and documented. In general, the county is slightly younger and has lower per capita income than other Bay Area counties, but both metrics are about the same as the state average. Median household income is higher than the state median household, but state median house cost is higher than in Solano County.

Four peer areas were considered for comparison to Solano County—Snohomish County in Washington, Rockland County in New York, Jefferson County in Colorado and Fort Bend County in Texas. These areas were chosen because they exhibit suburban/exurban land uses, have extensive freeway facilities and little fixed guideway transit infrastructure, have a vibrant central city business district and are distant from that central city. Other local jurisdictions in the Bay Area do not exhibit similar features (too far from San Francisco or too different in population) while other California examples are limited in use because they are within one jurisdiction (one county or city) making comparisons difficult.

Note the comparisons in Table 16.

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County	Land Use Density/pop per sq mi	Population	Center City Employment	Distance from Center City (mi)	CBD
Solano	460	413,000	350,000	44	San Francisco
Snohomish	290	713,000	200,000	29	Seattle
Rockland	1,790	312,000	1,900,000	32	Manhattan
Jefferson	700	550,000	441,000	15	Denver
Fort Bend	690	650,000	2,000,000	30	Houston

Table 16: Comparison to Solano County

Note that Snohomish's density is concentrated in the western one-third of the county, so the effective density in the transit catchment area is much greater. Center City employment for Manhattan is quite large, reflecting the entire 3 mile length of the island.

The following graphics characterize the differences between Solano County and other suburban counties in New York (Rockland County) and Washington State (Snohomish County). As an introduction, Solano average per person income is compared internally to other Bay Area Counties:

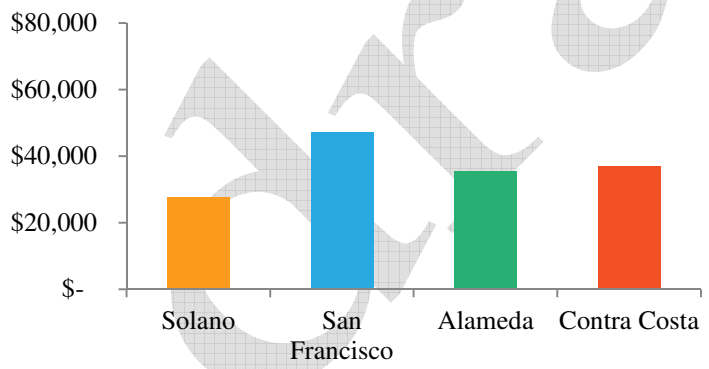

Figure 6: Average Per Person Incomes – San Francisco Bay Area

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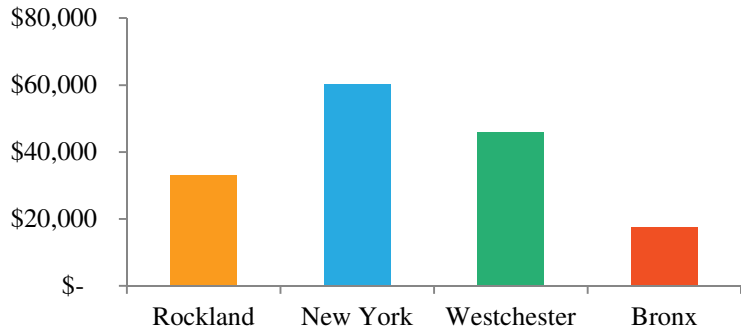

Figure 7: Average Per Person Income – New York Metro Area

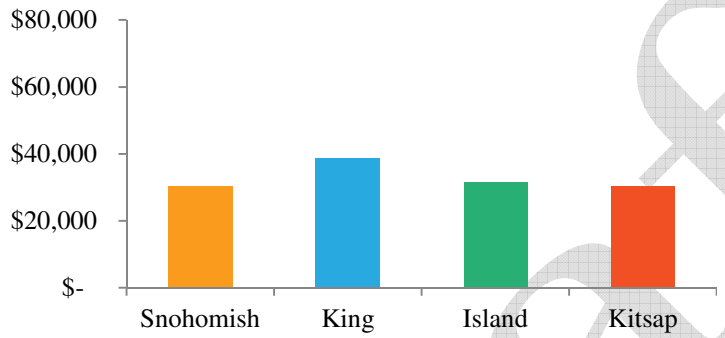

Figure 8: Average Per Person Income – Seattle Metro

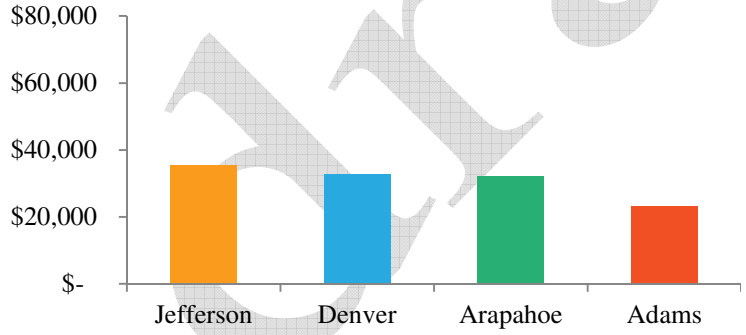

Figure 9: Average Per Person Income –Denver Metro

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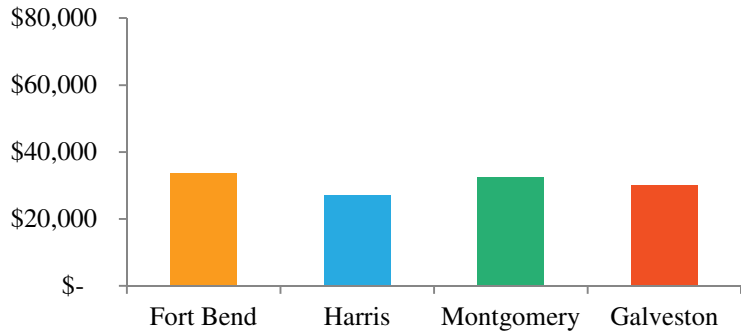

Figure 10: Average Per Person Income –Houston Metro

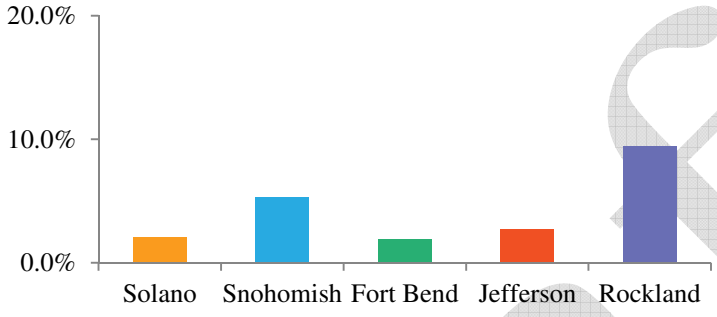

Figure 11: Mode Share for Public Transit

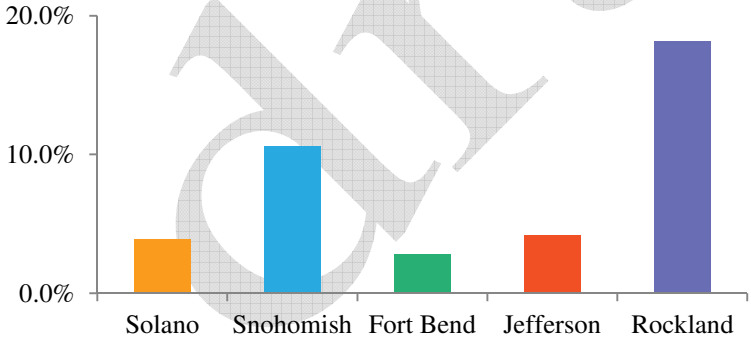

Figure 12: Mode Share for Public Transit for Regional Trips

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Suburban County	CBD County	Adjacent Inner Suburban County
Snohomish	78% (King County)	N/A
Rockland	59% (New York County)	73% (Westchester)
Jefferson	110% (Denver)	N/A
Fort Bend	123% (Houston)	N/A
Solano	*61% (SF)*	*77% (Contra Costa)*

Table 17: Comparison of Incomes to Adjacent Counties

5.3 Future Travel Patterns, Solano County

Based on the land use and demographic forecasts in Plan Bay Area, Solano County AM peak period "intercity" trips are projected to as follows:

Market	2030 AM Peak Period Trips	Growth 2010-2030
Solano to San Francisco	6,400	13%
Solano to I-80 Corridor (including Oakland)	17,000	19%
Solano to I-680 Corridor (including Central Contra Costa)	20,000	20%
Solano to Davis/Sacramento	11,000	-1%
Intra-county (Non-Local)	89,000	40%
Source: Solano-Napa Travel Model, 2012.		

Table 18: Projected Solano County Regional Trips 2010 to 2030

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6 Service Design—Goals and Performance Metrics

6.1 Overview

The Solano Intercity Transit Funding Agreement outlined basic service design criteria as well as identifying the need for performance metrics for Solano Express services.

As the Study evolved, the STA developed a Vision Statement to guide the development of goals, objectives and metrics. The Vision stated:

Vision

Solano Express is a regional express bus transportation service that is fast, comfortable, safe, reliable and frequent, delivered through a partnership by Solano's transit operators and STA at costs that are affordable to the residents of Solano.

This Vision, along with previously adopted Intercity Funding Agreement criteria, form the basis of the proposed Goals and Performance metrics. In addition, existing MTC Regional Express Bus performance metrics, as well as metrics that were studied in the MTC Transit Sustainability Project, also informed the proposed goals. Finally, the Study team endeavored to recognize best practices from other areas in the development of these goals, objectives and performance metrics.

6.1.1 Solano Intercity Transit Funding Agreement

The Agreement that funds the seven intercity routes includes service design and performance metrics to guide the delivery and evaluation of these services. As part of the Agreement, the parties established performance measures but left the establishment of benchmarks to this study.

The Intercity Agreement identifies the following criteria:

- Service Productivity Measures
  - Passengers per vehicle revenue hour (VRH)
  - Passengers per trip
  - Passengers per vehicle revenue mile (VRM)
- Cost Efficiency Measures
  - Cost per vehicle revenue hour (VRH)
  - Cost per vehicle revenue mile (VRM)
- Cost Effectiveness Measures
  - Cost per passenger trip
  - Farebox recovery ratio

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- Policy/Coverage Requirements
  - Provides connectivity between cities
  - Provides regional transit connections
  - Meets unmet transit needs
  - Minimize stops in each city
  - Is user friendly

6.1.2 MTC Regional Express Bus Performance Measures

MTC has established performance standards for the Regional Express Bus (REB) program. Those measures and standards are shown below:

Measure	Standard
Farebox recovery	Peak Service: 30% All Day Service: 20%
Change in passengers per revenue vehicle hour	0-3 years in operation: Positive change in passenger ridership 3-5 years in operation: 3-year averages calculated and compared Positive change between each 3-year cycle

Table 19: Regional Express Bus Performance Measures

6.1.3 MTC Transit Sustainability Project Goals and Criteria

Through the Metropolitan Transportation Commission (MTC)'s Transit Sustainability Project (TSP), a regional planning effort, goals, objectives, measures and design standards and performance norms were developed to inform regional transit service concept development for the San Francisco Bay Area counties. The TSP considered a number of goals, objectives, measures and standards/norms for regional bus services operating in the region's primary transit corridors. Examples include:

- **Goals and Objectives:**
  - Operate high quality, high frequency transit service in regional corridors
  - Create a regional transit network that achieves regional coordination and seamless connections
  - In multimodal corridors and facilities, prioritize transit access and speed
  - Achieve high cost effectiveness through operating efficiencies and high ridership

- **Measures and Standards:**
  - Regional All Day (RAD) Service:

    Examples: SolTrans routes 78, 80 and 85; FAST routes 20, 30 and 90

    Service Design Standards
    Minimum service frequency: 15 minutes peak weekdays
    Minimum service frequency: 30 minutes base weekdays
    Span-of-service: 24/7 LOS A (within corridor, mode flexible at night)
    Minimum operating speed: 21 mph is current norm
    Minimum reliability: 94% on time
    Travel time vs. auto: No more than 15 minutes longer

    Service Performance Measures
    Farebox recovery: 50% is current norm
    Productivity: 85% peak load factor and 35% overall capacity utilization

  - Regional Commute Only Service:

    Examples: FAST route 40

    Service Design Standards
    Minimum service frequency: 15 minutes weekdays
    Minimum span-of-service: Weekdays peak period only
    Minimum operating speed: 30 mph
    Minimum reliability: 94% on time
    Travel time vs. auto: No more than 15 minutes longer

    Service Performance Measures
    Farebox recovery: 50% is the current norm
    Productivity: 85% peak load factor and 35% overall capacity utilization

The goals, objectives, measures and standards outlined in the REB and TSP effort provide a regional context for reviewing the goals, objectives, measures and standards appropriate for the transit providers of regional services in Solano County.

6.1.4 Examples from Other Operators

As part of the Transit Corridor Study, a peer group of transit operators were studied to establish benchmarks related to effectiveness and efficiency. In total seven bus operators were reviewed, along with BART. All of these operators provide service in suburban areas into either a central city business district or to a subway rail station that connects into the CBD (in some cases both). Table 20 lists the finding

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Measures	Rockland City, NY Tappan Zee	Rockland City, NY NYC Private Bus	Go Transit Bus Toronto	Sound Transit	Snohomish Transit	Academy Lines NJ	Loudon County VA	BART	Median (not including BART)
Service Design Requirements									
Connects Solano County cities	N	N	Y	Y	Y	N	N	Y	Y
Connects to regional transit	Y	Y	Y	Y	Y	Y	Y	Y	Y
Meets unmet transit needs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Y	N/A
User friendly	Peak Yes	Peak Yes	Peak Yes	Peak Yes	Peak Yes	Peak Yes	Peak Yes	Yes	Peak Yes
Speed (mph average)	17	22.5		21.0	24.0	25.0	33.9	36	24
Service Productivity									
Passengers per vehicle revenue hour	20	10.0		26	38	13	26	63	26
Passengers per trip (weekdays)	N/A	N/A	34	30					30
Passengers per vehicle revenue mile	1.15	0.45	0.75	1.25	1.56	0.51	0.77	1.75	1.25
Peak corridor demand (hourly demand/capacity)									
Capacity utilization (passengers miles/seat miles)	37%	26%		38%	60%	60%	49%	33%	49%
Cost Efficiency									
Cost per vehicle revenue hour	$129	$164.31	*	$171.55	274.73**	$101.73	$186.35	$253.79	$171.55
Cost per vehicle revenue mile	$7.63	$7.30	$5.81	$8.16	$11.43	$4.06	$5.50	7.11	$7.30
Cost per revenue seat mile	$0.139	$0.133	$0.106	$0.163	$0.23	$0.81	$0.11	$0.105	$0.139
Cost Effectiveness									
Subsidy per passenger trip	$5.15	$4.42	N/A	$4.76	$3.96	$0.84	$1.46	$0.97	$4.42
Revenue per revenue seat mile	$0.027	$0.097	N/A	$0.044	$0.105	$0.073	$0.088	$0.08	$0.088
Farebox recovery ratio	19.4%	72.9%	N/A	27.1%	45.9%	89.5%	80%	76%	72.9%

Beat Median Near Median Beyond Median

*Hours not reported; fare combined with rail.
** High hourly cost due to deadheading.

Table 20: Transit Corridor Study Peer Group Transit Operators

6.2 Recommended Goals, Objectives and Benchmarks

Pursuant to the Intercity Transit Funding Agreement, the study team provided background and engaged in discussions with the Consortium to identify, review, consider and ultimately develop performance measures as identified in the Intercity Transit Funding Agreement. The following SolanoExpress service and performance benchmarks were recommended by the Consortium on August 27, 2013 and approved by the STA Board on September 11, 2013. These metrics include both the Intercity Transit Funding Agreement criteria, and additional metrics suggested in the MTC TSP:

Benchmark	Standard
Service Design Requirements	
Connects Solano County cities	Yes
Connects to regional transit	Yes
Meets unmet transit needs	Yes
User friendly	15 minutes frequency peak/ 94% on time/reliability
Speed (mph average)	35
Service Productivity Benchmarks	
Passengers per vehicle revenue hour	25.0
Passengers per trip	15.0
Passengers per vehicle revenue mile	1.0
Peak corridor demand (hourly demand/capacity)	85.0%
Capacity utilization (passengers miles/seat miles)	35.0%
Cost Efficiency Benchmarks	
Cost per vehicle revenue hour	$125.00
Cost per vehicle revenue mile	$5.00
Cost per revenue seat mile	$0.10
Cost Effectiveness Benchmarks	
Subsidy per passenger trip	$3.50
Revenue per revenue seat mile	$0.04
Farebox recovery ratio	50%

Table 21: Intercity/Solano Express Performance Measures

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These design objectives and performance benchmarks balance the need for a marketable and attractive service with fiscal constraints. Peer intercity/regional service farebox recoveries range from about 25 percent (in Snohomish) to 50 to 80 percent (east coast suburban systems, BART, as well as Route 80 and 90). These observations inform the development of the performance benchmarks.

The identified metrics guide intercity bus service development in the Transit Corridor Study and seek to both evaluate operating performance and also work towards regional land use and transportation integration. The goals, objectives and performance metrics provide the framework to deliver the objectives of the Study:

- Intercity Transit Funding Agreement stability, efficiency and flexibility goals;
- Recognition of demographic changes;
- Forecast changes in land use and density;
- Adoption of regional bus transit best practices and transit facilities design;
- Recognition of the current financial environment; and
- Capability of effectively competing for limited transportation funding to deliver the capital program.

Existing services are evaluated against the criteria, as are alternative service design concepts. The expected outcome is a service design and program of projects that is understandable, marketable, achievable and realistic.

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7 Assessment of Existing Services

7.1 Overview

Solano Express services – operated by FAST and SolTrans – feature seven routes serving both intra-county trips and trips to regional centers. The seven routes are:

Route 20	Fairfield to Vacaville
Route 30	Fairfield/Vacaville to Dixon and UCDavis/Sacramento
Route 40	Vacaville/Fairfield via Benicia Industrial Park to Pleasant Hill/Walnut Creek BART Station
Route 78	Vallejo/Benicia to Pleasant Hill/ Walnut Creek BART Station
Route 80	Vallejo to the El Cerrito del Norte BART Station
Route 85	Internal Solano: Fairfield to Vallejo, Ferry Terminal, Six Flags, Solano Community College Fairfield Campus and Solano Mall
Route 90	Suisun City/Fairfield to the El Cerrito del Norte BART Station

Based on the proposed service benchmarks, and the minimum standards required in the Intercity Funding Agreement, the following table lists the current performance of Solano Express.

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Measures		FAST	FAST	FAST	SolTrans	SolTrans	SolTrans	FAST
Service Productivity	Benchmark	20	30	40	78	80	85	90
Passengers per Vehicle Revenue Hour	25.0	14.1	10.8	7.1	8.5	25.5	13.1	16.2
Passengers per Trip	15.0	6.9	9.4	8.8	8.2	15.8	12.0	14.8
Passengers per Vehicle Mile Revenue Mile	1.0	0.6	0.3	0.2	0.4	0.7	0.4	0.5
Peak Corridor Demand (Hourly Demand / Capacity)	85.0%	42%	52%	40%	42%	88%	35%	66%
Capacity Utilization (Passenger Miles / Seat Miles)	35.0%	11%	18%	15%	14%	20%	15%	27%
Cost Efficiency	Benchmark	20	30	40	78	80	85	90
Cost per Vehicle Revenue Hour	$125.00	$106.68	$119.94	$103.95	$105.73	$107.06	$99.34	$116.68
Cost per Vehicle Revenue Mile	$5.00	$4.31	$3.40	$3.43	$5.39	$3.01	$3.29	$3.38
Cost per Revenue Seat Mile	$0.10	$0.08	$0.06	$0.06	$0.10	$0.06	$0.06	$0.06
Cost Effectiveness	Benchmark	20	30	40	78	80	85	90
Subsidy per Passenger Trip	$3.50	$5.65	$7.31	$10.36	$9.01	$1.31	$5.48	$2.94
Revenue per Revenue Seat Mile	$0.04	$0.02	$0.02	$0.02	$0.03	$0.04	$0.02	$0.04
Farebox Recovery Ratio (STA)	50%	25%	34%	29%	28%	69%	28%	59%
Farebox Recovery Ratio (RM2 RC)	30%	N/A	34%	29%	N/A	N/A	N/A	N/A
Farebox Recovery Ratio (RM2 RAD)	20%	25%	N/A	N/A	28%	69%	28%	59%

Performance scale compared to benchmark: **Worse** **Just Below** **Better**

Table 22: Current Performance of Solano Express

7.2 Analysis

The assessment of current Solano Express services focuses on four areas:

- Service Design Principles
- Service Productivity Benchmarks
- Cost Efficiency Benchmarks
- Cost Effectiveness Benchmarks

7.2.1 Service Design Principles

The Intercity Funding Agreement notes five core service design principles:

- Provides connectivity between cities
- Provides regional transit connections
- Meets unmet transit needs
- Minimize stops in each city
- Is user friendly

Table 23 lists the current service design performance (except user friendly, which is discussed separately):

Service Attributes	Benchmark	Current
Peak Service Frequencies	**15**	15 to 60
Midday Service Frequencies	**30**	30 to 60
Average Speed (mph)	**35**	31
Simple, Legible Routings	**Y**	N
Connects to Regional Transit	**Y**	Y
Connects Solano Cities	**Y**	Marginal

Table 23: Current Service Design Performance

User Friendly

User-Friendly means the expectations of quality for a transit service. These expectations fall into five categories:

1. Safety
2. Reliability
3. Frequency
4. Span of Service
5. Speed

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Reliability means "living up to the intent of the schedule" – either through on-time operation or headway adherence.

Frequency means that the bus needs to operate at least every 15 minutes for it to be considered a convenient option by most potential customers (LOS B per TCRP Report 100). For example, TRB Report 95 Chapter 9 indicates that the frequency elasticity of demand is +0.5 for transit services with headways of 11-60 minutes. This means that a headway improvement of 33% (i.e., from every 15 minutes to every 10 minutes) may be expected to increase ridership by 17% (or +0.5 x 33%) during the corresponding period. Likewise, widening the headway from 10 to 15 minutes (a 50% decline in service) may be expected to decrease ridership by 25% (or +0.5 x -50%) during the corresponding period. When the existing headway is less than 10 minutes, the sensitivity to service improvement is less, but still exists.

Speed means that transit service can be slower than an auto, but not by more than 15 minutes (LOS B per TCRP Report 100). It should also be noted that based upon studies of travel behavior most travel demand models assign a large penalty to wait time as compared to in-vehicle time –typically a factor of four, meaning that a minute spent waiting for the bus is perceived by the customer as four times longer than a minute spent on the bus.

Span of Service changes appear to have about the same elasticity of demand as frequency changes; however, the research is not consistent and the case studies often include additional service improvements making precise comparisons difficult. As noted, frequency of service and span of service (perceived as waiting time) are more important to passengers than service speed because from the customer's perspective the transit operator needs to get the other priorities right first, before speed is even considered in the trip decision-making process (i.e. transit customers do not like to spend more time waiting for the bus than on the bus).

Solano Express and User Friendliness While most Solano Express services are reported as reliable and safe, the other characteristics of a user-friendly transit service—frequency, span-of-service and speed—are deficient. Only Route 80 has 15 minute service and only during the peak periods. Route 90 has a short burst of 15 minute service in the peak hour. The other routes generally operate hourly or even less frequently. As a result, the transit system expects the customer to adjust to its schedule, rather than the transit system working for the customers' schedule. This is not "user-friendly" and results in less ridership.

Span-of-Service is also limited, with the Route 80 having a good span (from 5am to almost 11pm), but other routes providing far less service into the evenings. Finally speed is slow, compared to automobiles, as noted in this table:

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Route	Benchmark	Scheduled Speed	Meets Benchmark
FAST 20	35	28.8	N
FAST 30	35	29.0	N
FAST 40	35	33.4	N
SolTrans 78	35	25.2	N
SolTrans 80	35	25.2	N
SolTrans 85	35	22.5	N
SolTrans 90	35	45.0	Y

Table 24: Current Speed Comparison to Benchmark

Slow speed impact both passengers (through uncompetitive travel times) and in operations and financing (as slower speeds results in a less cost-effective service).

		Benchmark	FAST 20	FAST 30	FAST 40	SolTrans 78	SolTrans 80	SolTrans 85	FAST 90
Service Attributes	Peak Service Frequencies		60	3 trips	30-60	20-30	15	60	15
	Midday Service Frequencies		60	1 trip	1 trip	5 trips	30	60	60-120
	Average Speed (mph)	**35**	28.8	29.0	33.4	25.2	32.0	22.5	45.0
Service Performance	Passengers per Vehicle Revenue Hour	**25.0**	14.1	10.8	7.1	8.5	25.5	13.1	16.2
	Passengers per Trip	**15. 0**	6.9	9.4	8.8	8.2	15.8	12.0	14.8
	Capacity Utilization (Passenger Miles / Seat Miles)	**35%**	11%	18%	15%	14%	20%	15%	27%
	Farebox Recovery	**50%**	25%	34%	29%	38%	69%	38%	59%
	Subsidy per Passenger	**$3.50**	%5.65	$7.31	$10.36	$9.01	$13.31	$5.48	$2.94

Performance scale compared to standard:
Does not meet | Close to | Meets

Table 25: Solano Express Network Service Attributes and Performance Compared to Benchmark

Table 25 graphically shows those routes that are either within or close to the proposed benchmarks. Only Routes 80 and 90 achieve most of the benchmarks.

8 Recommended Transit Strategy

The Solano Express network has evolved over almost two decades to achieve a high market share of San Francisco and Oakland work trips, but low use within the county.

Based on the assessment of current service, existing *de facto* policy has been to favor coverage over frequency and speed over access. An example of coverage over frequency, in the travel market linking Fairfield to the BART system, there are two routes: one to El Cerrito del Norte and the other to Pleasant Hill and Walnut Creek. As a result, the number of buses per hour to *either* location is lower than it would be if the bus operated to only *one* BART station. Also, the route structure, with buses starting at intermediate locations along the freeway right-of-way, does not easily allow for travel between key nodes along the freeway. The effect is that speed is prioritized over access.

When combined, the priorities of coverage and speed create a system of seven routes that mostly operate infrequently. Bus routes are designed to get close to both passenger origin and destinations, but in doing so travel time degrades and transit becomes increasingly non-competitive.

As an alternative to the current service design, this plan creates three service options intended to better meet the service design objectives and improve overall performance. The three service options have common characteristics:

- Fewer routes with fewer route deviations
- More frequency on each route
- Routes that serve both internal Solano city to city trips and regional trips
- Better coordination between freeway infrastructure and transit infrastructure
- Coordination with Solano County Priority Development Areas (PDAs)
- Seamless connections to higher education centers
- Higher farebox recovery on each route and as a system

The proposed route structures are more “trunk-oriented” and “BART-like” than the current service pattern. The service design relies on passengers-getting-to-transit (rather than transit getting to passengers). This principle is reinforced by incrementally evolving the freeway system and the planned express lanes into a multimodal facility that supports transit services well.

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9 Service Alternatives

Three service options were designed and evaluated, with input from the Consortium. Each alternative has a "theme" that provides the context and logic for its service design. These three routing alternatives can be described as follows:

- Alternative A – Modest Change
- Alternative B – BART-Like Trunk System
- Alternative C – Alternative Trunk System

Each option was designed with about the same level of service hours overall for a fair comparison.

The Consortium was involved in all aspects of the service proposal including:

- The development of goals and objectives for the service;
- A review of the travel forecasts over 30 years;
- A review of the number of intercity buses required over a 15 year period;
- The adoption of performance benchmarks; and
- A review of the service concepts and alternatives.

A key consideration of transit service planning is to balance service needs with operational efficiency. Schedule efficiency is important because an efficient schedule results in better route productivity. Unfortunately, an efficient route is sometimes not an attractive one – passengers may find the most efficient route distant from their destinations.

Two key considerations are the locations of PDAs and the location of higher education facilities. Figure 13 identifies their locations within the County:

In addition, running times between key locations are important. Linking segments efficiently minimizes unproductive bus hours. Figure 14 identifies these "link times."

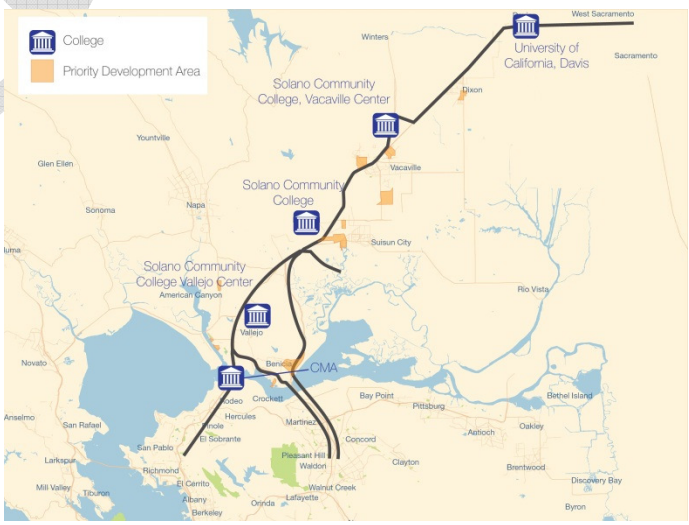

Figure 13: PDAs and Education Facilities in Solano County

All options recommend the following changes and assumptions:

- The Vallejo/Benicia to Walnut Creek and Fairfield to Walnut Creek express bus services continue to serve Walnut Creek BART station. The express bus stop at Pleasant Hill BART station is discontinued. This change allows for faster service and requires fewer buses. Almost all passengers using Pleasant Hill BART are transferring to BART, which can still occur at Walnut Creek. Walnut Creek has more all-day attractions than Pleasant Hill and better regional connections to the 680 corridor south.
- BART agrees to charge the same fare for SolanoExpress passengers transferring to/from either El Cerrito del Norte or the Walnut Creek BART Station.
- All Route 78 Vallejo/Benicia to Walnut Creek trips also serve Diablo Valley College in Pleasant Hill.
- The current Route 85 segment between Vallejo and Solano College is revised to operate on Highway 37 and use freeway ramp stops.
- Solano College in Vacaville is served on all alternatives, a new bus station is provided for Solano College Fairfield at Suisun Parkway and Kaiser Drive and Fairfield Transportation Center is redesigned to allow Solano Express buses to remain on freeway ramps and avoid city streets.

Development of Service Structure – Solano Express uses three major facilities for most of its service – I-80, I-680 and I-780. Running times between nodes were assessed from existing schedules, and adjustments were made based on observations and estimates of running time changes based on freeway facility improvements. Route options were then created by "mixing and matching" segments at different nodes.

Figure 14: Link Times

Service frequency on all routes is modified for consistency. Each alternative includes an initial service level and an "Improved" service level. Improved service levels are assumed to be initiated once demand increases and are likely within a five year period.

9.1 Alternative A – Modest Change

Alternative A is the *Modest Change* option. The rationale behind this route is to streamline the existing Solano Express system, with minimal changes. A main feature is the development of the Green Line concept, essentially a merger of Routes 20, 40 and parts of 30. This route allows travel from Davis to Walnut Creek BART throughout the day. The Green Line also allows for connections between the Solano College main campus and the Vacaville campus, as well as UC Davis. During peak hours the revised express Route 30 (Navy Line) continues to provide express service from Fairfield to Sacramento with intermediate stops at Vacaville and Dixon.

Colleges are also better connected with a revised routing for Route 85 (Sage Line), which is extended to the California Maritime Academy and provides connection between Solano College and CMA on a streamlined route via Highway 37.

Routes 80 (Blue Line) and 90 (Orange Line) have minor changes and operate largely as they do today. Route 78 (Red Line) only serves Walnut Creek BART and the Pleasant Hill stop is discontinued, although a stop at Diablo Valley College is added to Route 78 (Red Line).

Figure 15: Alternative A Diagram

Proposed Initial Year service frequencies are minor increases from current levels of service, but additional midday service frequency is limited due operation of a

six route system. Service frequencies are less than in other options, because service is spread among more routes.

The summary of service levels and estimated service hours is noted in Table 26.

		Service Frequency							Totals
	Alternative A	**Vallejo to Fairfield**	**Fairfield to Vacaville**	**Vacaville to Davis/ Sacramento**	**Suisun to Fairfield**	**Fairfield to Walnut Creek BART**	**Vallejo to Walnut Creek BART**	**Vallejo to El Cerrito BART**	
Initial Service Levels	Navy Line		60/-	60/-					
	Orange Line				15/90			15/90	
	Sage Line	60/60							
	Green Line		30/60	30/60		30/60			
	Red Line						30/60		
	Blue Line							15/30	
								Total Weekday Hours	265
Improved Service Levels	Navy Line		30/120	30/120					
	Orange Line				15/30			15/30	
	Sage Line	15/15							
	Green Line		15/30	30/16		15/30			
	Red Line						15/15		
	Blue Line							15/15	
								Total Weekday Hours	395
Note: 'Peak Period/Midday Period' service frequencies, i.e., 15/30 means 15 minutes in the peak and 30 minutes in the off-peak and midday)									

Table 26: Alternative A Service Levels Summary and Estimated Service Hours

9.2 Alternative B – BART-Like Trunk System

Alternative B is the *BART-Like Trunk*. The theme of this service option is to create a strong inter-regional transit trunk system from Walnut Creek to Davis with more service than provided in Alternative A. This transit trunk line, identified as the Green Line, provides good BART access from Fairfield and Vacaville. Fairfield is supplemented with the Blue Line that operates from Suisun City to the El Cerrito del Norte BART Station via downtown Vallejo.

The Blue Line combines Line 80 and 85 into a single route. Finally, the Red Line operates from Vallejo to the Walnut Creek BART Station as an improvement over the existing Line 78. From a regional perspective, the Green Line directly connects central Contra Costa County with Davis and as a result complements the Capitol Corridor, which operates in the I-80 corridor. The Navy Line continues the peak period service on the existing Route 30 express into Sacramento, as developed in Alternative A.

Alternative B combines the I-680 trunk with a large and important transit hub near Solano College, but adjacent to I-80 and near the proposed westbound truck scales. The Solano College station serves both the Blue and Green Line and gives Solano College students access to most places in the county and many regional destinations.

Figure 16: Alternative B Diagram

Proposed Initial Year Service Frequencies are modest increases from current levels of service, but allow additional midday service and some overall improvements in span of service, mainly provided by a streamlined route system.

The summary of service levels and estimated service hours is noted in Table 27.

		Service Frequency							Totals
	Alternative B	**Walnut Creek BART to Fairfield**	**Fairfield to Vacaville**	**Vacaville to Davis/Sacra**	**EC BART to Vallejo**	**Vallejo to Fairfield**	**Suisun to Fairfield**	**Vallejo to Walnut Creek BART**	
Initial Service Levels	Navy Line		60/-	60/-					
	Green Line	30/60	60/60	60/60					
	Red Line							30/60	
	Blue Line				15/15	15/15	15/15		
								Total Weekday Hours	250
Improved Service Levels	Navy Line		30/120	30/120					
	Green Line	10/15	10/15	20/60					
	Red Line							15/15	
	Blue Line				15/15	15/15	15/15		
								Total Weekday Hours	350

Table 27: Alternative B Service Levels Summary and Estimated Service Hours

9.3 Alternative C – Alternative Trunk System

Alternative C is the *Alternative Trunk*. The theme of this service option is to combine the more locally oriented services (the 85, which is an intra-Solano service) and the 78 (which has a strong local function in Benicia) into a single route and operates as the Red Line. As in Alternative B, the Green Line operates as the 680 trunk and makes connections at Solano College. However, in this alternative, the direct connection from Fairfield to El Cerrito del Norte is discontinued in favor of a direct Red Line connection between downtown Benicia and Fairfield with stops at Solano College. The Blue Line, which is a continuation of Route 80, operates from Vallejo to El Cerrito del Norte.

Figure 17: Alternative C Diagram

Proposed service frequencies are similar to Alternative C, and are as follows:

		Service Frequency							Totals
	Alternative C	**Vallejo to Fairfield**	**Fairfield to Vacaville**	**Vacaville to Davis/ Sacramento**	**Suisun to Fairfield**	**Fairfield to Walnut Creek BART**	**Vallejo to Walnut Creek BART**	**Vallejo to El Cerrito BART**	
Initial Service Levels	Navy Line		60/-	60/-					
	Green Line		60/60	60/60		15/30			
	Red Line	30/30			15/30		15/30		
	Blue Line							15/15	
								Total Weekday Hours	255
Improved Service Levels	Navy Line		30/120	30/120					
	Green Line		10/15	20/60	10/15	10/15			
	Red Line	15/15			15/15		15/15		
	Blue Line							15/15	
								Total Weekday Hours	355

Table 28: Alternative C Service Levels Summary and Estimated Service Hours

However, due to slightly more disadvantageous routings, Alternative C would require slightly more hours than Alternative B to provide similar levels of service.

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10 Evaluation of Alternatives

As part of the evaluation of the three service design options, STA developed a Vision Statement and adpoted set of evaluation metrics, as detailed in Section 6.

The preferred alternative is not required to meet all the metrics, but an analysis of the metrics is useful in discussing the adoption of the preferred alternative. The metrics are divided into service design (the product), service productivity (the use of the system) and cost efficiency (the efficiency of product delivery):

These criteria are as follows:

Benchmark	Standard
Service Design Requirements	
Connects Solano County cities	Yes
Connects to regional transit	Yes
Meets unmet transit needs	Yes
User friendly	15 minutes frequency peak/ 94% on time/reliability
Speed (mph average)	35
Service Productivity	
Passengers per vehicle revenue hour	25.0
Passengers per trip	15.0
Passengers per vehicle revenue mile	1.0
Peak corridor demand (hourly demand/capacity)	85.0%
Capacity utilization (passengers miles/seat miles)	35.0%
Cost Efficiency	
Cost per vehicle revenue hour	$125.00
Cost per vehicle revenue mile	$5.00
Cost per revenue seat mile	$0.10
Cost Effectiveness Benchmarks	
Subsidy per passenger trip	$3.50
Revenue per revenue seat mile	$0.04
Farebox recovery ratio	50%

STA is in the process of revising the Solano-Napa Travel Demand Model. The current model was able to realistically provide overall increases in transit demand based on existing service patterns (forecast to be about 37 percent over 30 years) but is unable to accurately develop route-by-route forecasts or forecast ridership

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increases associated with improvements in the quality of transit service (for example, more service or faster routes).

As a "work-around" to this issue, the study team assumed that Year 2020 is the base year, when the current model assumes that Solano Express ridership will have increased by about 19% above 2010 levels. Using a simple spreadsheet model, the study team compared current service levels (service frequencies and speed) against the base system and applied elasticity factors from TCRP Report 165. As a result, when the base ridership increase is factored up based on the spreadsheet model's estimates, ridership increases area as follows:

Alternative	Year 2020 Projected Ridership Increase
No Change	19%
Alternative 1	34%
Alternative 2	43%
Alternative 3	43%

Table 29 below summarizes the performance of the three alternatives compared to the current system; both the basic service levels and improved service:

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		Benchmark	Current	Alternative A - Year 2020	Alternative B - Year 2020	Alternative C - Year 2020
Service Attributes	Peak Service Frequencies	**15**	60	15/30	15	15
	Midday Service Frequencies	**30**	60	15/30	15	15
	Average Speed (mph)	**35**	31	35	35	35
	Simple, Legible Routings	**Y**	N	Y	Y	Y
	Connects to Regional Transit	**Y**	Y	Y	Y	Y
	Connects Solano Cities	**Y**	Marginal	Y	Y	Y
Service Performance	Daily Service Hours (Ph 2 = 2020)		250	285	287	297
	Increase in Service Hours		N/A	14%	15%	19%
Financial Performance	Annual Gross Cost		$7,421,666	$8,470,100	$8,520,568	$8,806,549
	Ridership Increase	**Base 19% Increase to 2020**	**N/A**	34%	43%	43%
	Annual Net Cost		$3,931,664	$3,779,285	$3,539,171	$3,825,152
	Subsidy per Pasgr		$3.61	$2.58	$2.28	$2.46
	Passgrs per Hour		15.9	19	20	19
	Capacity Utilization	**35%**	20.5%	24.2%	25.5%	24.7%
	Farebox Recovery	**50%**	48%	55%	58%	57%
				Meets Standard	Close to Standard	Does Not Meet Standard

Table 29: Alternatives Performance Summary Compared to Current System

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The table identifies the three service design options plus the current system and provides an assessment of an improvement sub-option for each alternative that increases service, generally to every 15 minutes south of Fairfield. The teal shading indicates a "good" rating, while the rose shading indicates a "poor" rating. As can be seen, Alternative B has the most instances of "good" assessment. This is due to Alternative B's simple route structure resulting in a more efficient use of vehicles and labor.

The implementing concept assumes that the current subsidy level of about $4 million annually is maintained. As patronage increases, additional fare revenues allow for more service so that while gross cost increases, net costs (after fares) remain about the same, or in the best estimates, could decline.

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11 Findings, Recommendations and Implementation Strategy

11.1 Findings

Key findings are as follows:

- Solano County intercity transit ridership is expected to increase about 35-40% over 30 years (and by about 19% by 2020) without any improvement in services or facilities.
- Transit competitive travel markets from Solano County to out-of-county destinations exist; there will likely be more transit competitive markets as the county adds residents and density in future years.
- Ridership will likely increase more than forecast if services are improved.
- Coordination between bus and BART services is good, but coordination to ferry service is not.
- Current bus facilities are primarily automobile oriented (i.e., providing parking), but do not improve transit operations (i.e., provide better freeway access).
- Current intercity routes do not connect colleges and universities in customer friendly ways.
- Current route performance is mixed. Routes 80 and 90 meet most performance metrics, but do not meet service quality guidelines. The other routes have lower farebox recovery ratios and higher subsidy levels. Overall, the SolanoExpress services have quality of service deficiencies including infrequent service (less than 15 minutes), confusing routings, slower than desired speeds, and do not provide direct and attractive transit service between cities within the county.

11.2 Recommended Service Design

Alternative B is recommended as the preferred alternative and will provide a restructured, simple, easily legible and high quality transit service for Solano County. The alternative is designed to adhere to the Vision of a rubber-tire, freeway oriented high quality transit system. The recommended service option results in:

- Higher ridership
- Incremental growth in the frequency and span of service
- Incremental improvements in transit capital facilities to provide more reliable and faster service to the county.

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As with any change, there are advantages and disadvantages, but overall more people benefit than those who do not. The plan provides mitigations for the negative outcomes.

Among the benefits of the plan are:

- Faster transit speeds
- Simple and easily understandable system and more direct routings.
- Better service frequencies
- Excellent connections between major college campuses

While passengers traveling from Fairfield to Berkeley have either a slightly longer ride via the new Blue Line (or need to park instead in Vallejo), the upside is that passengers on all routes experience less waiting. Passengers traveling to Central Contra Costa County have much better service from all parts of Solano County. College students traveling between Solano College Fairfield and Solano College Vacaville are directly connected and are connected to UC Davis.

System Design:

Alternative B features three all-day routes and one peak period express, as follows:

Table 30: Alternative B Diagram

To achieve 35 mph requires additional capital improvements that lead to about 3 to 5 minutes of time savings

Route	Green (40)	Blue (80)	Red (70)	Navy (30)
Terminals	Davis to Walnut Creek BART	Suisun City to El Cerrito delNorte BART	Vallejo TC to Walnut Creek BART	Fairfield TC to Sacramento
Average Distance between Intermediate Stops	7 miles	10 miles	3 miles	15 miles
Frequency	15 FTC WC BART Peak	15 Peak	15 Peak	60 peak
	30 FTC WC BART Midday	15 Midday	30 Midday	
	60 Davis WC BART Nite	60 Nite	60 Nite	
	30 WC BART Davis Peak			
	60 WC BART David Midday			
Speed*	35	35	35	48
Span of Service	16 hours	16 Hours	16 Hours	Peaks Only; One midday trip

Table 31: Description of Recommended Alternative B Service

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Figure 18: Alternative B Diagram

Table 32 illustrates the service plan for each of the three routes, including routing, proposed stops and service frequencies. In addition, the table estimates each route's speed and identifies the number of minutes in travel time reduction to achieve the 35 mph benchmark. As stops are added in future years, additional time savings will be necessary to continue to adhere to the 35 mph benchmark.

		Route Design		Service Frequency							Travel Time	
	Alternative B	***Route***	***Stops***	***WC BART to Fairfield***	***Fairfield to Vacaville***	***Vacaville to Davis/Sacra***	***EC BART to Vallejo***	***Vallejo to Fairfield***	***Suisun to Fairfield***	***Vallejo to WC BART***	***Estimated Speed***	***Required Time Savings to Meet 35 mph***
Initial Service Levels	**Green Line**	From Sacramento to WC BART via I-80, I-680.	Downtown Sacramento, UC Davis, SC Vacaville, Vacaville Transportation Center, FTC, Solano College, Benicia Industrial, WC BART	15 pk 30 mid	60 pk 60 mid	60 pk 60 mid					**32**	**3 min** Sac to VV **6 min** VV to WC BART
	Red Line	From Vallejo Transit Center via Mare Island Parkway, Curtola Parkway, I-780, Military, 2nd Street, I-780, I-680 to DVC and WC BART	Vallejo Transit Center, Curtola Park and Ride, Military & W K, Military & W 11th, Military & 5th, Military & 1st, 5th @ I-780, WC BART							15 pk 30 mid	**30**	**5 min** Vallejo Ferry to WC BART
	Blue Line	From Fairfield/Suisun Amtrak via Hwy 12, Beck, West Texas, I-80, Hwy 37, Mare Island Way, Curtola Parkway, I-80, Cutting Blvd to El Cerrito del Norte BART	Fairfield/Suisun Amtrak, Hwy 12 & Beck, FTC, American Cyn (Hiddenbrooke), Hwy 37 & Fairgrounds, Wilson & Benson, Mare Island Way & Tennessee, Vallejo Ferry Terminal, Curtola Park & Ride, El Cerrito del Norte BART				15 pk 15 mid	15 pk 15 mid	15 pk 15 mid		**35**	**0 min**
Improved Service Levels	**Green Line**	**Change:** Between FTC and I-680, route via Suisun Parkway	**Add**: Dixon & I-80, Solano College/Suisun Parkway, I-680 & Gold Hill	15 pk 15 mid	60 pk 60 mid	60 pk 60 mid					**31**	Additional stops require savings of **3 min**
	Red Line	No Change	No Change							15 pk 15 mid	***No Change***	
	Blue Line	**Change**: Between FTC and I-680, route via Suisun Parkway	**Add**: Solano College/Suisun Parkway, Hwy 37 and Sonoma Blvd, I-80 & Richmond Parkway				15 pk 15 mid	15 pk 15 mid	15 pk 15 mid		**33**	Additional stops require savings of **3 min**

Note: The STA Board adopted a 35 mph benchmark for service speeds on the SolanoExpress services. Only Route 90 meets this benchmark currently, but all services can meet it if capital improvement are identified that speed bus service. As identified in Table 11-1, about 6 minutes from Vacaville to the Walnut Creek BART Station is needed to be saved to meet the standard. As additional stops are phased in (for example, Benicia Industrial) and additional 3 minutes need to be saved.

Table 32: Service Plan Three Routes

The Red Line needs to save about 5 minutes of time and the Blue Line, when the Solano College stop is provided, will need about 3 minutes of time savings.

11.3 Facilities and Freeway & Street Improvements

Alternative B assumes that the proposed Express Lanes are delivered on I-80 between Red Top Road in Fairfield and I-505 in Vacaville and that freeway travel times for the buses improve. Critical to achieving faster times is the concept of minimizing route diversions off the freeway right of way. This allows for faster speeds and better city-to-city connections.

This study identifies a performance specification – a minimum speed of 35 mph plus station sites to provide the necessary access. Further study is warranted to identify the best suite of improvements, but generally they can fall into the following:

> ***Transit Priority Measures*** including queue jumps, signal priority, bus lanes, bus ramps and other general "rail like" improvements that make bus service faster and more reliable. These may be provided on freeway ramps or city streets.
>
> ***On-Line Stations*** are facilities that allow the bus to stop without leaving the freeway right-of-way. The best examples of freeway bus stations maintain bus operations within the freeway right-of-way and give an exclusive location for buses to decelerate, stop, dwell and then accelerate back into the freeway. Examples include the El Monte Busway in Los Angeles and the freeway bus stations in Seattle.
>
> ***Equipment*** is the most intimate contact the passenger has with the transit system. How a bus looks, feels, and operates is of paramount importance. With the evolution of vehicle performance expectations – including disabled access, noise, comfort and bicycle provisions – buses need to be better.

The proposed on-line stations have the opportunity to become (or enhance existing) transit hubs. Prior to the full implementation of the transit priority measures and enhancement of existing hubs and development of new hubs, routings would be slower and somewhat indirect, but service can be implemented and will experience improved performance. As the hubs are enhanced, developed and improved, service frequencies will improve and passenger loads should also increase.

Major Capital Improvements, First Tier

The two most critical near-term transit improvements are the:

- Redesign and reconstruction of the I-80 ramps adjacent to the Fairfield Transportation Center to allow buses to remain in the freeway right-of-way, and
- Establishment of a new station at Solano College adjacent to the westbound truck scales and Suisun Parkway with direct access to I-80.

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These stations act as the "hubs" of the system and provide both access and connection between different regional transit lines and the local transit network.

Coupled with these initial on-line stations, Solano Express also needs new equipment better suited for regional transit service, in contrast to point to point commuter express service.

- The most progressive transit operators are now considering double deck buses for regional services because they have high capacity, reasonable operating costs, good ride quality and low floor access that benefits both cyclists and passengers with disabilities.

Minor Capital Improvements-Caltrans right-of-way, First Tier

In addition to the FTC and Solano College improvements, the Study proposes additional freeway stops on existing ramps, requiring minor improvements (for example, extensions of sidewalks). These minor improvements include:

- American Canyon/Hiddenbrooke Ramp Stop – Sidewalk Improvement
- Highway 37/Fairgrounds – Sidewalk Improvement
- I-680/Gold Hill – Sidewalk Improvement and Park & Ride Lot, and
- Benicia Industrial Park Transit Center Completion.

Minor Capital Improvements-City rights-of-way, First Tier

In the first tier improvements, transit priority measures should be developed and delivered for the following streets:

- UC Davis Campus
- Vaca Valley Parkway
- Curtola Parkway
- Military West, Benicia

These measures should include:

- Signal priority
- Queue jumps and bus bulbs
- Bus Lanes

Signal priority extends green time when a bus is approaching (or reduces red time) through the bus "talking" with the signal controller. In addition, other measures include queue jumps (where a separate lane is created nearside of the intersection for the bus to "jump" the queue of automobiles and advance to the front of the line, bus lanes (dedicated lanes for buses where density of service warrants), and bus bulbs (sidewalk extensions to allow the bus to stay within the travel lane which saves time for the bus and is safer for all traffic than pulling into and out of the travel lanes).

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Major Capital Improvements, Second Tier

As the system develops and additional access is desired, several other on-line stations can be considered. These include:

- I-80 Dixon (adjacent to Pitt School Road)
- I-80 Vacaville
- I-80 Air Base Parkway
- Hwy 37/Hwy 29

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Note the schematic strip diagrams and maps which illustrate the length, location and stops/stations for each of the three all-day routes, who they connect and where they terminate.

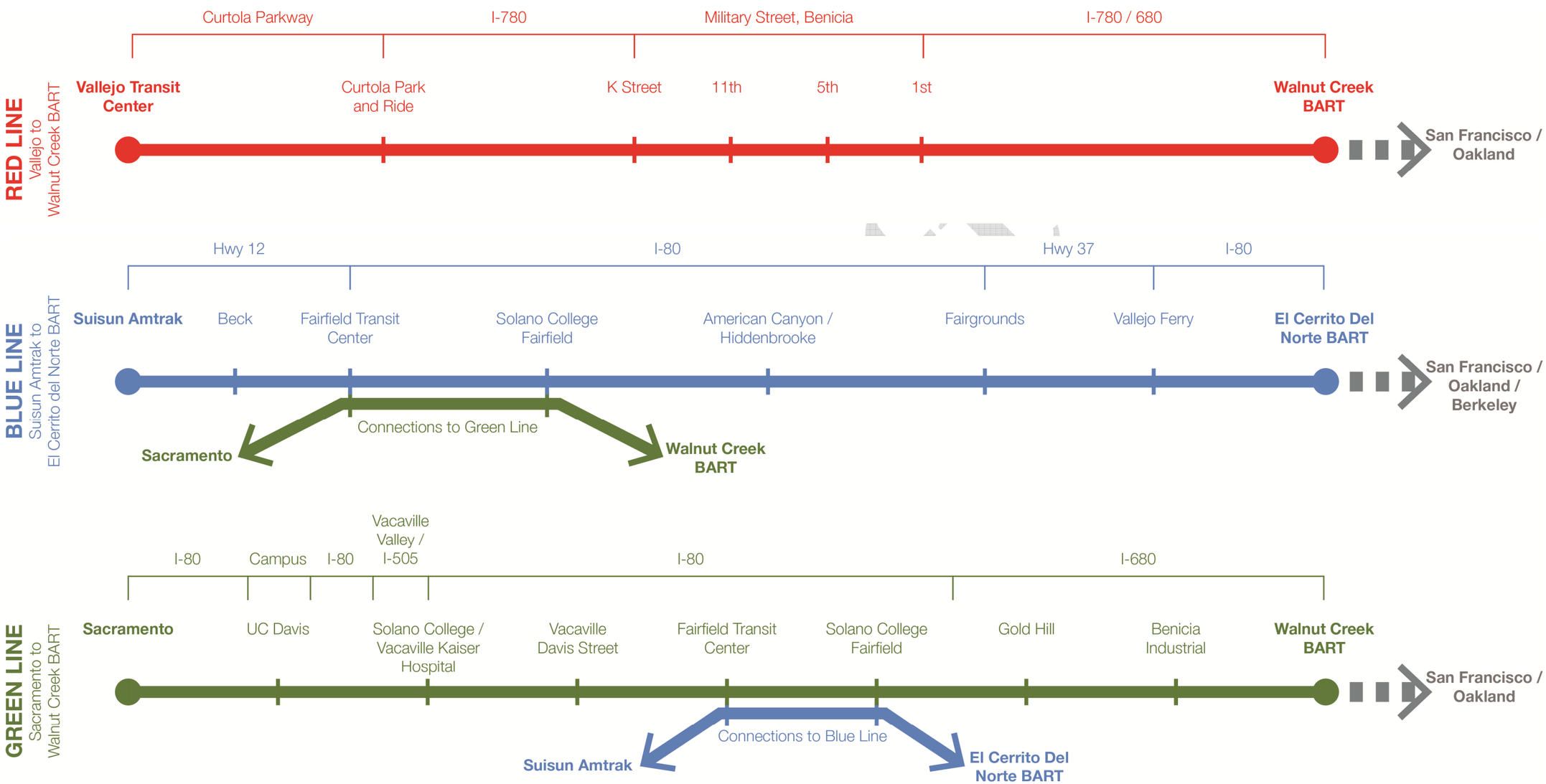

Figure 19: Strip Diagrams

Table 33 identifies the proposed transit travel time for each origin and destination pair. The light green identifies those pairs where travel time *decreases* while the red shading indicates those trips where travel time *increases*. Light blue shading indicates little change.

Almost all trip pairs obtain faster service. The few trips that take longer are limited to trips between Fairfield and BART El Cerrito del Norte BART Station. However, almost nobody actually is destined for El Cerrito – almost all the passengers transfer to BART for trips to downtown Oakland and San Francisco. For those trips via Walnut Creek, the trip is faster. The only actual travel itinerary where travel time degrades is Fairfield to Berkeley, but (using data from the ridership study) only about 100 trips a day (50 passengers) would be affected out of more than 4,400 daily trips

	Connection	Benicia/1st St	Curtola	Vallejo Ferry	Solano CC	FF Trans Ctr	Suisun Amtrak	Vacaville Davis	Vacaville SCC	Dixon	UC Davis	Sacramento
WC BART	*to Oakland +21 min*	25 / 15	40 / 30	45 / 35	81 / 30	55 / 35	63 / 40	70 / 50	76 / 60	89 / 70	104 / 85	129 / 110
delNorte BART	*to Oakland +20 min*		23 / 25	28 / 30	57 / 50	40 / 55	48 / 60	55 / 70	61 / 80	74 / 90	89 / 105	114 / 130
Benicia/1st St			15 / 15	20 / 20	56 / 40	73 / 45	80 / 50	90 / 60	96 / 70	109 / 80	124 / 95	149 / 120
Curtola				5 / 5	41 / 25	58 / 30	65 / 35	75 / 45	81 / 55	94 / 65	109 / 80	134 / 105
Vallejo Ferry	*to San Fran +55 min*				36 / 20	53 / 25	60 / 30	70 / 40	76 / 50	89 / 60	104 / 75	129 / 100
Solano CC						17 / 5	24 / 10	34 / 20	40 / 30	53 / 40	68 / 55	93 / 80
FF Trans Ctr							7 / 10	17 / 15	23 / 25	36 / 35	51 / 50	76 / 75
Suisun Amtrak								27 / 30	30 to 40 / 40	48 / 50	63 / 65	88 / 90
Vacaville Davis									6 / 10	19 / 20	34 / 35	59 / 60
Vacaville SCC										21 / 10	38 / 25	73 / 50
Dixon											15 / 15	40 / 40
UC Davis												25 / 25

Legend - Improve	Legend - Degrade	Legend - No Change
Existing	Existing	Existing
Proposed	Proposed	Proposed

Table 33: Proposed Transit Travel Time

11.4 Consistency with Vision and Goals

Alterative B delivers the STA via of a regional express bus system providing services equal to the speed, comfort, safety, reliability and frequency offered by BART rail operations, at costs that are affordable to the residents of Solano. In doing so, the proposed system is meets Service Design criteria by being ***user friendly*** with:

1. Simple and easy to understand routes.
2. Better service frequencies on each new route.
3. Faster service than the current system, and with capital improvements, becomes even faster.
4. Efficient routings with fewer diversions and more direct routes.
5. Consolidates markets (each bus serves more than one market) leading to better ridership.

Alterative B meets Service Productivity, Cost Effectiveness and Cost Efficiency criteria through:

6. Improved capacity utilization
7. Higher farebox recovery
8. Lower gross costs per passenger
9. Incremental development of operating improvements and capital enhancements.

Finally, Alternative B best serves to implement Plan Bay Area and Solano's Priority Development Areas. As Solano Express service is focused on on-line stations adjacent to PDA focus areas, the ability to travel both out-of-the-county and within the county is enhanced and development patterns are reinforced.

The main disadvantage of Alterative B are longer trips time from Fairfield to Berkeley, affecting 100 passengers a day out of more than 4,400 daily passengers.

Capital Coordination and Funding

Alternative B assumes that the transportation infrastructure will allow for transit speeds of 35 mph or greater from terminal to terminal and including intermediate stops. Each stop adds about one minute to the running time, and other improvements must mitigate those time increases. Such mitigations include the capital improvement program in Section 11.3.

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12 Next Steps

The following bullets identify the next steps to implement Alternative B in coordination with FAST and SolTrans:

1. Develop a fully fleshed out service proposal workplan that includes full timetables, fare collection and marketing concepts.
2. Development of a transition and phasing plan for the service changes.
3. Evaluation of Service Providers/Coordination with NCTPA to identify potential routes originating within Napa County to augment or improve service in the Highway 29 corridor that provides service to BART or the Vallejo Ferry. Consider joint routing, express-local routing or skip-stop services and additional frequency.
4. Finalize a financial and operating plan for the proposed service. Identify funding for capital program and consider Express Lane revenues to support the capital program.
5. Coordinate service planning and fare policies with BART to ensure minimizing costs of passengers and maximizing revenue to SolanoExpress and BART.
6. Coordinate a "Universal Pass" arrangement with Solano College to expand the improved service between college campuses.
7. Develop an overall capital improvement plan that delivers an infrastructure that allows 35 mph service speeds. Start this effort early to ensure coordination with other freeway projects and consider a programmatic environmental document to speed delivery. Coordinate with Napa County to develop Highway 29 transit enhancements tied to other corridor congestion relievers, such as intersection improvements, and Bus Rapid Transit street treatments, in order to compete with the auto. Identify fleet needs, and determine the vehicle type as part of the intercity bus replacement plan.

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13 Appendix

Overall Workplan for Implementation

1. Service Plan Workplan

- Develop Detailed Schedules
  - Provide Schedules at the Service Frequencies Recommended
- Develop Cost Estimates and Revenue Assumptions
  - Do Not Exceed 290 Weekday Service Hours
- Speed Improvements
  - Improve travel times through a combination of traffic improvements, physical infrastructure and operational changes.
  - Traffic signal priority – Prioritize local traffic signal investments to provide transit signal priority on Intercity/Regional bus transit routes.
  - Off-board fare collection – Implement all-door boarding with proof-of-payment fare collection to eliminate queuing at the front door of the bus. In synch with infrastructure that increases overall speed, the transit operators should engage in practices that also reduce dwell time and delay. Foremost of these is transitioning to a proof-of-payment system so that passengers freely enter the bus through all available doors. Random inspections would be used to encourage compliance with fare payment.
  - Develop detailed plans and justifications for on-line freeway stations.
- Branding and Marketing
  - Develop consistent "look and feel" with an individual corporate identify including schedules, websites, vehicle livery and all other aspects of branding.

2. Transition Plan

- Develop Overall Schedule to Transition Service from Current 7 Route System to 4 Route System
  - Identify 2020 for full implementation
  - Develop milestones for implementation
  - Coordinate with Financing Program
  - Coordinate with Capital Program

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3. Service Providers/NCTPA Coordination

- Consider appropriate Solano Express service provider(s) based on
  - STA Board Goals and Objectives
  - Local Knowledge
  - Overall Cost Effectiveness
- Coordinate with NCTPA
  - Ensure that services to del Norte BART are complimentary
  - Consider joint ticketing
  - Consider coordinated scheduling

4. Financing Plan

- Identify Operating Budget and Sources for 15 year program
- Identify Capital Sources and Amounts Available for Initial Program Development

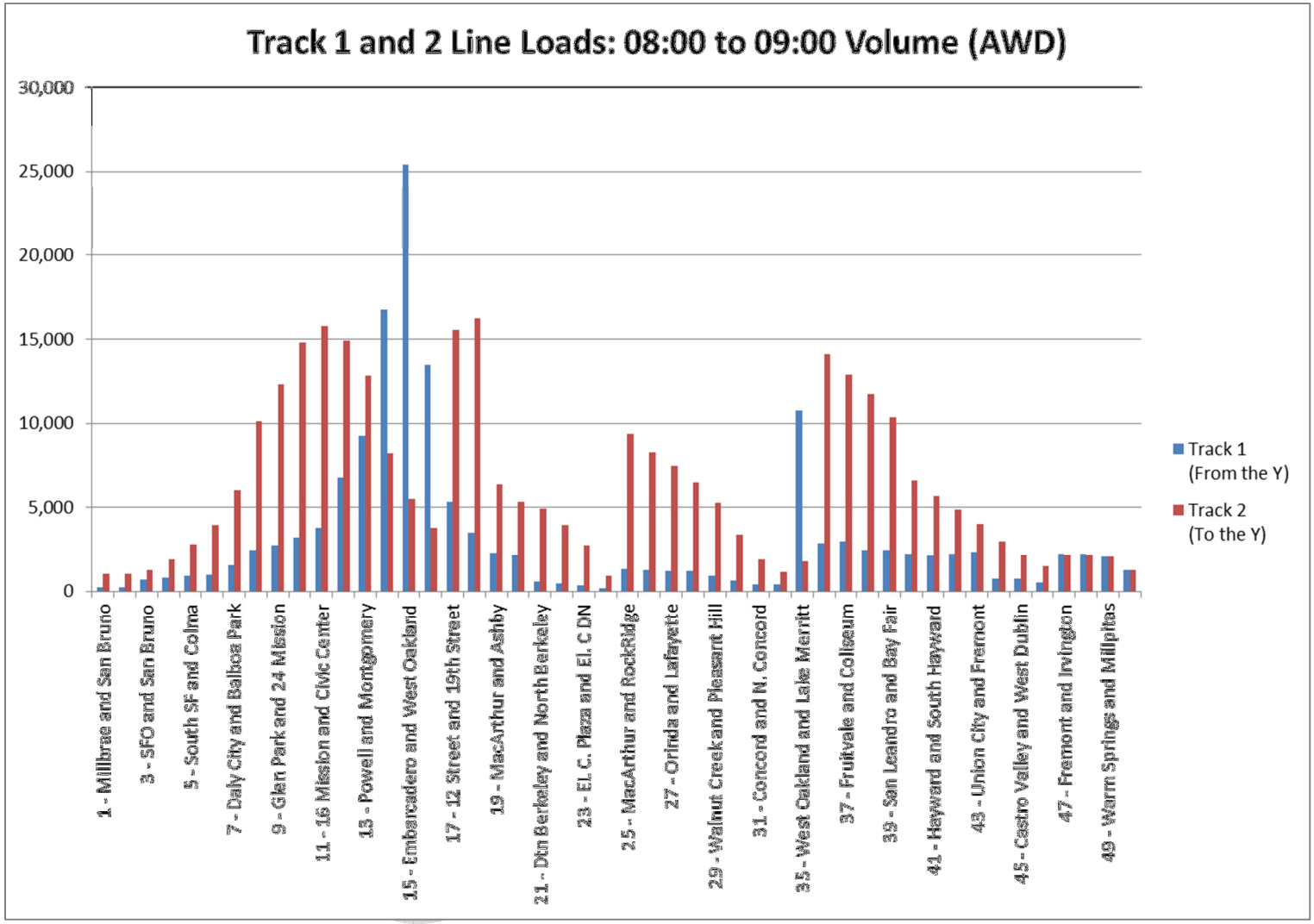
5. BART Coordination Issues

Identify key BART coordination issues for consideration and closure:

BART Capacity: More than 75 percent of Solano Express passengers transfer to BART. As a result, coordination with BART is a key component of a successful service. Currently, most Solano Express passengers access San Francisco and Oakland destinations via the El Cerrito del Norte BART Station. Alternative B proposes to move the BART transfer location for Fairfield and Vacaville passengers from El Cerrito del Norte to Walnut Creek; this affects about 200 peak hour Route 90 passengers.

As BART ridership increases, some BART lines have more available capacity than others. BART operates 11 peak hour trains on the crowded Pittsburgh/Bay Point line; Figure 20 indicates that at Walnut Creek there are about 6,500 passengers leaving that station competing for about 7,700 seats (there is additional standing room). This compares to four trains per hour leaving El Cerrito del Norte for San Francisco where 2,800 passengers are competing for about 2,800 seats for trains direct to San Francisco and another 1,700 seats for trains to Fremont. It appears that under current operations, it is likely that passengers boarding at Walnut Creek will find a seat.

BART's future plans call for "splitting" Yellow Line trains so the half the services operates from Pittsburg/Bay Point to 24th and Mission or Glen Park, and the other half operate from Pleasant Hill/Walnut Creek to SFO. Under this scenario, there should be more seats available at Walnut Creek.



Source: BART Sustainable Communities Operations Analysis, 2013

Figure 20: BART Line Loads 2012

BART Fares: Table 34 illustrates the fare difference from San Francisco to El Cerrito del Norte or Walnut Creek:

	From Walnut Creek	From El Cerrito del Norte	Difference
To Downtown Oakland	$3.20	$2.35	$0.85
To Downtown SF	$4.85	$4.10	$0.75

Table 34: Fare Difference

Clipper allows a different fare for passengers transferring from a connecting bus service. Alternative B assumes that Fairfield to San Francisco/Oakland passengers transfer to BART at Walnut Creek instead of El Cerrito del Norte. BART is currently collecting a fare at El Cerrito del Norte that is between 75 and 85 cents less than the fare collected at Walnut Creek. Alternative B proposes that BART continue to charge the same fare for SolanoExpress passengers that it collects at El Cerrito del Norte even if they make the connect at Walnut Creek. Since there is no revenue impact to BART (BART receives the same amount of fares as it does currently, just in a different place), it should be possible to negotiate an agreement between the agencies that charges Solano Express passengers the lowest fare between from either El Cerrito del Norte.

6. Solano College "Universal Pass"

The recommended transit system provides good connections between Solano College's Fairfield and Vacaville campus, as well as providing key connections to UC Davis. College students travel to and from each campus and between these campuses. The Solano College administration has proposed establishing a UC Berkeley-like "Class Pass" allowing unlimited travel on local buses and the newly realigned SolanoExpress. A key first step would be to establish the Class Pass using Transportation Fund for Clear Air funding to establish cost and need, and then transition into a student-paid registration surcharge after about two years.

7. Capital Plan

The capital program recommendations are divided into two types, vehicle and freeway and station improvements. These are summarized:

- **Vehicles**
  - **Fleet Size** – The total SolanoExpress service program requires 28 peak period buses or a total fleet of about 34 vehicles when fully implemented.
  - **Vehicle Type** – The current fleet of over-the-road coaches has been the express bus standard practice for the last 10 to 15 years. This coach type has served the market well, but the emerging market requires an upgraded coach. Over the road coaches have very high floors, which slow boarding, and are difficult for the disabled to use. These buses also have limited bicycle stowage. An intriguing choice could be low-floor double deck buses, which have been placed in service in the Seattle metro area. They offer

high capacity, very fast boarding, easy disabled access and plentiful interior bicycle storage. They are also used extensively by the corporate shuttle systems in the Bay Area.

As the current fleet is replaced, consideration should be given to replacing the over-the-road buses with double deck buses, subject to the manufacturers' ability to provide the desired fuel choice.

- **Freeway and Station Improvements**

5 Year Program

- Major Capital Improvement - 5 Year Priority Freeway Stations
  - On line station and access improvements at Fairfield Transportation Center
  - On line station at Solano College Fairfield
- Minor Capital Improvement - 5 Year High Priority Freeway Stops
  - On line stop (ramp) at I-80/American Canyon
  - On line stop at I-680/Gold Hill
  - On line stop at Hwy 37/Fairgrounds
- Minor Capital Improvement – City Right-of-Way
  - Transit priority measures

Year 1: Develop overall program/conceptual project plans/cost estimates

Year 2: Program funds/develop 30% plans/obtain environmental clearance

Year 3: Minor Capital – Initiate Construction and Delivery

Year 4: Major Capital – Begin construction

Year 5: Major Capital – Project completion

10 Year Program

- Major Capital Improvement - 10 Year Priority Freeway Stations
  - On line station at Dixon/Pitt School Road
  - On line station at Industrial/Benicia

15 Year Program

- Major Capital Improvement - 15 Year High Priority Freeway Stations
  - On line station at Vacaville/Davis
  - Additional on line stations (i.e., Air Base Parkway, Hwy 37/Hwy 29, etc.)

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