



Transit Connectivity Report

Metropolitan Transportation Commission • January 2005



Jack London Square · Oakland

Cover and interior photos
Peter Beeler (except where otherwise indicated)

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**METROPOLITAN
TRANSPORTATION
COMMISSION**

Joseph P. Bort MetroCenter
101 Eighth Street
Oakland, California 94607

510.464.7700 TEL.
510.464.7769 TDD/TTY
510.464.7848 FAX
info@mtc.ca.gov E-MAIL
www.mtc.ca.gov WEB



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Introduction and Methodology

To Rental Cars, Terminals
AirTrain
Elevators
BART/Caltrain
Hotel Shuttles
Parking Shuttles

samTrans
Courtyard G
Baggage Claim
Garage G

Action Cellular
Rent A Phone
ATM
samTrans
Courtyard G
Baggage Claim
Baggage Offices

On Level 4
To Rental Cars & All Terminals



Introduction: **What Is Connectivity?**

Connectivity is an indicator of a passenger's ability to use more than one transit system for a single trip. When effective, "good" connectivity improves transit trips needing multiple operators to travel to work, school, government service centers, a shopping district or other destinations. By making a multioperator trip nearly as easy as a single operator trip, good connectivity can attract new transit riders — and retain existing riders — by reducing travel times, providing more reliable connections, making it easier to pay and ensuring that transfers are easy and safe.

Poor connectivity, on the other hand, creates barriers that impede customers' ability to make efficient multioperator trips. When connectivity is poor, multioperator transit trips are frustrating, time-consuming and costly, lowering service quality for users and making transit unattractive for new customers.

Those persons who use more than one public transit system frequently request a convenient and "seamless" regional transit system. However, public transit services in the San Francisco Bay Area are operated by more than 20 agencies, each with its own unique policies, procedures and operating practices best suited for their immediate service areas and not always appropriate for regional travel. State legislation (e.g., Senate Bill 602 and Senate Bill 1474) has established responsibilities for the Metropolitan Transportation Commission to improve coordination among the various agencies. These responsibilities are documented in MTC's *Transit Coordination Implementation Plan* (incorporated in MTC Resolution 3055). The Commission amended the plan in October 2002 to include a new connectivity initiative intended to make multioperator trips easier for Bay Area transit riders.

The *Transit Connectivity Report* both documents the current status of transit connectivity in the Bay Area and recommends ways to improve it. These findings and recommendations are consistent with the goals of MTC's transit connectivity initiative:

- identify connectivity features that are in greatest need of improvement;
- identify priority connection locations or transit "hubs";
- identify best practices or models of how to implement improvements;
- recommend, where applicable, regional standards or procedures for adoption by transit operators, local governments and regional agencies to promote more seamless use of transit by customers.

Finally, in light of voters' March 2004 approval of Regional Measure 2 — which calls for better synchronizing transit systems' routes, fares, schedules and facilities — the *Transit Connectivity Report* concludes with next steps for continuing work.

Examples of Connectivity Initiatives

Important steps already are being taken to improve the ways customers can use multiple public transit carriers. Some projects — such as the phone- and Web-based 511 Traveler Information System and the TransLink® fare-payment smart card — are regional in nature. Other initiatives have been undertaken at the local level by two or more transit agencies working together to ensure better coordination of schedules, marketing programs, fare and transfer policies, etc.



Altamont Commuter Express (ACE) and the Valley Transportation Authority included Santa Clara County bus shuttle planning in the earliest design stages of the ACE train service. This approach produced an integrated train and shuttle system that provides fast, free connections from stations to work sites.

Cross-platform rail transfer stations with connecting local bus links have been developed through interagency agreements at the Richmond BART/Amtrak station, the Diridon Caltrain/ACE/Amtrak station in San Jose and the Millbrae Caltrain/BART station. (Photo of Millbrae Intermodal station)



MTC's Internet-based trip-planning system produces detailed, multioperator trip itineraries from a customer's origin and destination points.

Existing interagency passes and free transfer arrangements such as BART Plus, the Peninsula Pass and Muni Fast Pass (for use on BART in San Francisco) allow some riders to transfer easily from one service to another.



Following a successful TransLink® demonstration project, plans are under way for full phase-in of the TransLink® system. TransLink®, good on multiple systems, employs smart-card technology to facilitate fare collection, eliminating the need to carry cash.



Methodology

MTC established a Transit Connectivity Working Group comprised of representatives from transit agencies, cities, counties, congestion management agencies, business associations, the League of Women Voters, the Bay Area Council and other stakeholders interested in improving transit connectivity in the Bay Area. The working group reviewed and commented on various aspects of the project, and members of the group consulted one-on-one with MTC staff. A complete list of members serving on the working group is included as Appendix A.

Findings in this paper are based on (a) meetings with this stakeholder group, (b) interviews with transit agency staff, (c) a review of relevant reports and customer research, (d) field observations at more than 30 key transit locations, and (e) calls/visits to transit agency phone centers and Web sites. Although members of the working group represent customers, and communicated customer preferences to the extent possible, it was not possible to directly solicit transit customers' views for this project. Follow-up activities through the *Regional Measure 2 Transit Connectivity Plan* will provide opportunities for more direct customer input.

The Market for Interagency Transfers

Comprehensive, up-to-date information is not available on the number of Bay Area transit trips that involve transferring from one operator to another. In the absence of this information, transfer volumes can best be gauged by reviewing data from individual transit agencies (see **Table 1** on next page). With interagency transfers, indications are that far more people make *bus/rail* transfers than *bus-to-bus* transfers.

A report prepared in 1998 by UC Berkeley graduate student Gregory Shiffer (now a planner at AC Transit) provides some useful information. That report, which analyzed transit fare coordination and the potential impact of the TransLink[®] program, documented that far fewer interagency bus-to-bus transfers occur than interagency bus/rail transfers. For example, the report states that 93 percent of Muni riders who transfer to another system switch to BART or Caltrain, while just 7 percent transfer to another bus system. Similarly, the report concluded that 70 percent of SamTrans riders who transfer use Caltrain or BART, while 89 percent of AC Transit riders who transfer switch to BART.

Table 1: Interagency Transfers

BART

23 percent of BART's riders use some form of public transit (buses, shuttles, light rail) to travel from home to BART.

- Of these, 46 percent use Muni, 32 percent use AC Transit, 5 percent use Samtrans, 4 percent use County Connection and 13 percent use other bus systems.
- 49 percent drive, 26 percent walk and 3 percent use a bike to travel from home to BART.
- Home-to-BART transit use is 20 percent of all riders in the AM peak, 29 percent in the PM peak and 28 percent in the off-peak.

22 percent of BART's riders use some form of public transit to get from BART to their work/school/shopping destinations.

- Of these, 38 percent transfer to Muni, 24 percent to AC Transit, 20 percent to shuttles, 5 percent to County Connection and 4 percent to SamTrans, with 9 percent using other bus systems.
- 67 percent of BART riders walk, 9 percent drive and 2 percent use a bike to travel from BART to their final destinations.

[Source: BART 1998 Customer Survey]

Caltrain

26 percent of Caltrain morning riders use transit to travel to and/or from a Caltrain station.

Overall, 15 percent of all Caltrain riders use some form of public transit to travel to Caltrain stations.

- 37 percent of all Caltrain riders boarding in San Francisco use transit to reach stations. 6 percent of riders boarding in San Mateo County use transit, while 11 percent of riders boarding in Santa Clara County use transit.

36 percent of Caltrain riders use some form of transit to travel from Caltrain to their ultimate destinations.

- 62 percent of Caltrain riders disembarking in San Francisco transfer to Muni. 23 percent of riders disembarking in San Mateo County transfer to Samtrans. 32 percent of riders disembarking in Santa Clara County transfer to Valley Transportation Authority (VTA).
- In addition to Caltrain-to-bus transfers, another 4,000 riders/day use public or private shuttle services, mainly on the work end of their trips in San Mateo and Santa Clara counties.

[Source: Caltrain memo 12/02]

Altamont Commuter Express (ACE)

42 percent of ACE train riders transfer to VTA shuttles at Great America station in Santa Clara for trips to their worksites.

- Smaller numbers of riders connect to ACE trains via VTA buses/shuttles at the Diridon Station in San Jose, County Connection or WHEELS buses in the Tri-Valley area, and AC Transit buses in southern Alameda County.

[Source: VTA staff report, 2002]

Golden Gate Ferry

9 percent of Golden Gate's Larkspur-San Francisco ferry riders transfer to Muni in San Francisco, and 1 percent transfer to BART.

- 81 percent walk, 6 percent use Golden Gate buses 67 & 69, 3 percent use other modes.

1 percent of ferry riders use a non-Golden Gate bus to get to the Larkspur ferry.

- 71 percent drive, 11 percent use Golden Gate buses, 7 percent carpool, 4 percent drop-off, 6 percent walk and 1 percent use a bike.

[Source: Golden Gate Transit staff report]

Vallejo Ferry

An average of 550 Vallejo ferry riders each day transfer to Muni buses and light rail in San Francisco.

[Source: Muni staff report]

AC Transit (Transbay)

20 percent of AC Transit riders transfer to BART, 3 percent transfer to another bus system and 1 percent transfer to ferries.

- 3,000 AC Transit weekday transbay bus riders transfer to/from Muni at the Transbay Terminal in San Francisco.

(Sources: 2003 AC Transit Rider Profile, Muni staff report)

Barriers to Transit Connectivity

FOR ALL TRAINS
USE PEDESTRIAN UNDERPASS TO YOUR LEFT.
DO NOT CROSS TRACKS.

DO NOT WALK
OR PLAY
ON TRACKS!

NO TRESPASSING



Amtrak California

2003

Key Findings: **Transit Connectivity Barriers**

MTC and Bay Area transit agencies are actively working to mitigate four major barriers to effective transit connectivity found in this study:

- service connections;
- information and amenities at transfer points;
- pretrip planning; and
- fare policies and fare collection.

Service Connections

Customers making interagency transit trips need timely, efficient connections between their service providers. However, some Bay Area customers who must make interagency trips (or are considering a trip outside their local service area) are faced with significant barriers that make their journeys long or inconvenient. Specific interagency service problems are as follows:

- 1 infrequent service, uncoordinated schedules and/or poor schedule adherence sometimes force passengers to endure long waits for connecting service;
- 2 some connecting bus services stop running at night and on weekends, leaving mainline train and bus riders unable to reach their final destinations;
- 3 some agencies' services do not directly connect, forcing customers to walk long distances, or even take taxis or transfer to a third agency's local bus to make their connections; and
- 4 poor connections can cause riders to feel unsafe while transferring.

Connectivity Keeps Existing Customers... And Attracts New Ones

Customer surveys and other analyses conducted by MTC and Bay Area transit agencies show that improving transit connectivity is important to current and potential transit riders alike:

Participants in MTC's outreach for the *2001 Regional Transportation Plan* cited "improving bus and train performance through more efficient transfers across agency boundaries" as one of six top-level recommendations for getting more out of our existing transportation system.

"Seamless transit, a less fragmented system" emerged as one of the top three regional needs/issues identified by focus groups convened as during Phase 1 of the development of the *Transportation 2030 Plan*.

Telephone polling for the *Transportation 2030 Plan* showed "improving coordination among transit agencies" is a top priority for Bay Area residents.

Of 45 specific service characteristics ranked for customer dissatisfaction in BART's 2002 Customer Satisfaction Survey, "timely bus connections" ranked in the top 10, marking this a top priority for future improvements.





Isolated connection points can discourage transit use by causing riders to feel unsafe while transferring.

Transfer Point Information and Amenities

Customers who are transferring from one agency to another often need key information and guidance at the transfer point. Switching between trains, buses, ferries and shuttles in busy transit centers can be a confusing task, particularly for first-time riders.

Key transfer locations should provide shelter from the elements, and be comfortable and safe. Beyond these transfer point basics, amenities such as food/drink, bathrooms, telephones and reading materials can provide welcome support for transit riders (where appropriate) and help to attract new customers for trains, buses and ferries.

Members of the Transit Connectivity Working Group concur on the need to improve customer assistance and amenities at transfer hubs. For example, interagency “wayfinding” signage, which directs passengers to connecting services at transit centers, is inadequate at most

stations and highly inconsistent from agency to agency. Institutional barriers (e.g., not knowing whom to contact, signage restrictions imposed by cities, lack of resources for signage maintenance) contribute to and exacerbate signage problems.

Specific problems that discourage new interagency riders and hamper existing users are as follows:

- 1 most of the Bay Area’s rail and ferry stations lack signage that clearly directs customers to nearby connecting buses, shuttles and light rail;
- 2 local transit information displays in stations are often overwhelming, hard to decipher, out-of-date and/or poorly located;
- 3 station staff provide inconsistent levels of customer service, leaving customers unable to count on personal assistance with vital information on connecting services; and
- 4 many transfer points lack basic customer amenities — shelter, seating, safe environment, bathrooms, food/drink, reading materials, etc.



Transit information displays are often overwhelming, hard to decipher, out-of-date and/or poorly located.

Pretrip Planning

Obtaining good pretrip planning information, whether by telephone or over the Internet, is essential for transit riders making new trips or reconfirming information for a trip that has been taken before. Easy, quick access to up-to-date information is especially important for people starting a new job or enrolling in school, residents who have recently moved, visitors from outside the Bay Area, or weekend recreational travelers. “Choice” customers (those with access to cars) who have trouble getting information on interagency transit trips may decide to not use transit. Transit-dependent customers who encounter

problems getting trip planning information may experience longer, inefficient trips or may actually miss work, school, etc.

MTC's 511 TakeTransitSM Trip Planner is a key feature of the multimodal 511 traveler information service provided on the phone at 511 and on the Web at <www.511.org>. 511 minimizes barriers to transit information by supporting connections to transit agencies on the phone and consolidating information about regional transit agencies on the Web. Approximately 16,000 requests for transit information are received on the 511 phone system each week. The web page hosts approximately 140,000 user sessions per week and approximately 75,000 transit itineraries are generated by the 511 TakeTransitSM Trip Planner weekly. In a June 2004 survey, 86 percent of callers to 511 seeking transit information were somewhat or very satisfied with the service.

Callers to 511 can request a connection to the transit agency of their choice for information on routes, schedules, fares, bikes on transit, accessibility and service updates. Callers also can request information on commuter incentives, airports and paratransit service. In addition to transit information, callers can access information about real-time traffic conditions, rideshare options and bicycling. Beginning in 2005, the 511 service will be further enhanced to provide real-time transit arrival information.

As Internet use continues to rise, transit connectivity stakeholders recognize the value of fully implementing a regional transit Web site with



MTC Archives

Friendly station agents can be essential links in a chain of transfers.

Customer Service Centers: Six Barriers to Efficient Trip Planning

- 1 Getting information over the phone for two-agency trips often requires the customer to call one agency, hang up and then call the second agency.
- 2 Transit agencies have different hours for operating telephone information centers.
- 3 Transit agencies' Web sites are not designed to make it easy to construct multiagency trip plans.
- 4 Many Bay Area residents still do not have Internet access at home or work. This is a particular problem for low-income residents.
- 5 Riders are often unclear about or unaware of the best locations for transferring from one agency to another.
- 6 Trip-planning barriers are even harder to overcome for non-English speakers.



an automated trip planner. An important step for improving connectivity will be to complete the expansion of the Regional Transit Database (RTD). In the fully built-out RTD, route, schedule and fare information for all transit operators will be maintained and updated in a unified manner, enabling transit trip planning across agency boundaries.

Table 2: Transit Customer Service Center Characteristics

Transit Agency	Give Multiple Agency Info?	Weekday Hours	Saturday Hours	Sunday Hours	Language Capability?
AC Transit	YES	7AM to 7PM	9AM to 5PM	9AM to 5PM	Staff
BART	YES	6AM to 10PM	6AM to 10PM	8AM to 10PM	Staff & Language Line
Benicia Transit	NO	7AM to 7PM	8:30AM to 7PM	No Sunday Service	N/A
Caltrain	YES	6AM to 10PM	8AM to 8PM	8AM to 8PM	Staff & Language Line
County Connection	NO	6AM to 7PM	8AM to 4:30PM	No Sunday Service	Staff & Language Line
Fairfield/Suisun Transit	NO	5:30AM to 8:30PM	7:30AM to 5:30PM	No Sunday Service	Staff
Golden Gate Transit	NO	7AM to 7PM	8AM to 6PM	8AM to 6PM	Staff
Healdsburg In-City Transit	NO	9AM to 4PM	No Saturday Service	No Sunday Service	N/A
LAVTA/WHEELS	YES	5AM to 1AM	6AM to 12AM	7AM to 11:30PM	Staff
Napa VINE	NO	7:30AM to 6PM	8AM to 5PM	No Sunday Service	N/A
Petaluma Transit	NO	6AM to 7PM	9:30AM to 4:30PM	No Sunday Service	N/A

Transit Agency	Give Multiple Agency Info?	Weekday Hours	Saturday Hours	Sunday Hours	Language Capability?
SamTrans	YES	6AM to 10PM	8AM to 8PM	8AM to 8PM	Staff & Language Line
San Francisco Muni	NO	6AM to 8PM	8AM to 6PM	8AM to 6PM	Staff
Santa Clara VTA	NO	5:30AM to 8PM	7:30AM to 4PM	No Sunday Service	Staff & Language Line
Santa Rosa CityBus	NO	7AM to 6PM	6AM to 7PM	9AM to 6PM	N/A
Sonoma County Transit	NO	7:30AM to 5:30PM	No Saturday Service	No Sunday Service	N/A
Tri Delta Transit	NO	4AM to 2:30AM	4AM to 1:30AM	4AM to 1:30AM	N/A
Union City Transit	NO	3:45AM to 9:30PM	6:00AM to 8PM	7:30AM to 7PM	N/A
Vacaville City Coach	NO	7AM to 7PM	7AM to 7PM	No Sunday Service	N/A
Vallejo Transit	NO	8AM to 5:30PM	No Saturday Service	No Sunday Service	N/A
WestCAT	NO	6AM to 8PM	8AM to 7PM	No Sunday Service	N/A

Despite increasing use of the Internet, direct customer assistance is still the best way for many people to get the transit information they need. As illustrated in **Table 2** on the facing page, many transit operators do not provide operator assistance at night or on weekends, and most do not provide information about services provided by connecting transit operators.

Fare Policies and Fare Collection

Bay Area transit agencies establish their own fare and transfer policies with the goal of attracting and retaining riders while maximizing revenues. For instance, each of the dozen-plus agencies that connect with BART sets its own transfer rules and fare policies (see **Tables 3 and 4**). Even veteran riders can find themselves unsure about transfer discounts, the pros and cons of using multiple-agency passes, rules for seniors and youths, etc. While the TransLink® smart fare card will help to make these differences invisible to riders, this report does not assume that all riders will convert to the TransLink® card once the system is fully implemented across all transit systems.

Three Most Common Fare Problems

- 1 Customers attempting to use more than one system are often faced with a confusing array of transfer and fare policies.
- 2 Customers using two bus systems sometimes pay two fares for a single trip.
- 3 Transit agencies have different age definitions for youths, students and seniors, creating confusion for customers using multiple systems.



Varying fare definitions for youth and seniors can create confusion, especially for new riders.

Table 3: Rail/Bus and Rail/Rail Transfer Policies

Transit Operators	Transfer Policy (as of September 1, 2003)	Transit Operators	Transfer Policy (as of September 1, 2003)
BART and AC Transit	<ul style="list-style-type: none"> Get free two-part transfer in station Present half of transfer on bus, pay \$1.25 (usually \$1.50) Keep other half for next trip back to BART; pay \$1.25 again (good for next week day) AC ended BART Plus pass participation 9/1/03 	BART and Valley Transportation Authority (VTA)	<ul style="list-style-type: none"> From BART, get free transfer in station Present transfer for "local fare credit" No discount to BART: Pay full fare unless using BART Plus
BART and Muni	<ul style="list-style-type: none"> Buy two-part transfer for \$1 in station Transfer machines only take quarters, change machine gives three quarters, two dimes and nickel Present transfer on bus Keep other half for next trip back to BART (good for next day) BART Plus allows \$15-\$50 BART rides plus unlimited bus rides for half-month 	BART and Capitol Corridor	<ul style="list-style-type: none"> Purchase \$10 BART ticket for \$8 on train
BART and Samtrans	<ul style="list-style-type: none"> No discount from BART Pay full fare unless using BART Plus No discount to BART: Pay full fare unless using BART Plus 	BART and Dumbarton Express	<ul style="list-style-type: none"> BART Plus pass accepted as local fare credit or partial transbay fare credit (with transbay upgrade) BART-to-bus transfer accepted as credit for local trips only at Union City BART station BART-to-bus transfer not good for transbay trips
BART and County Connection	<ul style="list-style-type: none"> From BART, get free transfer in station Present transfer on bus and pay 75¢ No discount to BART: Pay full fare unless using BART Plus Can buy special 20-round-trip books for \$25 (usually \$30) 	BART and Golden Gate	<ul style="list-style-type: none"> No transfer discounts to or from BART
BART and Tri Delta	<ul style="list-style-type: none"> From BART, get free transfer in station Present transfer plus 50¢ No discount to BART: Pay full fare unless using BART Plus 	Caltrain and Samtrans	<ul style="list-style-type: none"> Caltrain monthly ticket holders get a local fare credit for transfers to Samtrans buses No discount to Caltrain: Pay full fare
BART and WestCAT	<ul style="list-style-type: none"> No discounts for transfers other than BART Plus: Pay full fare 	Caltrain and VTA	<ul style="list-style-type: none"> Caltrain monthly ticket holders get a local fare credit for transfers to VTA buses and light rail No discount to Caltrain: Pay full fare
BART and WHEELS	<ul style="list-style-type: none"> From BART, get free transfer in station Present transfer plus 60¢ No discount to BART: Pay full fare unless using BART Plus 	Caltrain and Muni	<ul style="list-style-type: none"> Caltrain monthly ticket holders who purchase Peninsula Pass (\$33) ride MUNI free (at all times) Non-Peninsula Pass holders pay full fare
BART and Vallejo Transit	<ul style="list-style-type: none"> Pay full fare 	Caltrain and Dumbarton Express	<ul style="list-style-type: none"> Peninsula Pass holders get local fare credit or partial transbay fare credit Caltrain monthly ticket holders get local fare credit or partial transbay fare credit at Palo Alto station only
BART and Benicia Transit	<ul style="list-style-type: none"> Pay full fare 	Caltrain and Golden Gate	<ul style="list-style-type: none"> No transfer discounts to or from Caltrain
BART and Union City Transit	<ul style="list-style-type: none"> From BART, get free transfer in station Present transfer plus 25¢ No discount to BART: Pay full fare unless using BART Plus 	Caltrain and BART	<ul style="list-style-type: none"> No transfer discounts to or from Caltrain
		Capitol Corridor and AC Transit	<ul style="list-style-type: none"> Get a free two-way transfer from train conductor

Table 4: Fare Definitions for Age Groups

Transit Operator	Senior	Youth	Child
AC Transit	65+	5–17	4 and under free (limit 2)
BART	65+	5–12	4 and under free
Benicia Transit	62+	5–17	5 and under free (limit 2)
Caltrain	65+	5–11	4 and under free (limit 1)
County Connection	65+	Same as adult	Under 6 free
Fairfield/Suisun Transit System	60+	6–18	Under 6 free (limit 2)
Golden Gate Transit	65+	6–18	5 and under free (limit 2)
Healdsburg In-City Transit	60+	5–17	4 and under free
LAVTA/WHEELS	60+	Same as adult	Under 6 free
Napa VINE	65+	6–18	5 and under free (limit 2)
Petaluma Transit	65+	Same as adult	Under 5 free (limit 2)
SamTrans	65+	5–17	4 and under free (limit 1)
San Francisco Muni	65+	5–17	Under 5 free
Santa Clara VTA	65+	5–17	Under 5 free
Santa Rosa CityBus	65+	Student discount w/ ID	Under 5 free (limit 3)
Sonoma County Transit	60+	18 or Under	N/A
Tri Delta Transit	65+	Same as adult	5 and under free
Union City Transit	60+	Same as adult	Under 5 free
Vacaville City Coach	62+	5–18	Under 5 free
Vallejo Transit	65+	6–18	5 and under free (limit 2)
WestCAT	65+	Same as adult	Under 6 free (limit 2)

Transit Operators	Transfer Policy (as of September 1, 2003)
Capitol Corridor and County Connection	<ul style="list-style-type: none"> Get a free two-way transfer from train conductor
Capitol Corridor and WestCAT	<ul style="list-style-type: none"> No transfer discounts to or from Capitol Corridor
Capitol Corridor and Golden Gate	<ul style="list-style-type: none"> No transfer discounts to or from Capitol Corridor
Capitol Corridor and VTA	<ul style="list-style-type: none"> No transfer discounts to or from Capitol Corridor
Capitol Corridor and Altamont Commuter Express (ACE)	<ul style="list-style-type: none"> No transfer discounts to or from Capitol Corridor
Capitol Corridor and Caltrain	<ul style="list-style-type: none"> No transfer discounts to or from Capitol Corridor
ACE and County Connection	<ul style="list-style-type: none"> Show ACE ticket/pass for free transfer to County Connection bus No discount on County Connection to ACE
ACE and WHEELS	<ul style="list-style-type: none"> Show ACE ticket/pass for free transfer to WHEELS bus No discount on WHEELS to ACE
ACE and VTA	<ul style="list-style-type: none"> Show ACE ticket/pass for free transfer to VTA bus No discount on VTA to ACE VTA ACE shuttles free both ways
ACE and AC Transit	<ul style="list-style-type: none"> No transfer discounts to or from ACE
ACE and Caltrain	<ul style="list-style-type: none"> No transfer discounts to or from ACE



107 PLEASANT HILL BART

313

313

111553

95.7 FM
THE BEAR
Your New
Country Station



115 WALNUT CREEK BART

Recommendations

C. PAUL BETTINI TRANSIT CENTER



SAN RAFAEL

Recommendations

This section of the report presents a series of recommendations for improving transit connectivity by addressing gaps and barriers identified in the previous section. Where applicable, examples of best practices or planned improvements are provided. These recommendations include seven major points:

- 1 establish a regional network of transit hubs and services;
- 2 improve regional wayfinding signage and information assistance;
- 3 fully implement the regional transit trip planning system;
- 4 expand real-time transit information;
- 5 improve customer information telephone services;
- 6 plan for “last mile” connecting services; and
- 7 complete the TransLink® rollout and conduct an integrated fare study.

Further development of these recommendations will occur as part of the Regional Measure 2 (RM 2) Connectivity Study, including testing the recommendations through focus groups, surveys or other means of measuring consumer satisfaction and preferences.

In some cases, the best way to improve transit connectivity simply would be to expand existing transit service levels, with more frequent operations minimizing the time necessary to transfer from one service to another. At present, this is not a viable strategy for the region’s operators; indeed many of them are now reducing service levels. These recommendations, therefore, represent a wide range of options, starting with those that can more realistically be accomplished with limited resources.

Some recommendations focus on policy revisions and, as such, are not expected to result in significant new costs to implement them. Other recommendations would improve information sharing, or

Regional Measure 2 Connectivity Improvements

- Direct platform access between Muni and BART at Embarcadero and Civic Center stations in downtown San Francisco
- \$20 million for expanded express bus service and related infrastructure improvements
- \$22 million to integrate TransLink® with operator fare equipment and expand the system to new transit services
- \$20 million for MTC to provide assistance to transit operators in implementing real-time scheduling equipment
- Planning assistance to develop an integrated fare structure program, sponsored by the TransLink® Consortium
- Directs MTC to develop a *Transit Connectivity Plan*. That plan would emphasize the role of transit hubs operating as part of a timed-transfer network or as pulsed hub connections. See **Appendix E** for statutory language describing the plan.

establish common regional goals or standards. Still other improvements are expected to be incorporated into existing regional efforts already under way, most notably the TransLink® universal fare card and customer information programs. Finally, some recommendations involve more extensive, long-term projects for which no new sources of funding have yet been identified.

Fortunately, voters’ approval of RM 2 — which is expected to generate an additional \$125 million in bridge toll revenues each year — provides one new source of funds to support recommendations from this project. The 35-year RM 2 expenditure plan identifies capital, operating and planning projects, several of which specifically address connectivity gaps.

Recommendation 1

Establish a Regional Network of Transit Hubs And Services

The need to enhance a system of regional transit hubs is central to this report. The lack of a clearly designated hub system in much of the Bay Area has emerged as a barrier for customers whose trips involve more than one agency. Ultimately, a system of high-speed trains, express buses and ferries operating between designated regional hubs is the key to developing a seamless Bay Area transit system.

This project identified a preliminary list of 19 interagency transfer hubs (see **Table 5** and the **Proposed Transit Hubs Map** on the inside of the back cover). These 19 hubs were selected, based on their current functionality as interagency transfer locations, from the more than 100 Bay Area rail, bus and ferry stations (listed in **Appendix B**). In 2005, a more technical analysis (including additional data on hub activity) will be conducted through the RM 2 Study to (a) confirm or modify the hub list, (b) analyze how transit agencies interact at these hubs, and



Diridon Station has become the key Santa Clara County hub linking Caltrain, ACE, Capitol Corridor, Amtrak, VTA buses, the downtown DASH shuttle and Santa Cruz buses — plus VTA light rail (under construction). Diridon also will become a key station on the planned South Bay BART extension.

(c) identify opportunities for new services, better schedule coordination and other connectivity improvements.

A regional network of transit hubs must not only include existing transfer locations, but also recognize future plans for rail expansion, a regional express bus network, enhanced water transit and a statewide high-speed rail system. Therefore, a phased approach is recommended for developing a regional transit network based on a series of inter-agency transfer hubs:

Short Term

Design and implement a regional program to increase awareness of the 19 interagency hubs and services so customers (both Bay Area residents and visitors) will know where they can most easily transfer between services. This effort would be the first step toward creating greater public awareness of a regional transit system and would be expanded after the current preliminary list of hubs has been reviewed and refined in the RM 2 Connectivity Study. The hub awareness program should feature a regional map identifying the designated hubs and their connecting services. The map would also provide basic information such as ticket/transfer details and customer amenities for each hub. Awareness will be promoted through www.511.org, print materials, transit agency Web sites, outreach to the media and other low-cost strategies.

Intermediate Term

As part of the *RM 2 Connectivity Plan*, MTC will conduct a detailed and comprehensive analysis of connectivity issues at each of the designated hubs. This effort will identify specific connectivity improvements — including physical infrastructure, right-of-way enhancements, schedule coordination, signage, customer information and traveler amenities — that will increase transit ridership and customer satisfaction. For each hub, the analysis will propose a set of actions ranging from relatively low-cost, near-term improvements such as better directional signs to higher-cost, longer-term strategies such as new tunnels or walkways between connecting services.

Hub Selection Criteria

Step 1: Initial Selection

- 1 Station/center connects three or more transit services OR
- 2 Station/center shows an above-average interagency connecting transit mode share OR
- 3 Station/center is the most important transit center in a county or subregion, as defined by local transit agencies

Step 2: Quantitative Screening

- 4 Volume of service as indicated by number of buses, trains or ferries per day
- 5 Volume of service as indicated by number of rail boardings per day

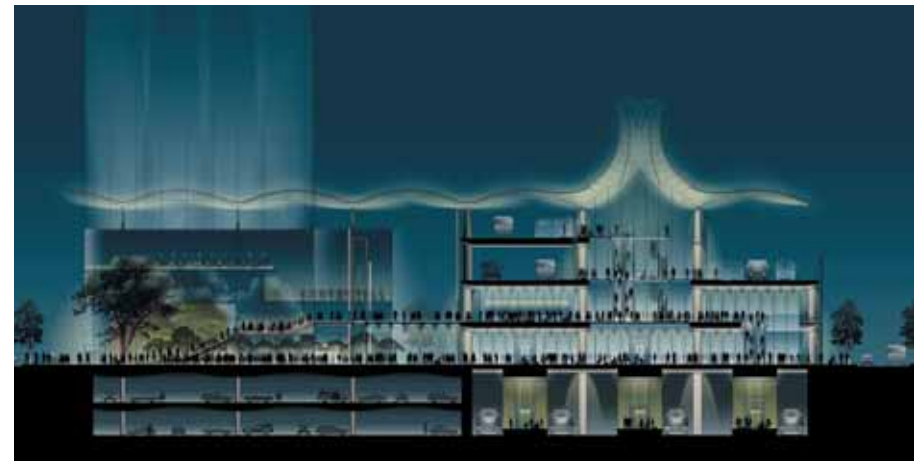
Long Term

The *Bay Area Regional Rail Plan* (to be completed by July 2006 per RM 2) and MTC's Transportation/Land Use Platform provide an opportunity for the Commission and its partners to identify and establish a highly integrated system of regional hubs and services that closely ties together all of the region's rail, bus, ferry, bike, walking and other transportation networks.

RM 2 calls for MTC to develop and adopt a *Bay Area Regional Rail Plan* for the short-, intermediate- and long-term development of passenger rail services. BART and Caltrain will provide day-to-day management and technical support for the development of the plan, which will be governed by a steering committee of appointees from MTC, BART, Caltrain, Amtrak, Altamont Commuter Express, the California High-Speed Rail Authority, Valley Transportation Authority, Sonoma-Marín Area Rail Transit and other Bay Area rail interests.

The plan will produce strategies to better integrate passenger rail systems, improve interfaces with connecting services, expand the regional rapid transit network and coordinate investments with transit-supportive land use.

MTC's Transportation/Land-Use Platform, developed for the *Transportation 2030 Plan*, can lend vital support to regional connectivity efforts. The platform encourages changes to local land-use plans to support transit-oriented development where the region is making major transit expansion investments. While MTC does not have control over local land-use decisions, it can establish conditions for transportation funding that support transit-oriented development near major transit hubs. This will help to both develop future transit hubs that support the region's transportation and land-use goals and promote transit connectivity.



San Francisco, AC Transit and Caltrain have formed a joint powers authority to redevelop and expand San Francisco's Transbay Terminal — linking transit services for seven counties and a possible high-speed rail service — and to develop high-density, mixed-income housing.

Table 5: Proposed Regional Transit Hubs

Hub	Primary Selection Criteria			Other Data	
	Services	Connecting Mode Data	Key Interagency Connections	AM Peak Transit Vehicles (all modes)	AM Peak Entries/ Exits (rail only)
Diridon Caltrain San Jose	Caltrain, Capitols, Amtrak, Altamont Commuter Express (ACE), Valley Transportation Authority (VTA), Santa Cruz Transit	N/A	Three important train lines (Caltrain, ACE and Capitol Corridor) connect to downtown San Jose's VTA bus and light-rail (future) network and to Santa Cruz area buses	276	5,822
Great America Santa Clara	ACE, Amtrak, VTA light rail, shuttles	42 percent of ACE riders transfer to VTA	First opportunity for East Bay/San Joaquin ACE and Capitol Corridor riders to transfer to VTA dedicated shuttles and light rail	104	1,180
Mountain View Caltrain	Caltrain, VTA light rail, buses, shuttles	N/A	First opportunity for SF/Peninsula Caltrain riders to transfer to VTA light rail network	87	3,199**
Palo Alto Caltrain	Caltrain, Samtrans, VTA buses, Dumbarton Express, shuttles	N/A	Key link between VTA buses and Samtrans buses. Dumbarton Bridge transit corridor connects with Caltrain. Major Stanford shuttle system.	219	3,466**
Millbrae BART/Caltrain	Caltrain, BART, shuttles	N/A	Only Bay Area direct BART/Caltrain connection plus BART shuttle to SFO	79	2,112
Caltrain Terminus (4th and King) San Francisco	Caltrain, Muni, Samtrans	37 percent of SF Caltrain riders use Muni to reach station	Only Caltrain connection to SF Muni light-rail network and downtown SF shuttle buses	376	6,848***
Ferry Terminal San Francisco	Golden Gate, Muni, Oakland/Alameda Ferry, Vallejo Ferry, Harbor Bay Ferry, Amtrak buses	9 percent of Golden Gate ferry riders transfer to Muni	Connects Bay Area ferry network with Muni and BART. Three-block walk to Transbay Terminal buses.	508	0***
Transbay Terminal San Francisco	AC Transit, Muni, Samtrans, Golden Gate, Greyhound	3,000 AC riders transfer to/from Muni daily	Major bus connector for Muni, AC Transit, Golden Gate and Samtrans. One-block walk to BART.	819	0***
Embarcadero BART San Francisco	BART, Muni, Golden Gate, Samtrans, shuttles	55 percent of BART riders use bus or LT to reach station	First opportunity for westbound BART riders to transfer to Muni light rail and buses. One-block walk to Ferry Terminal and 1-2 blocks to Transbay Terminal.	767	100,756***
Civic Center BART San Francisco	BART, Muni, Golden Gate Transit, Samtrans	51 percent of BART riders use bus or LT to reach station	Best transfer point for many SF Muni light rail/bus riders to BART	897	22,774***
Richmond BART/Amtrak	BART, Amtrak, AC Transit, Golden Gate Transit	24 percent of BART riders use bus to reach station	Only East Bay direct Amtrak/BART connection	132	7,506

		Primary Selection Criteria		Other Data	
Hub	Services	Connecting Mode Data	Key Interagency Connections	AM Peak Vehicles (all modes)	AM Peak Entries/ Exits (rail only)
El Cerrito del Norte BART	BART, Vallejo Transit, AC Transit, WestCAT, Golden Gate Transit	27 percent of BART riders use bus to reach station	BART transfer to Solano and Marin buses	280	19,013
Pleasant Hill BART	BART, Benicia Transit, County Connection, Fairfield/Suisun, WHEELS	8 percent of BART riders use bus to reach station	BART transfer to Solano buses	169	11,633
12th St Oakland BART	BART, AC Transit	46 percent of BART riders use AC to reach station	Key transfer point from BART to AC Transit bus network plus walk/shuttle to Jack London Square ferries and Amtrak	479	26,830
Dublin/Pleasanton BART	BART, WHEELS, Amtrak buses, County Connection, Modesto Area Express/MAX, San Joaquin Regional Transit/SMART	8 percent of BART riders use bus to reach station	BART transfer to San Joaquin buses plus shuttle to ACE	171	7,527
Fremont BART*	BART, AC Transit, VTA	13 percent of BART riders use bus to reach station	Key transfer point for East Bay BART to VTA network	179	9,028
San Rafael Transit Center	Golden Gate, Greyhound, Airporters	N/A	SF-Marin-Sonoma buses transfer to bus to East Bay BART	121	0
Santa Rosa Transit Mall	Golden Gate, Santa Rosa Transit, Sonoma Transit, Mendocino Transit, Airporters	N/A	SF-Marin-Sonoma buses transfer to Mendocino buses	196	0
Vallejo Ferry Terminal*	Vallejo Ferry, Napa Transit, Benicia Transit	N/A	Vallejo-SF ferries transfer to Napa and Solano buses	88	0

* Currently, neither Southern Alameda County nor Solano County has an obvious primary interagency regional hub. Southern Alameda County has Fremont BART (BART/VTA/AC), the Fremont ACE/Amtrak station and Union City BART (BART/ Dumbarton/AC). Solano County has the Vallejo Ferry (ferries, buses), the Fairfield Transit Center (buses) and the Suisun Amtrak station (Amtrak, buses).The RM 2 study will review these issues.

** Figures are for Caltrain, BART,ACE and Amtrak only because the Connectivity Project was unable to obtain consistent, comparable and up-to-date data across the region for bus and light rail entries/exits at transfer hubs.The addition of the bus and light rail numbers, which will provide a more complete description of each hub's activity, will be accomplished during the Regional Measure 2 Connectivity Study in 2004-05.That study will also review similar data for other transfer points that have been suggested by transit agencies and other entities for inclusion in the Regional Transit Hub list.

*** Passenger entries and exits for connecting Muni light rail, cable car, trolley bus and other bus lines for an average 24-hour period as follows: 4th and King-13,651;Transbay Terminal-8,513; Ferry Terminal-4,674; Embarcadero-31,638; Civic Center-28,258.



The San Rafael Transit Center has a good signage system that clearly directs riders to the proper platform.

Recommendation 2

Develop a Regional Wayfinding Signage and Information Assistance Program

MTC will lead an effort, as part of the RM 2 Connectivity Study, to develop a regionally consistent program of wayfinding signage and information assistance. While implementation of these improvements may initially focus on the designated regional hubs, the ultimate goal is to provide travelers — both Bay Area residents and visitors — with a dependable level of information and assistance across the region.

Phase 1 of the study would:

- identify agencies/jurisdictions needed to participate in signage and information improvement;
- obtain customer input;
- determine regional standards/guidelines for signage (graphics, colors, location, sizes, amounts, relationships);
- recommend a wayfinding signage and on-site information program and develop an implementation plan, including cost estimates for ongoing maintenance and monitoring; and

- recommend a regional 24/7 information program and develop an implementation plan, including cost estimates for ongoing operation.

Phase II of the effort would implement findings and recommendations emerging from Phase I.

Recommendation 3

Fully Implement Regional Transit Trip-Planning System

The Transit Connectivity Project recognizes the importance of fully implementing MTC's TakeTransitSM Trip Planner and supports its expansion to include all agencies in the region. The Trip Planner, an important step forward for interagency connectivity, allows customers to simply enter online an origin, destination and trip time to receive a detailed, multiagency trip itinerary showing service providers, routes, times and fares.

MTC will continue efforts to bring all transit agencies on board, and will clearly document expectations to do so in the next update



Muni has developed extra-large signs at the Embarcadero BART/Muni Metro station that clearly direct the large crowds (including many new transit riders) headed to the baseball park.



BART's new platform information displays provide significantly improved real-time train information.

of the *Transit Coordination Implementation Plan* (MTC Resolution 3055). MTC recognizes the importance of making the Trip Planner available to all Bay Area transit customers through a

sustained commitment from all transit agencies in the system. Once the database is complete, the database operator and participating agencies will need to keep the data up to date to ensure a high level of accuracy when schedule information is provided to the public. The *RM 2 Connectivity Plan* will clearly describe MTC's expectations for ongoing agency support.

Recommendation 4

Expand Real-Time Transit Information

One tool to enhance transit connectivity is expanded use of real-time transit information, which provides customers with actual real-time schedule information on arrival/departure times for buses, trains and ferries. A number of operators are currently designing or implementing real-time tools for their riders (see **Appendix C** for details). The Transit Connectivity Project supports these efforts and recommends regional coordination of real-time implementation.

Thanks to passage of RM 2, a \$20 million MTC grant program will be avail-



AC Transit is testing real-time bus information at the El Cerrito del Norte BART station.

able to assist transit operators with the implementation of real-time transit information systems. These systems will provide information to riders at transit stops or via telephone, wireless devices or the Internet while also helping agencies communicate with adjoining operators to improve schedule coordination. RM 2 requires that priority be given to projects identified in MTC's *2005 RM 2 Transit Connectivity Plan*. However, given the interest of transit agencies and the very near-term opportunities for implementation, this report recommends that the region accelerate the implementation of the RM 2-funded real-time transit information program based on the work conducted for this report. MTC will develop criteria to allocate these funds, including the condition that recipients of funds will make the real-time transit information available to the 511 phone and Web services. Other criteria could include how far along the agency's real-time transit program already is or the need to communicate with adjoining transit agencies to improve schedule coordination at transit hubs.



MTC and Muni will test customer phone access to "next-train" information for Muni Metro stops.

The Bay Area Regional Intelligent Transportation Systems (ITS) Architecture (adopted in the fall of 2004) includes operator-specific plans for real-time transit information technology. The architecture also recommends establishment of a standard interface between these real-time systems as a high priority follow-up project. Establishing a common methodology for data exchange between transit agencies' real-time systems will improve information sharing among the region's operators, and simplify integration of real-time transit information into the 511 traveler information service.

Recommendation 5

Improve Customer Telephone Information Services

The Transit Connectivity Project recommends that customer information phone services be improved in two ways. First, "after-hours" service should be available by phone so customers from any part of the region can obtain comprehensive transit information when they need it, even if their local agency's information center is closed. Possible options



Shuttles, taxis and vanpools play a critical role in covering the "last mile" for transit passengers.

include rolling over calls from closed agencies to one or more agencies that remain open later in the evening or creating new "after hours" telephone information services. MTC is investigating the feasibility and cost of these approaches in order to recommend a preferred strategy.

Secondly, transit service information should be provided in languages other than English. Currently, transit agencies provide multiple-language capabilities in some parts of the region using agency staff or through contract with language-line type services. On behalf of the operators, MTC is exploring how to extend this assistance to all agencies through a regional contract with a language-line provider or other means. In addition, MTC should pursue funding to expand the 511 telephone system to serve non-English callers.

Recommendation 6

Plan for "Last-Mile" Connecting Services

Shuttles, taxis and vanpool services play an important role in enhanced connectivity. The RM 2 Connectivity Study should include a strategic, regionwide plan for developing "last-mile" connecting services. This project would be coordinated with the Bay Area Air Quality Management District, which currently funds the regional Shuttles Working Group and which provides significant funding for public/private shuttle programs in the region.

The plan's goals would include:

- identify successful regional "last-mile" services (bus, shuttle, bike, pedestrian, taxi, etc.) and evaluate their effectiveness in complementing fixed-route bus and rail services;
- recommend strategies to better integrate shuttles or other last-mile services with existing public transit (e.g., enhance customer awareness, identify infrastructure improvements, etc.);
- recommend strategies to improve the ways last-mile services enhance transit connectivity;

- identify potential new markets for expanding shuttle/last-mile services;
- identify opportunities for creative planning and funding partnerships between businesses, cities, transit agencies, universities and others that support last-mile services; and
- develop a financial plan to maintain existing services and to expand where it is most cost-effective to do so.

Recommendation 7

Complete TransLink® Roll-out and Conduct Integrated Fare Study

Full regional rollout of the TransLink® program will allow riders to transfer among all Bay Area agencies with a single universal pass, and will greatly simplify fare collection processes for the operators. Indeed, transit operators ultimately are expected to phase out paper transfers, tickets and printed passes, leaving TransLink® and cash as the sole remaining fare instruments.

Once TransLink® is fully integrated, it will provide the opportunity to address other policy-related aspects of fare collection, including uniform regional definitions of various fare categories (child, youth, senior), and a uniform regional transfer policy. Under RM 2, the TransLink® Consortium is charged with developing a plan for an integrated fare program covering all regional rapid transit trips. Policy-related questions such as those identified through this study should be addressed via that plan. These actions will encourage greater use of the region's transit network by making travel easier and less costly for transit riders whose regular commute involves multizonal travel and may involve transfers between two or more transit agencies. Special discount fares currently available (usually on a monthly basis) to regular transit customers will be incorporated into TransLink® as well.

Table 6: Summary of Recommended Connectivity Improvements

Recommendation	Next Steps	Lead Agency/Partners
Establish a regional network of transit hubs	(a) Adopt preliminary set of 19 transit hubs as the focus of short-term information improvements (b) Develop specific project proposals for medium and long-term improvements	MTC/stakeholders in RM 2 Connectivity Study
Develop a regional Wayfinding Signage and Information Assistance Program	RM 2 Connectivity Study	MTC/ transit agencies (BART, Caltrain)
Fully implement regional transit trip-planning system	<i>Transit Coordination Implementation Plan Update</i>	MTC/ transit operators
Expand real-time transit information	Adoption of Regional Intelligent Transportation Systems Architecture; develop criteria for awarding RM 2 grants	MTC/ transit operators
Improve customer information telephone services	<i>Transit Coordination Implementation Plan Update</i>	MTC/ transit operators
Plan for "last-mile" connecting services	RM 2 Connectivity Study	MTC/ Air District
Complete TransLink® roll-out and conduct integrated fare study	RM 2 Connectivity Study, <i>Transit Coordination Implementation Plan Update</i> , Integrated Fare Study	MTC/ TransLink® Consortium



Conclusion/Next Steps



No Smoking

Conclusion/Next Steps

A Regional Measure 2 (RM 2) Transit Connectivity Study is required by statute to be completed and adopted by the Commission as part of the *Transit Coordination Implementation Plan* update by December 2005. The RM 2 Transit Connectivity Study will consider and build upon the findings in this *Transit Connectivity Report*.

MTC finalized a scope of work for the RM 2 Transit Connectivity Study project and issued a request for proposal (RFP) to solicit consultant assistance in the fall of 2004, with the goal of initiating the project in early 2005. **Appendix E** provides statutory language directing MTC's efforts for the study. Key tasks for the upcoming study are envisioned as follows:

- define a regional network of transit hubs to connect regional rapid transit services to one another, and to feeder transit services;
- establish definitions and service thresholds for timed-transfer or pulsed-hub connections;
- identify physical infrastructure and right-of-way improvements to improve system reliability and connections at transit hubs;
- identify amenities (benches, shelters, bathrooms, improved access to transit information, etc.) that would promote transit connectivity at the transit hubs;
- recommend a wayfinding signage program and develop an implementation plan, including identifying agencies/jurisdictions needing to participate in the program, and respective cost estimates for developing and maintaining the program;
- evaluate current methods for promoting schedule coordination, and recommend regional standards and procedures to minimize transfer times between transit lines at key transit hubs;
- develop a plan for “last-mile” connecting services;
- establish performance measures and recommend data collection procedures to assess ongoing connectivity plan implementation; and
- prepare the draft and final *Transit Connectivity Plan*.



Full implementation of TransLink® will make fare collection payment a breeze for passengers — and simplify fare collection for transit operators.



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N - Inbound

Appendix A: Transit Connectivity Working Group Members

AC Transit

**Jaimie Levin, Victoria Wake,
Ken Rhodes, Aaron Priven**
1600 Franklin Street
Oakland, CA 94612
510.891.7244
jlevin@actransit.org
Vwake@actransit.org
Krhodes@actransit.org
Apriven@actransit.org

BART

Malcolm Quint
300 Lakeside Drive
Oakland, CA 94604
mquint@bart.gov

San Francisco Municipal Railway

Ron Niewiarowski
1145 Market Street, 3rd floor
San Francisco, CA 94103
415.934.3938
Ron_Niewiarowski@ci.sf.ca.us

Caltrain/SamTrans

Corinne Goodrich, Marion Payet
P.O. Box 3006
San Carlos, CA 94070
650.508.6200
goodrichc@samtrans.com
payetm@samtrans.com

Valley Transportation Authority

Chris Augenstein, Mike Aro
3331 North First Street
San Jose, CA 95134
408.321.7093
Chris.augenstein@vta.org
Mike.aro@vta.org

Golden Gate Transit

Linda Mitchell
1011 Anderson Drive
San Rafael, CA 94901
415.457.4427
lmitchell@goldengate.org

League of Women Voters

Eva Alexis
1340 Arch Street
Berkeley CA 94708
510.839.1608
evaalexis@attbi.com

Bay Area Council

Michael Cunningham
200 Pine Street #300
San Francisco, CA 94104
415.981.6600
mcunningham@bayareacouncil.org

City of Oakland, Office of Public Works

Shanna O'Hare
250 Frank Ogawa Plaza
Oakland, CA 94612
510.238.6613
Sohare@oaklandnet.com

City of Palo Alto

Gayle Likens
P.O. Box 10250
Palo Alto, CA 94303
650.329.2136
gayle.likens@city.palo.alto.ca.us

Peninsula Alliance

**Christine Maley-Grubl,
David Nelson**
1150 Bayhill Drive, Suite 107
San Bruno, CA 94066
650.558.8170
Christine@commute.org
David@commute.org

City and County of San Francisco

Charles Rivasplata
City and County of San Francisco
1660 Mission Street
San Francisco, CA 94103
(415) 558-6255
charles.rivasplata@sfgov.org

San Mateo CCAG

Rich Napier, Walter Martone
555 County Center, 5th floor
Redwood City, CA 94063
650.599.1420
rnapierr@co.sanmateo.ca.us
wmartone@co.sanmateo.ca.us

Alameda County Transportation Authority

**Christine Monsen,
Executive Director**
426 17th Street, Suite 100
Oakland, CA 94612
510.893.3347, ext. 103
cmonsen@acta2002.com

Solano Transportation Authority

Elizabeth Richards
333 Sunset Avenue
Suisun City, CA 94585
800.53.KMUTE
erichards@STA.SNCL.com

Central Contra Costa Transit Authority

Cindy Dahlgren
2427 Arnold Industrial Way
Concord, CA 94520
925.676.1976
cdahlgren@cccta.org

Metropolitan Transportation Commission

Connie Soper
101 8th Street
Oakland CA 94607
510.464.7746
csoper@mtc.ca.gov
Bruce Riordan
3115 Eton Avenue
Berkeley CA 94705
510.655.0939
brriordan@lmi.net

Appendix B: Complete Bay Area Station List: Bay Area Rail Stations, Ferry Terminals and Bus Centers

ACE

Diridon (Capitol Corridor, Caltrain)
 Fremont (Capitol Corridor)
 Great America (Valley Transportation Authority/VTA Light Rail, Capitol Corridor)
 Livermore
 Pleasanton

AMTRAK

Antioch
 Berkeley
 Diridon (ACE, Caltrain)
 Emeryville
 Fremont (ACE)
 Great America (ACE, VTA Light Rail)
 Hayward
 Martinez
 Oakland
 Richmond (BART)
 Suisun

BART

12th Street Oakland
 16th Street Mission
 19th Street Oakland
 24th Street Mission
 Ashby
 Balboa Park
 Bay Fair
 Berkeley
 Castro Valley
 Civic Center (Muni Metro)
 Coliseum/Airport
 Colma
 Concord
 Daly City
 Dublin/Pleasanton
 El Cerrito del Norte
 El Cerrito Plaza
 Embarcadero (Muni Metro)
 Fremont
 Fruitvale
 Glen Park
 Hayward
 Lafayette
 Lake Merritt
 MacArthur
 Millbrae (Caltrain)
 Montgomery (Muni Metro)
 North Berkeley

North Concord/Martinez
 Orinda
 Pittsburg/Bay Point
 Pleasant Hill
 Powell (Muni Metro)
 Richmond (Amtrak)
 Rockridge
 San Bruno
 San Leandro
 SFO

South Hayward
 South San Francisco
 Union City
 Walnut Creek
 West Oakland



Bus passengers at the San Rafael Transit Center

CALTRAIN

22nd Street
4th and King (Muni Metro)
Atherton
Bay Meadows
Bayshore
Belmont
Blossom Hill
Broadway
Burlingame
California Avenue
Capitol
College Park
Gilroy
Hayward Park
Hillsdale
Lawrence
Menlo Park
Millbrae (BART)
Morgan Hill
Mountain View (VTA Light Rail)
Palo Alto
Paul Avenue
Redwood City
San Antonio
San Bruno
San Carlos
San Jose Diridon (ACE, Capitol Corridor)
San Martin
San Mateo
Santa Clara
South San Francisco
Stanford
Sunnyvale
Tamien (VTA Light Rail)

FERRIES

Alameda
Alameda Harbor Bay
Larkspur
Oakland
Sausalito
San Francisco Ferry Terminal
Tiburon
Vallejo

MAJOR BUS CENTERS

(not attached to rail station)

Fairfield — Transportation Center
Milpitas — Great Mall
Oakland — Eastmont
San Francisco — Transbay Terminal
San Jose — Eastridge
San Jose — Transit Mall
San Rafael — Transit Center
San Ramon
Santa Rosa — Transit Mall
Vallejo — Downtown

MUNI METRO

Castro
Civic Center (BART)
Embarcadero (BART)
Forest Hills
Montgomery (BART)
Powell (BART)
Van Ness
West Portal

VTA LIGHT RAIL

Baypointe
Mountain View (Caltrain)
Tamien (Caltrain)



Signage at the Fairfield Transportation Center

Appendix C: Real-Time Scheduling Information – Status of Implementation Among Bay Area Transit Operators

Agency Contact	Category* Active Fleet Size	CURRENT STATUS	PRIMARY INTENT	Short Term Plans	Long Term Plans	Expected Cost
AC Transit John Rudniski 510.577.8803	Large 700 buses	<ul style="list-style-type: none"> Real-time information available along the San Pablo corridor with 50 display units (three routes: 72, 72R, & 72M) All 700+ buses equipped with automated vehicle location (AVL) Additional funding desired for expansion AVL based on Orbital Real time scheduling operation based on NextBus (only simple longitude/latitude data needed) AC uses their radio system for polling of GPS data. This allows for cost savings over a full NextBus system which charges a per bus per month fee for wireless communications. 	<ul style="list-style-type: none"> Improve overall service quality Increase and retain ridership 	<ul style="list-style-type: none"> Currently on a three-year contract with NextBus 	<ul style="list-style-type: none"> Expand NextBus onto the major trunk lines 	<ul style="list-style-type: none"> AVL system cost was part of an overall radio communications upgrade, so a definite figure is not available NextBus capital cost was \$70,000 NextBus operations cost is \$75,000/year (assumption is that these operation costs are for the three routes)
BART Frank Ruffa 510.464.6573	Large 669 heavy rail	<ul style="list-style-type: none"> Current supervisory system gives real time data with 95% accuracy Real time arrival information has been available for decades; the current version is three years old 	<ul style="list-style-type: none"> Improve overall service quality 	<ul style="list-style-type: none"> Real time arrival information to be fed into the BART Web site Provide a “clean” version for public consumption Improve network security 	<ul style="list-style-type: none"> Upgrade the core system to comply with modern standards Move towards standardization of system architecture Use open source software, instead of proprietary 	<ul style="list-style-type: none"> Too complex and multi-faceted to be estimated

Agency Contact	Category* Active Fleet Size	CURRENT STATUS	PRIMARY INTENT	Short Term Plans	Long Term Plans	Expected Cost
Caltrain Frank Burton 650.508.7991 or Chuck Harvey, COO 650.508.7720	Medium 73 cars 23 locomotives	<ul style="list-style-type: none"> Currently conducting a preliminary study identifying four major project components: <ol style="list-style-type: none"> central control office upgrades, station upgrades, rolling stock equipment upgrades, and improved interagency link 	<ul style="list-style-type: none"> Improve overall service quality 	<ul style="list-style-type: none"> The major project components include: communication systems upgrades, addition of amenities at seven stations, other infrastructure improvements, software upgrades, and personnel training 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Total cost as estimated in the study: \$4,690,000 (central control office: \$440,000; station upgrades: \$525,000; Rolling stock equipment: \$3,300,000; interagency link: \$425,000)
Central Contra Costa Transit Authority Cindy Dahlgren 925.676.1976 Tech: Steve Miraglo 925.676.1976	Medium 112 motor bus	<ul style="list-style-type: none"> An outdated AVL system in place and not being used Newer AVL-like annunciators and GPS devices by Clever Design on some buses 	<ul style="list-style-type: none"> Customer satisfaction 	<ul style="list-style-type: none"> None due to funding constraints; there are many more pressing needs 	<ul style="list-style-type: none"> Would be interested in its application by other systems 	<ul style="list-style-type: none"> N/A
Fairfield-Suisun Transit Kevin Daughton	Small 30 motor coaches 8 paratransit	<ul style="list-style-type: none"> No AVL 	<ul style="list-style-type: none"> Improve operations and customer service 	<ul style="list-style-type: none"> A \$5M study currently in progress, planning for countywide implementation, that looks at AVL/Smartbus technologies 		<ul style="list-style-type: none"> If there are leftover funds from the study, they may be diverted to capital investments in real time scheduling
Golden Gate Transit Ron Downing 415.257.4583 Tech: Bruce Orcutt 415.257.4493	Medium 5 ferry 215 buses	<ul style="list-style-type: none"> None in place. GGT might have funding in place for a rudimentary AVL radio system. They will know more in near future. 	<ul style="list-style-type: none"> Address long wait lines by giving customers some reliability. Increase and retain ridership GGT must replace its radio system and they want it to be an AVL system like LAVTA's. 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Implement an AVL system in five years; no set timetable for real-time info implementation 	<ul style="list-style-type: none"> Unsure

Appendix C: Real Time Scheduling Information – Status of Implementation Among Bay Area Transit Operators *(continued)*

Agency Contact	Category* Active Fleet Size	CURRENT STATUS	PRIMARY INTENT	Short Term Plans	Long Term Plans	Expected Cost
Livermore Amador Valley Transit Authority (LAVTA)/ WHEELS Corey LaVigne 925.455.7561	Small 67 motor bus 17 demand response	<ul style="list-style-type: none"> AVL system implementation is complete for 80 buses in the active fleet as of March 2004. Contracted with Siemens for vehicle locator, paratransit and dispatching package that also comes with real time schedule software LAVTA hired one full-time employee to work with the data. Their system polls every 30 seconds. 	<ul style="list-style-type: none"> Provide information to customers Improve operational efficiency 	<ul style="list-style-type: none"> Phase I: AVL/Real time testing is currently going on until December to fix the bugs; formal announcement will be made then Phase II: Integration of real time scheduling system with the hardware Transit signal priority project is also a part of the ITS effort 	<ul style="list-style-type: none"> Upgrade the system as necessary The reason Siemens was chosen was because of its advanced technology based on 800MHz, rather than CDPD; also, Siemens system had the best protection against obsolescence 	<ul style="list-style-type: none"> Project costs: \$3.25 million LAVTA has secured funding for the current fiscal year's operation costs
SamTrans Frank Burton 650.508.7991	Medium 323 motor bus 79 van	<ul style="list-style-type: none"> AVL technology in place on all SamTrans revenue and paratransit vehicles Information on vehicle location available to customer service reps (limited) Predictive departure info available at Millbrae BART. System by Transit Television Networks. Information based on AVL data from Orbital Systems. Kiosks and bus bay displays direct riders from BART/train platforms to correct bus bays. System designed for easy expansion. Additional funding needed for expansion. Exploring public/private partnerships with shopping centers. Samtrans leases time from a local radio tower that covers only the northern area of their service area. To add coverage they would need to add a node to the tower. This is technically feasible but requires funding. If communications system goes down then the display sign and kiosks reflect schedule information as opposed to real-time data. The Orbital data has hooks designed with it so that Transit Television Network's predictive application can pick up the data. Samtrans owns the entire system and their polling is every two minutes. 	<ul style="list-style-type: none"> To provide departure information to riders To direct passengers to departure points Improve operational efficiency 	<ul style="list-style-type: none"> Explore partnerships to expand systems to shopping centers Explore funding sources for expansion to key BART/ Samtrans points including Colma and Daly City stations 	<ul style="list-style-type: none"> Expand passenger info system to all stations and selected wayside midroute bus stops Provide passenger info on bus performance status via web and telephone 	<ul style="list-style-type: none"> Current maintenance costs are \$20,000/year

Agency Contact	Category* Active Fleet Size	CURRENT STATUS	PRIMARY INTENT	Short Term Plans	Long Term Plans	Expected Cost
Santa Rosa Mona Babauta 707.543.3331	Small 26 motor bus	<ul style="list-style-type: none"> Demand for AVL and real time scheduling is not there due to mostly disabled/student customer demographics In terms of AVL, the joke is that you can go to the tallest building in Santa Rosa and see where all the buses are 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Financial plans mention implementing an AVL system by 2005 	<ul style="list-style-type: none"> Wait for the technology to mature and become more reliable 	<ul style="list-style-type: none"> The AVL plan for 2005 allocates \$1 million
SF Muni Duncan Watry 415.934.3937	Large 40 cable car 178 light rail 499 motor bus 330 trolley bus	<ul style="list-style-type: none"> No preexisting AVL system; AVL and NextBus are being implemented together Implementation in three phases by mode. Phase One: currently on Muni Metro, cable cars and 22 Fillmore. Phase two: trolley coach. Phase three: motor coaches. Muni owns their NextBus system and has purchased a perpetual license to the NextBus algorithms 	<ul style="list-style-type: none"> Based on positive customer feedback during the pilot project 	<ul style="list-style-type: none"> A \$2 million 2003 federal earmark is currently frozen. MTC and Muni are working together to free up the funds. Seeking RM2 funds for phases 2 and 3 	<ul style="list-style-type: none"> Implement AVL/real-time equipment on all vehicles 	<ul style="list-style-type: none"> Total expected project costs are as follows: \$11.5 million capital \$1.3 million operations and maintenance
Sonoma County Transit Bryan Albee 707.585.7516		<ul style="list-style-type: none"> Sept. '02: All the buses have GPS but there is no live telecommunications. The data is downloaded every night from the bus into their main system. 				
Tri Delta Steve Ponte 925.754.6622	Small 44 motor bus 16 paratransit	<ul style="list-style-type: none"> AVL implementation to be completed for dial-a-ride buses by the end of the year 	<ul style="list-style-type: none"> Know where the buses are Feed information to passengers Improve overall system efficiency 	<ul style="list-style-type: none"> Finish the implementation of AVL on the entire bus fleet by 2005 – 6 	<ul style="list-style-type: none"> Eventually implement real-time technology after the AVL framework is in place 	<ul style="list-style-type: none"> \$500,000 to \$750,000 for dial-a-ride AVL Needs funding for real-time scheduling

Appendix C: Real Time Scheduling Information – Status of Implementation Among Bay Area Transit Operators *(continued)*

Agency Contact	Category* Active Fleet Size	CURRENT STATUS	PRIMARY INTENT	Short Term Plans	Long Term Plans	Expected Cost
Vallejo Pam Bellchamber 707.553.7224	Small 52 motor bus 10 paratransit 3 ferry	<ul style="list-style-type: none"> • GPS on ferries • No AVL 	<ul style="list-style-type: none"> • Improved customer service • Coast Guard requirement 	<ul style="list-style-type: none"> • Participating in countywide AVL study, driven by Fairfield Suisun Transit, that looks at AVL/Smartbus technologies 		<ul style="list-style-type: none"> • If there is some leftover funding from the study, it may be diverted to capital investments in real time scheduling
VINE Peter Engel 707.259.8779		<ul style="list-style-type: none"> • Started an AVL system for signal pre-emption, but it did not work well. VINE is phasing out the system. 				
Valley Transportation Authority Jim Unites 408.321.7032	Large 430 motor bus 80 light rail 4 historic trolley	<ul style="list-style-type: none"> • AVL technology implementation completed and operational since last year. No real-time information available to public. 	<ul style="list-style-type: none"> • Increase/retain ridership • Better customer experience 	<ul style="list-style-type: none"> • Get the intelligent transportation systems earmark for real time approved • Devise a system integration plan to link all communication systems • Finalize funding sources (e.g., Caltrans) • Go through an open procurement process to obtain real time software, and test for reliability on selected routes • Implement real time on all light-rail stations, and on Bus Rapid Transit Route 22 (El Camino Real) then move on to other major bus stops 	<ul style="list-style-type: none"> • Acquire funding to purchase additional display devices 	<ul style="list-style-type: none"> • Intelligent Transportation Systems (ITS) earmark is \$1.6 million; total cost for the first phase (light rail) is \$3 million
WestCat Aleida Chavez 510.724.3331 Cyrus Minofar Alameda CMA 510.836.2560, ext. 14	Small 38 coaches 12 vans	<ul style="list-style-type: none"> • All vehicles equipped with AVL. 30 second polling. Using for fleet management, not bus arrival information for public. Staff Web site. 	<ul style="list-style-type: none"> • Fleet management 	<ul style="list-style-type: none"> • Applied for \$450,000 grant from Bay Area Air Quality Management District for transit priority traffic signals. • Customer service info with web and kiosks 	<ul style="list-style-type: none"> • Interested in system like LAVTA's 	

* No data available: Rio Vista Transit, Cloverdale Transit, Union City Transit, Altamont Commuter Express, Vacaville Transit, Healdsburg Transit, Petaluma Transit, Benicia Transit

Appendix D: Bay Area Clean Air Partnership (BayCAP) Shuttle Inventory

Funded by Bay Area Air Quality Management District

Bay Area Shuttle Summary (June 2004)

- 150+ shuttles connecting rail stations with employers, universities, medical centers, shopping districts and other key destinations.
- Shuttles are managed by nearly 50 public and private entities — transit agencies, cities, employers, colleges/universities, etc.
- Majority of shuttles are funded through public/private partnerships. Typical funders include the Air District, transit agencies, local governments and sponsoring organizations.
- Nearly all shuttles are fare-free and most are open to the public.
- Shuttles serve more than 8 million riders per year.
- Majority of shuttle riders were previously solo drivers. Surveys show that 60–80 percent have shifted from driving to rail/shuttle.
- Shuttles in the Bay Area originally served employers and employees. Now, shuttles are expanding to serve residents, shoppers, seniors, low-income residents, children and other target populations.
- Most shuttles are contracted out to private shuttle vendors. Some are operated in-house and some are operated by transit agency staff.

For more information, contact Bruce Riordan, Bay Area Clean Air Partnership, briordan@lmi.net.

Six Key Bay Area Shuttle Models

1. Small Transit System

Large ridership (700,000 – 3 million/year). 100% self-funded. 7 days/week. Up to 18+ hours/day.

- Emery-Go-Round, UC Berkeley, UCSF, Stanford

Operating Information					
Shuttle	Annual Riders	Period	Annual Cost	Cost Description	Funding Sources
Emery-Go-Round	850,000	2003	\$1.6 million	Includes all operating and administrative costs	Emeryville businesses (PBID)
UC Berkeley	782,000	FY 02-03	\$1.6 million	Includes all operating and administrative costs. UC pays a per-mile fee to AC Transit for vehicles, maintenance and driver training	UC Berkeley parking revenue
UCSF	1,200,000	2003	\$3 million	Includes all operating and administrative costs	UCSF parking revenue Medical Center assessment
Stanford	1,400,000	2003	\$3 million	Includes all operating and administrative costs; vehicle purchase costs separate (Stanford owns vehicles)	Stanford and local partners

Key Partnerships:

- UC Berkeley and AC Transit
- Emery-Go-Round and UC Berkeley; Emery-Go-Round and AC Transit
- Stanford and city of Palo Alto; Stanford and Caltrain

2. Operated by Transit Agency

Funding usually 25% employer/city, 25% Bay Area Air Quality

Management District, 50% transit agency. Normally meet a.m. and p.m. peak-period trains.

- Caltrain, Samtrans (to BART), Valley Transportation Authority/VTA (to Altamont Commuter Express/ACE and light rail)

Operating Information (selected programs)					
Shuttle	Annual Riders	Period	Annual Cost	Cost Description	Funding Sources
Caltrain	1,000,000	2003	\$3.2 million	Includes all operating costs, including vehicle leasing	Caltrain, C-CAG, Measure A, TFCA, employers
Samtrans (to BART)	375,000	2003	\$1.2 million	Includes all operating costs, including vehicle leasing	Samtrans, C-CAG, Measure A, TFCA, employers
VTA/ACE	240,000	FY02-03	\$1.45 million	Includes all operating costs, including vehicle leasing	ACE, TFCA, employers
VTA Light Rail	360,000	FY02-03	\$1.4 million	Includes all operating costs, including vehicle leasing	VTA, TFCA, employers

Key Partnerships:

- Caltrain JPB, C-CAG, Peninsula Alliance, cities and employers
- Samtrans, BART, C-CAG, Peninsula Alliance, cities, employers
- ACE and VTA

3. Operated by/for City

Some peak period, others off-peak. Serve mix of markets — employers, hotels, seniors, residents, etc. Funding mix of city, businesses, transit agency.

- San Carlos, San Leandro, Santa Clara, Palo Alto, Menlo Park (partial list)

Operating Information (selected programs)					
Shuttle	Annual Riders	Period	Annual Cost	Cost Description	Funding Sources
San Carlos SCOOT	170,000	Annualized from March 04 ridership	\$938,000	Includes all operating and administrative costs	San Carlos, C-CAG, Measure A, TFCA
San Leandro LINKS	160,000	Annualized from April 04 ridership	\$345,000	Include all operating and administrative costs	City of San Leandro, BART, TFCA, LIFT, employers (BID 1/05)

Key Partnerships:

- LINKS, BART and employers
- SCOOT and San Carlos School District

4. Large Business Park

Contracted with local transit provider. 100% funded by business park.

- Bishop Ranch (contract with County Connection),
Hacienda Business Park (subsidy to WHEELS service)

Operating Information (selected programs)

Shuttle	Annual Riders	Period	Annual Cost	Cost Description	Funding Sources
Bishop Ranch	233,000	Annualized from 2004 ridership	\$750,000	Includes all operating and administrative costs	Bishop Ranch Transportation Association
Hacienda Business Park	290,000	2003	\$198,000	\$128,000 annual payment to Livermore/ Amador Valley Transportation Authority (LAVTA) plus \$70,000 for other costs	Hacienda Business Park

Key Partnerships:

- Bishop Ranch and County Connection
- Hacienda and LAVTA/WHEELS

5. Hospitals

Staff, patients, visitors, nearby residents. 100% funded by hospital. Tight parking. Development agreements.

- Children's, Summit, Alta Bates, Kaiser, Seton Medical Center, St. Mary's Medical Center (partial list)

Operating Information (selected programs)

Shuttle	Annual Riders	Period	Annual Cost	Cost Description	Funding Sources
Children's/ Summit	60,000	2003	n/a	n/a	Children's and Summit

Key Partnerships:

- Hospitals and rail agencies (station access)

6. 100 Percent Private

Restricted to employees of a funding organization.

- Sun Microsystems, NUMMI, Bank of America, Mervyn's, Cisco, Nasa Ames, Applied Materials, Wells Fargo, IBM, San Jose Water Company, Lawrence Berkeley Lab (partial list)

Operating Information (selected programs)

Shuttle	Annual Riders	Period	Annual Cost	Cost Description	Funding Sources
Sun	100,000	2003	\$1.1 million	Includes all operating and administrative costs	Sun

Key Partnerships:

- Employers and rail agencies (station access)

Appendix E: Senate Bill 916 30914.5 (d) (Regional Measure 2)

The Metropolitan Transportation Commission shall adopt a regional transit connectivity plan by December 1, 2005. The connectivity plan shall be incorporated into the commission's Transit Coordination Implementation Plan pursuant to Section 66516.5 of the Government Code. The connectivity plan shall require operators to comply with the plan utilizing commission authority pursuant to Section 66516.5 of the Government Code. The commission shall consult with the Partnership Transit Coordination Council in developing a plan that identifies and evaluates opportunities for improving transit connectivity and shall include, but not be limited to, the following components:

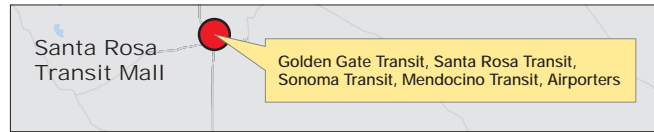
1. A network of key transit hubs connecting regional rapid transit services to one another, and to feeder transit services. "Regional rapid transit" means long-haul transit service that crosses county lines, and operates mostly in dedicated rights-of-way, including free-way high-occupancy vehicle lanes, crossing a bridge, or on the bay. The identified transit hubs shall operate either as a timed transfer network or as pulsed hub connections, providing regularly scheduled connections between two or more transit lines.
2. Physical infrastructure and right-of-way improvements necessary to improve system reliability and connections at transit hubs. Physical infrastructure improvements may include, but are not limited to, improved rail-to-rail transfer facilities, including cross-platform transfers, and intermodal transit improvements that facilitate rail-to-bus, rail-to-ferry, ferry-to-ferry, ferry-to-bus, and bus-to-bus transfers. Capital improvements identified in the plan shall be eligible for funding in the commission's regional transportation plan.

3. Regional standards and procedures to ensure maximum coordination of schedule connections to minimize transfer times between transit lines at key transit hubs, including, but not limited to, the following:
 - A. Policies and procedures for improved fare collection.
 - B. Enhanced trip-planning services, including Internet-based programs, telephone information systems, and printed schedules.
 - C. Enhanced schedule coordination through the implementation of real-time transit-vehicle location systems that facilitate communication between systems and result in improved timed transfers between routes.
 - D. Performance measures and data collection to monitor the performance of the connectivity plan.

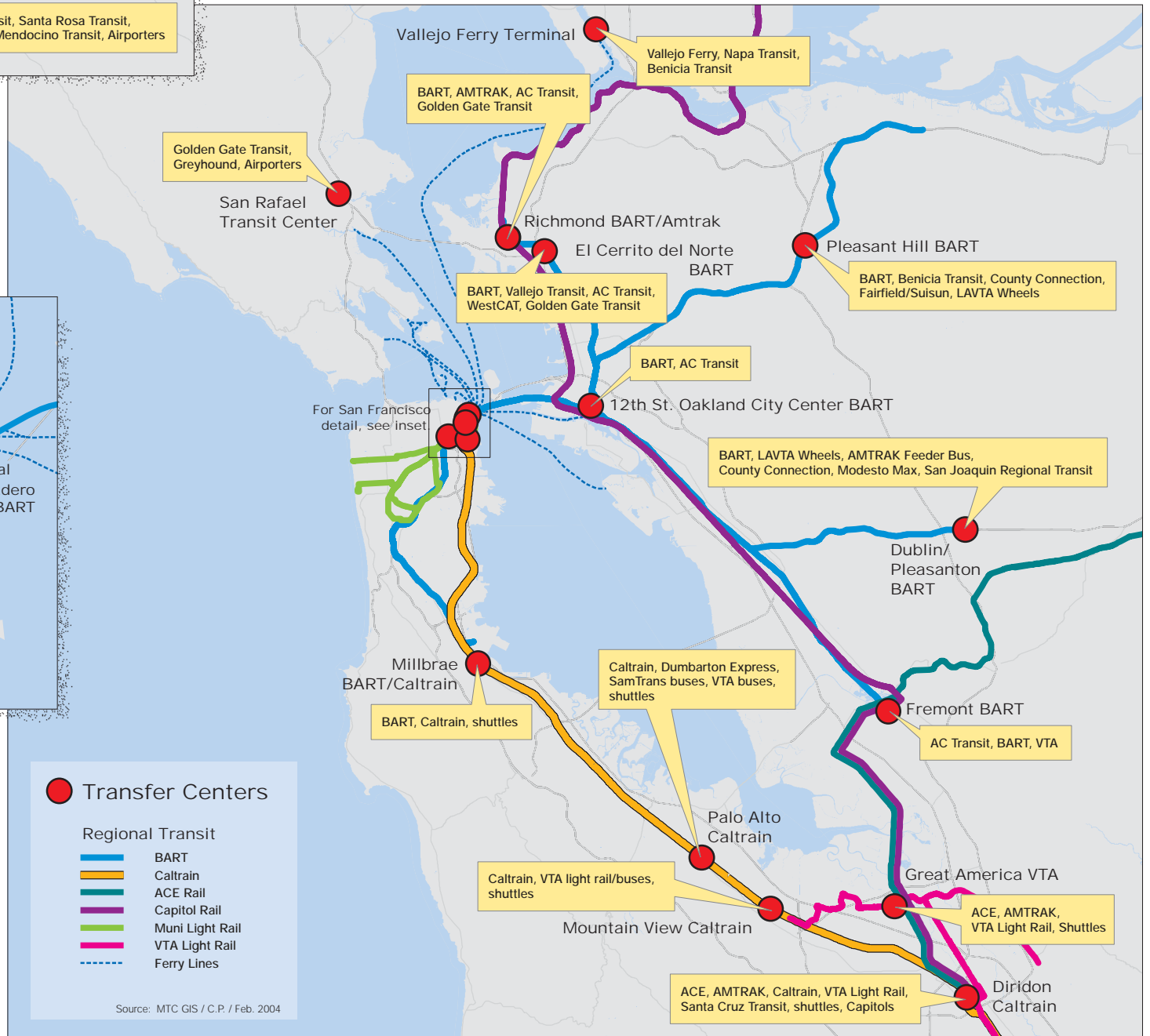
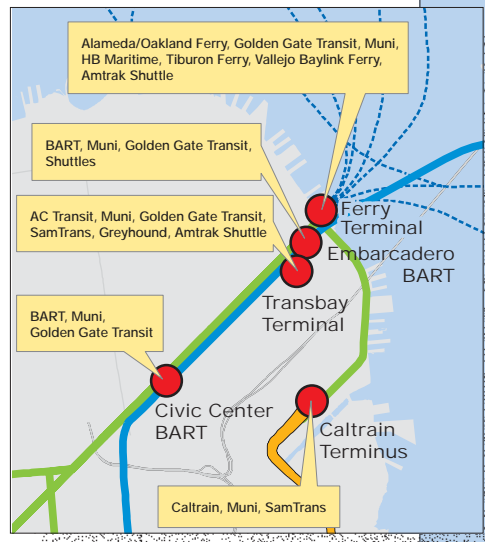
The connectivity plan shall focus on, but not be limited to, feeder transit lines connecting to regional rapid transit services, and the connection of regional rapid transit services to one another. The connectivity plan shall be adopted following a Metropolitan Transportation Commission public hearing at least 60 days prior to adoption. The commission shall adopt performance measures and collect appropriate data to monitor the performance of the connectivity plan. The plan shall be evaluated every three years by the commission as part of the update to its regional transportation plan. No agency shall be eligible to receive funds under this section unless the agency is a participant operator in the commission's regional transit connectivity plan.

Appendix F: Map of Proposed Regional Interagency Hubs

Santa Rosa Inset



San Francisco Inset





**METROPOLITAN
TRANSPORTATION
COMMISSION**

Joseph P. Bort MetroCenter
101 Eighth Street
Oakland, California 94607

510.464.7700 TEL.
510.464.7769 TDD/TTY
510.464.7848 FAX
info@mtc.ca.gov E-MAIL
www.mtc.ca.gov WEB