

***DRAFT REPORT***

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**DUMBARTON RAIL CORRIDOR STUDY  
SERVICE PLAN EVALUATIONS**

Prepared for the  
**San Mateo County  
Transportation Authority**

Prepared by  
**Parsons Transportation Group**  
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## TABLE OF CONTENTS

		Page
	Table of Contents	i
	List of Figures and Tables	ii
<b>1.0</b>	<b>INTRODUCTION AND PURPOSE</b>	
1.1	Study Objectives	1-1
1.2	Background Information	1-2
1.3	Study Approach	1-3
<b>2.0</b>	<b>STUDY AREA FEATURES</b>	
2.1	Union Pacific Rail Corridors	2-1
2.2	Passenger Rail Service	2-3
2.3	Bay Area Rapid Transit (BART)	2-8
2.4	Bus Transit	2-10
2.5	Community Planning	2-10
<b>3.0</b>	<b>MARKET ASSESSMENT AND RAIL SERVICE OPPORTUNITIES</b>	
3.1	Prior Study Alternative Service Scenarios	3-1
3.2	Assessment of Travel Market	3-3
3.3	Passenger Rail Patronage Opportunities	3-7
3.4	Screening of Alternative Service Routes	3-11
3.5	East Bay Terminus: Union City versus Hayward	3-13
<b>4.0</b>	<b>RECOMMENDED RAIL SERVICE PLAN</b>	
4.1	Overview of Operations	4-1
4.2	Stations and Supporting Facilities	4-3
4.3	Preliminary Train Schedules	4-5
4.4	Rolling Stock Options	4-8
<b>5.0</b>	<b>ESTIMATED REVENUE AND COSTS</b>	
5.1	Expected Patronage and Revenue	5-1
5.2	Required Capital Improvements	5-4
5.3	Equipment Leasing Costs	5-7
5.4	Annual Operating Costs	5-7
<b>6.0</b>	<b>KEY FINDINGS AND CONCLUSIONS</b>	6-1

## LIST OF FIGURES AND TABLES

<b>Figure Number</b>		<b>Page</b>
1-1	Dumbarton Corridor Study Area	1-4
2-1	Union Pacific Railroad Corridors	2-2
2-2	Existing Passenger Rail Service	2-5
2-3	BART Rail Service	2-9
2-4	Trans-Bay Express Bus Service	2-11
2-5	Planning Considerations	2-13
3-1	Dumbarton Rail Corridor Study Alternatives	3-2
3-2	Dumbarton Rail Passenger Capture Rate	3-10
4-1	Recommended Dumbarton Rail Service Routes	4-2
5-1	Dumbarton Rail Daily Passenger Volumes	5-3
<b>Table Number</b>		
2-1	Existing Weekday Timetable: Westbound and Southbound	2-6
2-2	Existing Weekday Timetable: Eastbound and Northbound	2-7
3-1	AM Peak Hour Westbound Traffic across Dumbarton Highway Bridge	3-5
3-2	PM Peak Hour Eastbound Traffic across Dumbarton Highway Bridge	3-6
3-3	AM Peak Hour Westbound Traffic across Dumbarton Highway Bridge	3-7
3-4	PM Peak Hour Eastbound Traffic across Dumbarton Highway Bridge	3-8
3-5	Dumbarton Rail Passenger Capture Rates	3-9
3-6	Dumbarton Rail Capital Costs	3-12
3-7	Relative Value Ratio (Capital Investment Per Rider)	3-12
4-1	Proposed Dumbarton Corridor Station Facilities	4-4
4-2	Proposed Weekday Timetable: Westbound Dumbarton Service	4-7
5-1	Daily Dumbarton Rail Corridor Passenger Volumes on the Dumbarton Railroad Bridge, Year 2010	5-2
5-2	Estimated Capital Costs	5-5
5-3	Current Caltrain Operating Costs	5-11
5-4	Adjusted Train Operating Costs Per Train Mile	5-11
5-5	Annual Operating and Maintenance Cost: Dumbarton Corridor Bridges	5-12
5-6	Annual Operating and Maintenance Cost: Dumbarton Corridor Track, Roadbed and Signals	5-12

## 1.0 INTRODUCTION AND PURPOSE

The Metropolitan Transportation Commission (MTC) is preparing a *Blueprint for the 21<sup>st</sup> Century* that will include a proposed plan for expanding the region's passenger rail system. The San Mateo County Transportation Authority (SMCTA) and other interested agencies are working cooperatively to advance rail-based transportation improvements that will respond to existing and future demands for urban mobility in the South San Francisco Bay area. One possibility for extended commuter rail service is the "Dumbarton Rail Corridor", a former freight line that links the Peninsula and the East Bay, between Redwood City and Newark. This report documents a SMCTA-sponsored study that defines a logical Rail Service Plan for the Dumbarton Corridor, so that this candidate project can be included in the *Blueprint for the 21<sup>st</sup> Century*. This first report section describes the study objectives, provides background information, and explains the study approach.

### 1.1 Study Objectives

In the last decade, potential for commuter rail service in the Dumbarton Corridor was recognized in a number of studies. These investigations of service alternatives culminated in the *Dumbarton Corridor Transit Concept Plan*, as prepared by the SMCTA in November of 1998. The Concept Plan provides general guidelines for the contemplated commuter rail service, including hours of service and the general limits of train runs, both initially and in the future. The guidelines also reflect input received at several public meetings.

The purpose of the current SMCTA study was to develop a more detailed preliminary description of the proposed service described in the *Dumbarton Corridor Transit Concept Plan*, as needed to make a reliable assessment of the following:

- **Initial capital costs** associated with acquiring rolling stock and with restoring the rail corridor to a condition where it will safely and efficiently accommodate commuter rail trains and passengers.
- **Annual operating and maintenance costs** for providing patrons with a reliable and convenient transportation alternative to use of private automobiles.
- **Expected patronage and revenue** that would be generated by the new rail service.

This information will allow the Dumbarton Rail Service to be included as a candidate project in the transportation component of the *Blueprint for the 21<sup>st</sup> Century*.

For purposes of this study it is assumed that the Dumbarton Corridor commuter train service would be an extension of the Joint Powers Board (JPB) Caltrain service using conventional commuter rail equipment. This study does not identify funding sources, or how cost sharing among agencies can be accomplished. Furthermore, the study does not address potential environmental impacts or the possible historic significance of existing Dumbarton Corridor railroad facilities.

## 1.2 Background Information

**Figure 1-1 Dumbarton Corridor Study Area** (page 1-4) shows the Dumbarton rail crossing in relation to communities on the Peninsula, San Francisco Bay, and communities in the East Bay. South of San Francisco, there are only three crossings of San Francisco Bay:

- The San Mateo Highway Bridge (Route 92).
- The Dumbarton Highway Bridge (Route 84).
- The inactive Dumbarton Railroad Bridge.

Congestion on the two highway toll bridges is indicative of the existing and latent demand for cross-Bay trips. The bridges are operated by Caltrans and the collected tolls are reserved for maintaining the highway bridges.

The Dumbarton Corridor was formerly part of the 16.2-mile long Centerville Line, which allowed Trans-Bay freight train movements between Redwood Junction and Niles Junction, via Newark Junction (see Figure 1-1). Although the Centerville Line is still very active in the five-mile stretch between Newark and Niles, through-rail operations between Redwood Junction and Newark Junction stopped about two decades ago. In this report the eleven-mile rail right-of-way between Redwood Junction and Newark Junction is referred to as the **Dumbarton Rail Corridor** (or **Dumbarton Corridor**). References to the Centerville Line are to the line east of Newark Junction.

Redwood Junction is approximately midway on the 49-mile JPB Peninsula Corridor Line that provides Caltrain commuter rail service between San Francisco and San Jose. Millbrae is about halfway on the JPB Line between San Francisco and Redwood Junction; the Sunnyvale Station is approximately midway between Redwood Junction and San Jose.

The San Mateo County Transit District (SamTrans) purchased the Dumbarton Corridor in 1994 as an investment for future transportation purposes. The Dumbarton Corridor is inactive, with the following exceptions:

- Between a half mile to two miles east of Redwood Junction, rail freight service is provided to some small customers.
- Within about a mile west of Newark Junction, four medium-sized industries use rail freight service.

From west to east, the Dumbarton Corridor has these unique sections:

- In the first four miles, the wye tracks at Redwood Junction join and to the east the corridor has seven at-grade rail crossings, in addition to an overcrossing structure that carries the rail corridor over the Highway 101 freeway. About 0.75 mile east of Highway 101, near Chilco Street, there is an expanding office commercial area that is also experiencing high-tech growth.
- The next four miles of the corridor include a series of nine bridges carrying the former rail corridor across San Francisco Bay. A July 1999, Capital Investments Working Paper by the Parsons Transportation Group, titled *Corridor Rehabilitation, Redwood Junction to Newark Junction*, provides a detailed description of the Dumbarton swing bridge, seven fixed bridges and the Newark Slough swing bridge.

- The last three miles of the Dumbarton Corridor include a 2.25-mile stretch at-grade, but without crossings, and then the active 0.75-mile segment that has four at-grade crossings. The most westerly of these crossings is Willow Street. At Newark Junction, the Dumbarton Line no longer has a connection leading to and from the north. The Dumbarton Line terminates by leading south into the Coast Line (the north-south rail mainline at Newark Junction), about a hundred feet north of the turnout for the start of northerly Centerville Line wye track.

The *Dumbarton Corridor Transit Concept Plan* made the following suggestions for new rail service:

- Begin/end service in the East Bay near Newark Junction, at the Fremont Amtrak station on the Centerville Line, or farther east at a new commuter station in Union City.
- On weekday mornings between 6:00 and 8:00 AM, run nine trains at 15-minute headways from the East Bay, through the Dumbarton Corridor, to Redwood Junction. Have the first, third, fifth, seventh and ninth trains continue north on the JPB Line to Millbrae. Run the other four trains south on the JPB Line to Sunnyvale.
- Between 4:00 and 6:00 PM, provide the reverse service from the Peninsula to the East Bay

On March 25, 1999, SMCTA gave notice to the Parsons Transportation Group (PTG) to conduct a comprehensive study aimed at reviewing the suggested operating plan and refining the suggested framework for new commuter rail service.

### 1.3 Study Approach

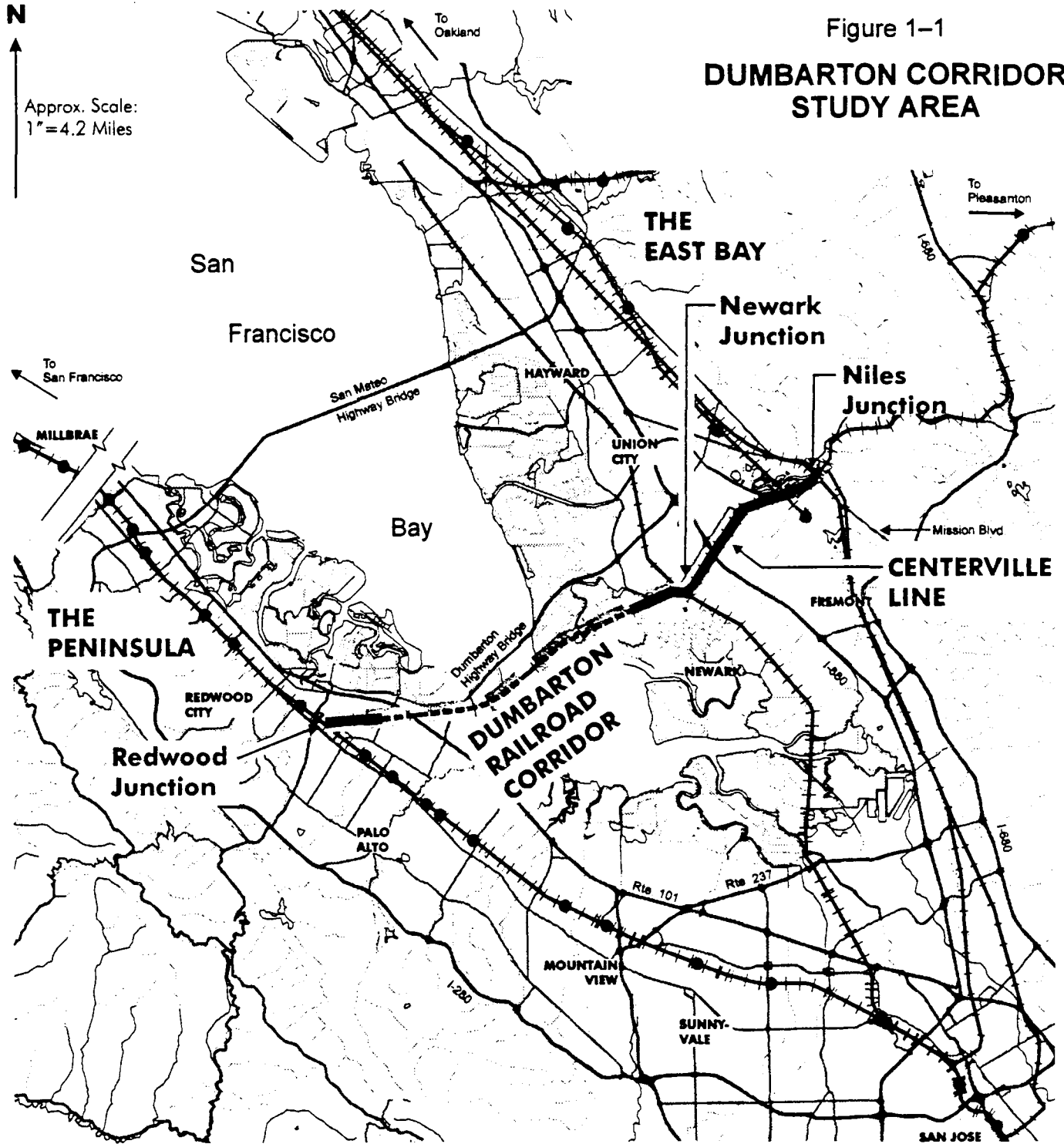
After reviewing previous evaluations, field investigations and meetings with interested parties were conducted to get a better understanding of existing conditions, and to assess the perceived opportunities and constraints for using the existing rail system as part of a logical rail service extension plan. These inventory activities are documented in Section 2.0 of this report.

A preliminary market assessment was then completed to assess the latent commuter rail patronage market that might be captured with various service routes, stations and terminals. Concurrently, Parsons Transportation Group railroad specialists reviewed previous condition assessments of the Dumbarton Corridor facilities and the associated rehabilitation cost estimates. Engineering studies also addressed changes that would have to be made in the JPB Corridor and along Union Pacific trackage, to allow Dumbarton rail service to commence for various service scenarios. Each candidate service plan was then evaluated by comparing its level of capital cost requirements against the magnitude of expected patronage. This process identified the best rail service option. Section 3.0 summarizes the market assessment and screening of rail service possibilities.

The recommended rail service plan was then defined in terms of train operations (frequency and preliminary schedules), rolling stock requirements, station developments and needed supporting facilities. See Section 4.0 for details.

Figure 1-1

### DUMBARTON CORRIDOR STUDY AREA



**Legend:**

-  Dumbarton Rail Corridor
-  Active Portions of Centerville Line and Dumbarton Corridor
-  Existing Rail Transit Station

The recommended rail service plan for the Dumbarton Corridor was then evaluated in more detail to establish refined estimates for the following considerations:

- Forecasted patronage and annual revenue.
- Estimated capital improvement and rolling stock costs.
- Annual operating and maintenance costs.

Section 5.0 summarizes these cost estimates, based on the detailed evaluations and estimates provided in the following Parsons Transportation Group documents that complement this report:

- *Corridor Rehabilitation, Redwood Junction to Newark Junction; Capital Investments Working Paper, July 13, 1999.*
- *Improvements East of Newark Junction, Stations and Supporting Facilities; Capital Investments Working Paper, July 13, 1999.*
- *Operating Costs Working Paper, July 13, 1999.*

Overall key findings and conclusions are recapped in Section 6.0 of this report.



## **2.0 STUDY AREA FEATURES**

The Peninsula side and East Bay side of the Dumbarton Corridor both have a developed transportation network that includes rail freight operations, commuter/intercity rail service, and bus transit. A number of transportation improvements are programmed or being contemplated. Rail service for the Dumbarton Corridor should be tailored to be compatible with these elements. This report section provides a summary of the existing and planned transportation network. Discussions with East Bay transportation officials are also presented.

### **2.1 Union Pacific Railroad Corridors**

**Figure 2-1 Union Pacific Railroad Corridors** (page 2-2) shows rail freight in the study area. All railroad freight operations are by the Union Pacific Railroad Company (UP). The UP also owns all railroad corridors, except for the Bay Area Rapid Transit (BART) Line, the JPB's Peninsula Corridor), and SamTrans' Dumbarton Corridor across San Francisco Bay.

In the East Bay there are multiple rail freight corridors between San Jose and Oakland, as described below:

- The Coast Line, between San Jose and Oakland, which is closest to the Bay and runs through Newark Junction as a single track.
- The San Jose Branch and Milpitas Line approach Niles Junction from the south as essentially a single rail corridor that splits. The San Jose Line ends into the Canyon Subdivision at Niles Junction; the Milpitas Line continues directly north of Niles Junction as the single-track Hayward Line, going to and from Oakland.
- The Canyon Subdivision enters the Bay Area from east at Niles Junction, crosses the Hayward Line, turns north and continues as a third rail corridor (typically one-track) leading to Oakland.

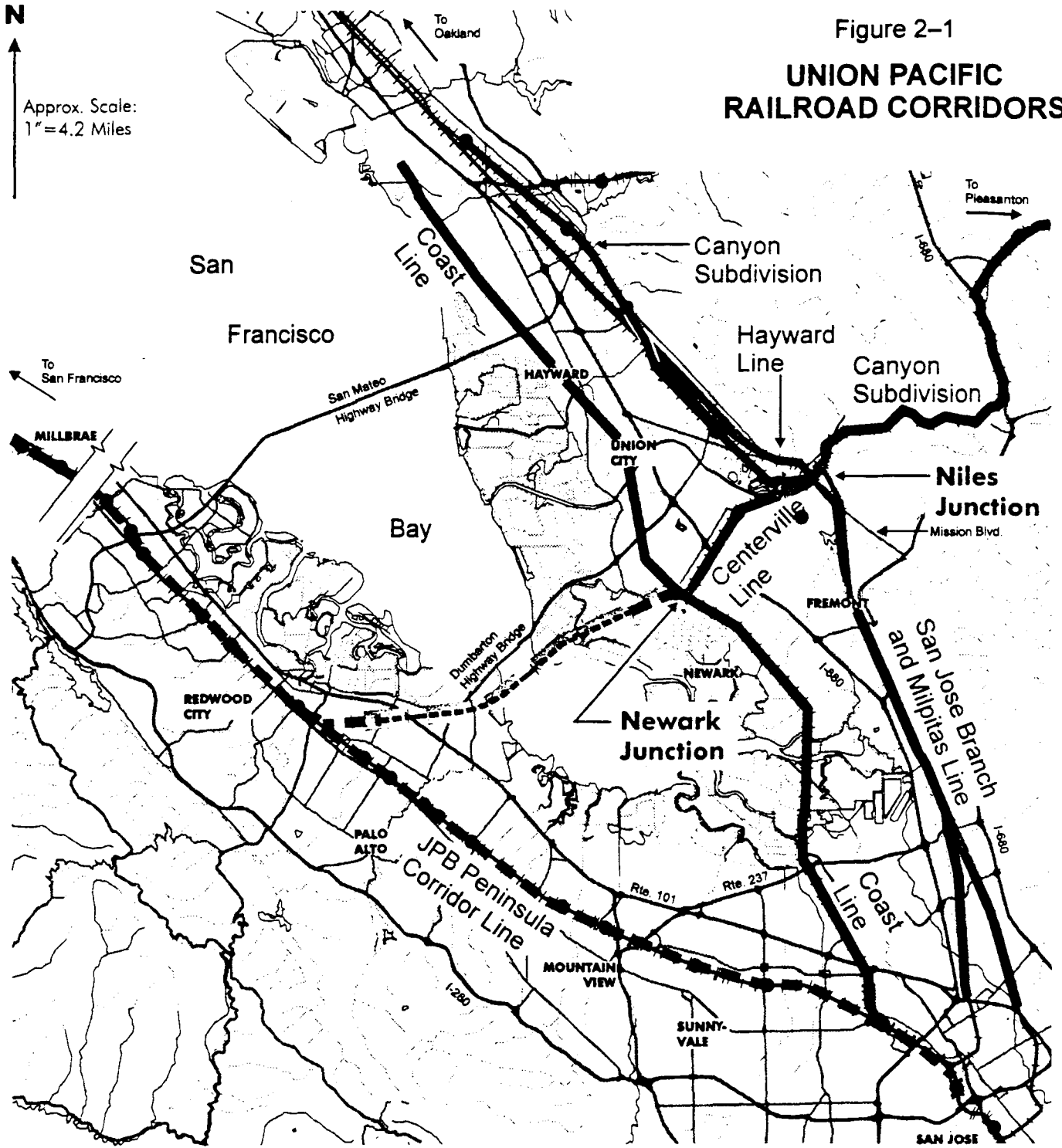
A number of freight and passenger trains operate through Niles Junction and all movements are prone to delays.

Within the six miles north of the Centerville Line, the two freight rail corridors run north from Niles Junction to Oakland, as follows:





- The Canyon Subdivision crosses the Hayward Line at grade, follows the south bank of Alameda County Flood Control Channel, turns over the creek and runs north and immediately parallel to BART on the east.
- The Hayward Line heads northwest from Niles Junction, along the west side of Mission Boulevard. About 1.5 miles north of Niles Junction, in southern Union City, the Hayward Line turns and runs north and parallel to both BART and the Canyon Subdivision, about 800 feet to the east of the Canyon Subdivision.
- About three miles north of the Centerville Line, just north of the Union City BART Station, BART is grade separated over Decoto Road, and the two freight lines have at-grade crossings, about 100 and 900 feet to the east of BART, respectively.

Figure 2-1

# UNION PACIFIC RAILROAD CORRIDORS



Approx. Scale:  
1" = 4.2 Miles

- Legend:**
-  Dumbarton Rail Corridor
  -  Union Pacific Owned Freight Line
  -  Union Pacific Freight Service on JPB Peninsula Line
  -  Existing Rail Transit Station

About two miles north of Decoto Road, in southern Hayward, the BART and Canyon Subdivision lines turn and cross over the Hayward Line on grade separation structures. This occurs about a third of a mile south of Industrial Parkway.

The UP and Southern Pacific Transportation Company (SP) merged in 1996. Prior to that time the SP owned the Centerville Line, Coast Line and Hayward Line, and the UP owned the Canyon Subdivision (which is also referred to as the Western Pacific Line). The UP, contacted by PTG regarding the Dumbarton Rail Corridor Study as part of an inventory process, expressed an interest in abandoning the Hayward Line within 5.8 miles north of Niles Junction, by making the following rail system modifications:

- At Niles Junction, connect the lines from the south more directly to the Canyon Subdivision to the west, possibly by constructing a grade separation carrying the new connection over the Centerville Line.
- Just west of the BART grade separation over the Centerville Line, add a new connection to link the Centerville Line to the Canyon Subdivision near the Alameda County Flood Control Channel.
- Double track the Canyon Subdivision north from the Alameda County Flood Control Channel to about a half mile south of Industrial Parkway (about five miles).
- Provide a new connection between the Canyon Subdivision and Hayward Line, just south of Industrial Parkway.

With this arrangement, the UP indicated that the Capitol Route (Amtrak) trains that now use the Centerville Line and Hayward Line, could be diverted to the improved Canyon Subdivision Line, and thereby avoid potential delays at Niles Junction. The UP indicated the improved Canyon Subdivision could handle more passenger trains than the existing freight line system. The information provided by the UP is intended to be used in this study as background information and not necessarily as an assumption. Capital improvements required to allow the initiation of the Dumbarton train service are contained in Subsection 5.2.

## 2.2 Passenger Rail Service

**Figure 2-2 Existing Passenger Rail Service** (page 2-5) depicts the current commuter rail and intercity rail service in the study area. Caltrain commuter rail service and freight trains use the main two-track JPB Corridor between San Francisco, Redwood Junction and San Jose, and south to Gilroy. The main stop in San Jose is Diridon Station, near downtown San Jose. North of San Jose, about 34 Caltrain commuter trains operate in each direction on weekdays. More limited service is provided on weekends. Construction is underway to make extensive improvements to the JPB Corridor. A second phase of improvements is also programmed. These modifications to the physical facilities are being done to improve existing service, and to allow running additional commuter train service between San Francisco and San Jose.

Near the northerly Dumbarton Corridor wye track at Redwood Junction, there are five Caltrain stops along the main JPB Corridor, as follows:

- San Carlos (3.0 miles north of Redwood Junction).
- Redwood City (1.2 miles north).
- Atherton (1.6 miles south).
- Menlo Park (2.7 miles south).
- Palo Alto (3.9 miles south).

In addition to Caltrain and BART, there are two other types of passenger rail service in the East Bay:

- The Altamont Commuter Express (ACE).
- The Amtrak Capitol Route.

ACE trains run between Diridon Station (San Jose) and Stockton, via the Coast Line north to Newark Junction, then east on the Centerville Line to Niles Junction, and east on the Canyon Subdivision. Currently, only non-holiday weekday service exists, with two westbound trains in the morning and two trains eastbound in the evening. Stops in the Bay Area include Great America (about six miles north of San Jose) and the Fremont Centerville Station (located about mid-way between Newark Junction and Niles Junction). ACE officials are advancing plans to add a third weekday train in each direction, and possibly an additional trip between Pleasanton and San Jose.

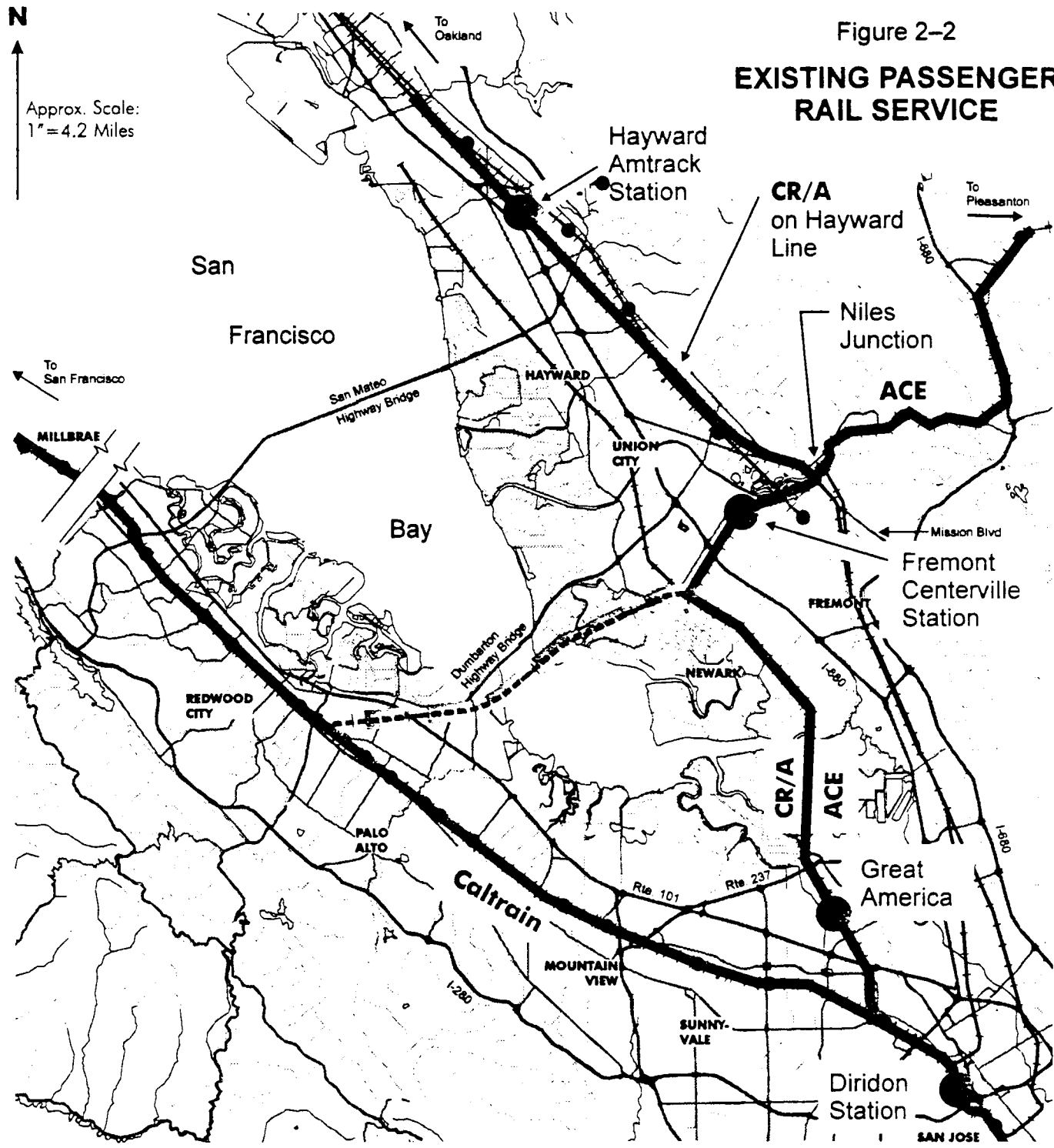
The Amtrak Capitol Route intercity trains run between Sacramento and San Jose, via Oakland. These trains use the Hayward Line between Oakland and Niles Junction, and then the Centerville Line and Coast Line. Every day there are three trains in each direction, with stops at Great America, Fremont Centerville, and Hayward (at the Amtrak Station on the Hayward Line). In the study area, Amtrak also operates the Coast Starlight trains between Los Angeles and Seattle along the Capitol Route, but the two trains (one in each direction) do not make local stops between San Jose and Oakland. Most of the Capitol Route trains and the Coast Starlight pass through the study area outside the peak hours for commuter work/home trips.

At Newark Junction, the Centerville Line starts with power-controlled turnouts on the northerly and southerly wye tracks, which merge and continue east about five miles to Niles Junction. To improve ACE service, construction is in progress to provide two main tracks in this stretch. The Fremont Centerville Station (2.8 miles east of Newark Junction) is also being improved by the City of Fremont, including expansion of parking areas to a total of 122 spaces. Rail users are not charged for parking. The Fremont Centerville Station complex is owned by the City of Fremont, with the exception that the platform is UP property.

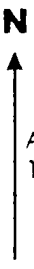
Train schedules change periodically and two additional ACE trains are expected, but not scheduled. For study purposes only, existing timetables were used to evaluate if there is flexibility for adding the Dumbarton runs. Discussion follows in Subsection 4.3 of this report. **Table 2-1 Existing Weekday Timetable: Westbound and Southbound** (page 2-6) shows morning passenger rail service provided by ACE and Caltrain in the study area and between San Francisco and San Jose. **Table 2-2 Existing Weekday Timetable: Eastbound and Northbound** (page 2-7) provides similar information for the reverse service provided in the afternoon. *TEXT CONTINUES ON PAGE 2-8*

Figure 2-2

**EXISTING PASSENGER RAIL SERVICE**



Approx. Scale:  
1" = 4.2 Miles



**Legend:**

-  Dumbarton Rail Corridor
-  Union Pacific Owned Freight Line
-  Union Pacific Freight Service on JPB Peninsula Line
-  Existing Rail Transit Station
-  ACE = Altamont Commuter Express
-  CR/A = Capitol Route/Amtrak

**Table 2-1  
EXISTING WEEKDAY TIMETABLE:  
WESTBOUND AND SOUTHBOUND**

Station (Read Down)	Train Numbers (See notes below) (Times are A.M. departures, except as noted)													
	22	ACE 01		24		ACE 03	26	28		30	32		34	36
San Francisco	5:00			6:00			6:30	6:55		7:00	7:25		7:30	8:00
Pleasanton		5:40				6:47								
Hayward														
Fremont Centerville		6:03				7:10								
Atherton	5:53			-			7:24	-		7:53	-		8:23	8:54
Menlo Park	5:55			6:57			7:27	7:39		7:56	8:10		8:26	8:57
Palo Alto	5:58			7:00			7:30	7:42		7:59	8:13		8:29	9:00
California Avenue	6:01			7:03			7:33	7:45		8:02	8:16		8:32	9:03
		ACE				ACE								
Intermediate Stops are Not Shown														
Arr. San Jose Diridon	6:30	6:43		7:33		7:50	8:03	8:14		8:31	8:44		9:00	9:31

ACE = Altamont Commuter Express; Am = Amtrak Capitol Route; other train numbers refer to existing Caltrain runs on JPB Peninsula Line.

Intermediate Caltrain stops between San Francisco and Atherton are not shown. Caltrain trains leaving San Francisco after 8:00 AM are not shown. Three westbound Capitol Route Trains and the southbound Coast Starlight Train operate though study area outside normal commuter hours.

**Table 2-2  
EXISTING WEEKDAY TIMETABLE:  
EASTBOUND AND NORTHBOUND**

Station (Read Up)	Train Numbers (See notes below) (Times are P.M. departures, except as noted)														
	69	71		ACE 02	73		75	77		Am 730	ACE 04	79		81	
Arr. Oakland											6:38				
Arr. San Francisco	5:02	5:33			6:03		6:22	6:49				7:09		7:45	
Arr. Pleasanton				5:08							6:38				
Hayward										6:19					
Fremont Centerville				4:44						6:03	6:14				
Atherton	4:05	4:35			5:05		-	5:50				-		6:48	
Menlo Park	4:02	4:32			5:02		5:31	5:47				6:17		6:46	
Palo Alto	3:59	4:29			4:59		5:28	5:44				6:14		6:43	
California Avenue	3:56	4:26			4:56		5:25	5:41				6:11		6:40	
				ACE						Am	ACE				
Intermediate Stops are Not Shown															
San Jose Diridon	3:30	4:00		4:14	4:30		5:00	5:15		5:35	5:44	5:45		6:15	

ACE = Altamont Commuter Express; Am = Amtrak Capitol Route; other train numbers refer to existing Caltrain runs on JPB Peninsula Line.

Intermediate Caltrain stops between Atherton and San Francisco are not shown. Caltrain trains leaving San Jose before 3:30 PM and after 6:15 PM are not shown. Schedule for eastbound Amtrak Train 730 is as shown. Two other eastbound Capitol Route Trains and the northbound Coast Starlight Train operate though study area outside normal commuter hours.

Regional planning emphasizes improving and expanding the existing Caltrain commuter rail service, and expanding the Altamont Commuter Express (ACE) commuter trains. A number of rail passenger service improvements are currently under consideration in and near the study area, including the following:

- A southerly extension of the East Bay BART Line from Fremont south to the Warm Springs area.
- Introduction of commuter rail service between Union City and San Jose, using primarily existing railroad rights-of-way.
- More frequent Caltrain service in the existing JPB corridor.
- Additional runs on the Capitol Route.
- The addition of a third ACE train in each direction.

The Dumbarton Corridor rail service discussed in this report will generally complement any one or all of the above rail service expansions. The Dumbarton service will not be a substitute for any other possible rail improvements now under consideration.

The California High Speed Rail Authority is considering a 680-mile high-speed bullet train system to link Los Angeles with the San Francisco area. Alternative train routing evaluated the merits of using the Dumbarton Corridor. On June 17, 1999, it was announced that the preferable route would link San Francisco and San Jose, possibly by making use of the JPB corridor. Thus, at this stage it is assumed the potential high-speed train would not use the Dumbarton Corridor.

### 2.3 Bay Area Rapid Transit (BART)

**Figure 2-3 BART Rail Service** (page 2-9) shows the BART heavy rail rapid transit system alignment in the study area. In the East Bay, the BART Oakland-Fremont Line runs generally north-south. The line now terminates at the Fremont BART Station (about 0.8 mile south of the Centerville Line). About 1.3 miles east of the Fremont Centerville Station, BART is elevated a level above existing ground on embankment and crosses over the Centerville Line on a grade separation structure, about 0.25 mile south of the Alameda County Flood Control Channel. If the new rail connection between the Centerville Line and Canyon Subdivision were ever built, it probably would be located so it passes through the BART embankment in tunnel or with a new bridge structure.

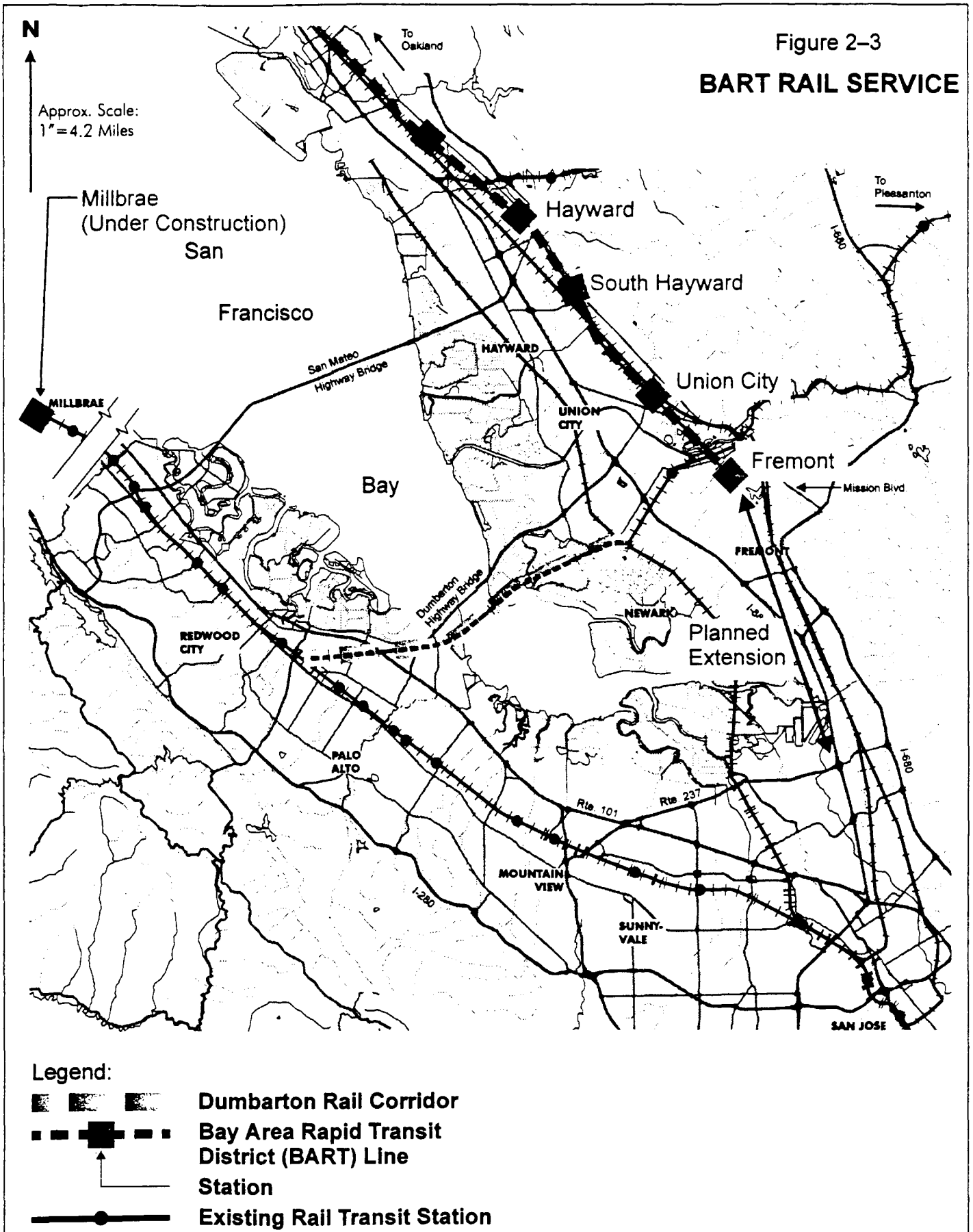
There are four BART Stations in the study area, located as follows relative to the Centerville Line:

- Downtown Hayward (9.6 miles north).
- South Hayward, near Tennyson Road (6.6 miles north).
- Union City, 0.3 mile south of Decoto Road (2.6 miles north of Centerville Line).
- Fremont (0.8 mile south of Centerville Line).

On the Peninsula side, construction is underway to extend the BART Daly City Line south to a new intermodal terminal in Millbrae that integrates and expands the existing Caltrain Station and existing parking facilities. The BART Line will also provide rail transit service between Millbrae and the San Francisco International Airport terminals, which are approximately two miles north of Millbrae. The JPB Line improvements recognize that the Millbrae Station will be a major travel focal point for existing and added trains, once the BART extension is built and in operation.



Figure 2-3  
**BART RAIL SERVICE**



In the East Bay, comprehensive transportation planning has long recognized the need for extending the East Bay BART Line from Fremont south to the Warm Springs area. Although this will be a relatively expensive project, many residents in southern Alameda County and northern Santa Clara County will benefit from having the option to use rail rapid transit, in lieu of private vehicles.

## 2.4 Bus Transit

All BART Stations in the East Bay are well served by Alameda County (AC) Transit. The BART Union City Station is a major focal point for AC Transit and local bus services. On the Peninsula, SamTrans and the Santa Clara Valley Transportation Authority (VTA) have many bus runs that serve Caltrain stations.

SamTrans also provides Trans-Bay limited-stop, express bus service, as follows:

- Via San Mateo Bridge: Between Hayward BART Station and Foster City and San Mateo.
- Via Dumbarton Highway Bridge: Between Union City BART Station and the Palo Alto Caltrain Station, Stanford Industrial Park, and Menlo Park.

Currently, a monthly pass on these express buses costs \$70. **Figure 2-4 Trans-Bay Express Bus Service** (page 2-11) shows the express bus routes. These buses operate westbound in the morning and eastbound in the evening. The 90E bus that uses the San Mateo Highway Bridge travels between the Hayward BART Station and Hillsdale Caltrain stop in 33 minutes. These buses also directly serve three major employment zones on the Peninsula.

The SamTrans buses using the Dumbarton Highway Bridge (DB, DB1, and DB2) typically travel between Union City and the Palo Alto Caltrain Station in 36 and 39 minutes, respectively. Run DB2 provides similar service between Union City and Menlo Park. The times include the time for stopping at the existing Newark Park and Ride Lot, which is just east of the bridge's toll plaza. The westbound buses use a special lane to bypass other queued highway vehicles at the toll plaza. Tolls are not collected in the eastbound direction. On the Peninsula, the DB, DB1, and DB2 buses also serve a number of major employment zones, in addition to the Palo Alto Caltrain Station.

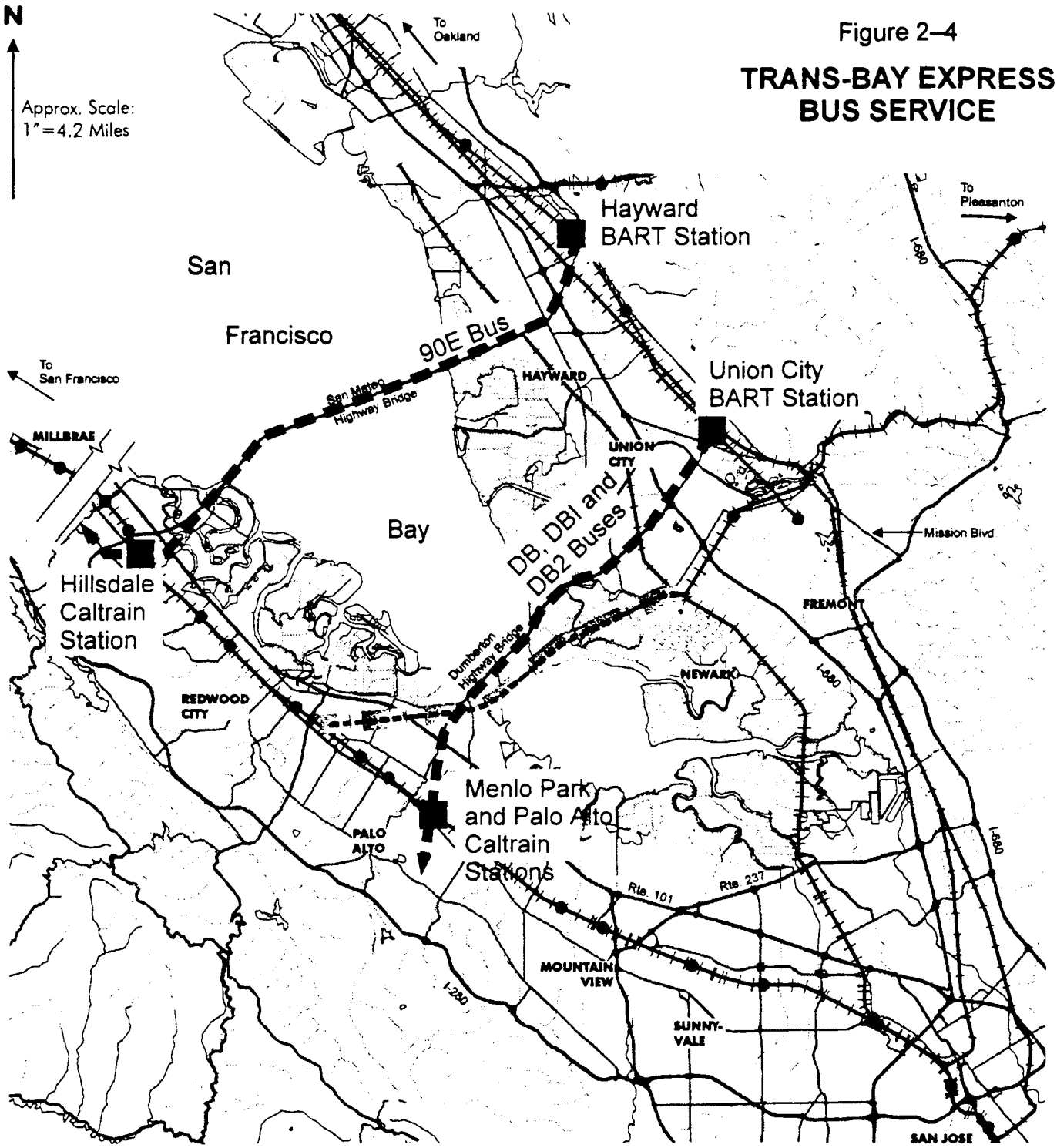
In recent years, the number of employee-sponsored shuttle buses to and from rail passenger stations has increased. Local transit agencies continue to promote this promising option for inducing more employees to make use of passenger rail transit systems.

## 2.5 Community Planning

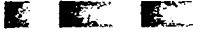


The recommended Dumbarton commuter rail service described in Section 4.0 was tailored to be compatible with contemporary community planning, wherever practical. When the added trains begin operations, adjustment of local community plans may be desirable to maximize the overall public benefits that will result from Dumbarton Corridor rail service.

Figure 2-4

# TRANS-BAY EXPRESS BUS SERVICE



Approx. Scale:  
1" = 4.2 Miles

- Legend:**
-  Dumbarton Rail Corridor
  -  SamTrans Trans-Bay Express Bus Service
  -  Existing Rail Transit Station

**Figure 2-5 Planning Considerations** (page 2-13) illustrates some contemporary community issues that have been recognized in the suggested Dumbarton rail service. By study definition, on the Peninsula side, the added rail service will essentially be a physical extension of the existing Caltrain service that uses the JPB Corridor. Consequently, study staff did not solicit the comments of local officials in Peninsula communities, because there are no service route options. It is anticipated that guidance from these individuals will be obtained by SMCTA, when a refined Dumbarton Corridor service plan is advanced through the project development process.

Along the Dumbarton Corridor in Menlo Park, the area bounded by Highway 101, the Bayfront Expressway (Route 84) and the Dumbarton Corridor, is experiencing expansion of office/commercial uses, including high-tech service industries. The inactive Chilco Street rail crossing is within walking distance of major developments. This would be a logical location for a new commuter rail station to serve employees who are East Bay residents. Four employer-sponsored shuttles now serve the area via the Menlo Park Caltrain Station.

There are numerous physical and operational options for Dumbarton rail service in the East Bay. Discussion follows in Section 3.0. To obtain input on community considerations, study staff had the following meetings with City officials:

- City of Hayward, May 25, 1999.
- City of Newark, May 28, 1999.
- City of Fremont, June 7, 1999.

City of Newark personnel offered the following guidance:

- The Dumbarton Rail service should not terminate in Newark. It should continue east to a logical terminal with existing BART stations.
- Any new Dumbarton Corridor commuter rail station for Newark should be located near or west of Willow Street (about 0.8 mile west of Newark Junction).

The City staff thought a Newark terminal at Newark Junction would draw outside traffic to the area; thus, intensifying growing traffic congestion.

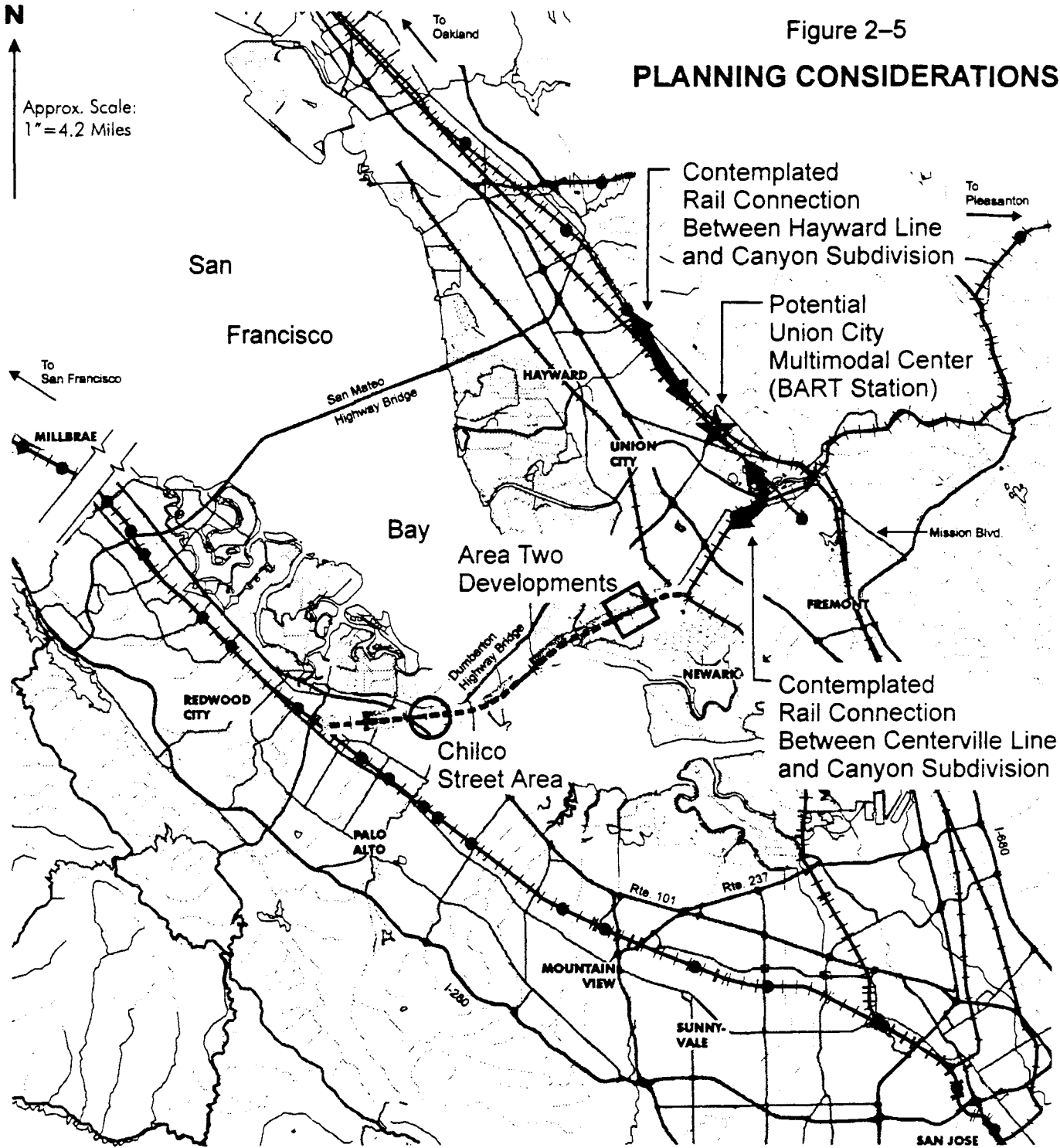
City of Newark staff provided a copy of *Specific Plan for Area Two in Newark*, May 1999. This plan is the applicable land-use-planning document for a portion of the Dumbarton Corridor in Newark. Area Two is about 1.0 square miles, situated southwest of the Thornton Avenue-Willow Street intersection. The inactive Dumbarton Corridor runs generally east-west through this development zone and a new north-south arterial is being contemplated, about 0.6 mile west of Willow. Land use planning for Area Two includes the features described below:

- Added contemporary high-tech research and development, and educational uses.
- Limited industrial uses.
- A commuter rail station with parking, situated in the center or eastern part of the planning area.

The plan recognizes that individuals not associated with nearby businesses would also use the new Dumbarton Corridor commuter rail station.

Figure 2-5

**PLANNING CONSIDERATIONS**



**Legend:**

-  Dumbarton Rail Corridor
-  Community Planning Considerations
-  Contemplated Inter-Corridor Rail Connections
-  Existing Rail Transit Station

Discussions with Fremont officials indicated that the southerly extension of BART from the current Fremont BART terminal was considered the highest priority transportation improvement. It is recognized that, in general, potential commuter rail patrons using the Dumbarton service would not otherwise use the BART extension. Thus, the objectives of the additional commuter rail service and the BART extension are not functionally competitive. City of Fremont staff also furnished information related to the operation of the Fremont-Centerville train station, which is used as a basis for assumptions associated with capital improvements and operating costs at this site.

Prior to the start of the current Dumbarton Corridor Rail Study, Union City representatives considered the merits of developing a new intermodal transportation center on the Canyon Subdivision, adjacent to the existing BART Station. The existing BART station complex has parking and bus connections, all located on the west side of the BART corridor. As part of the intermodal development, a pedestrian undercrossing would be provided to link the existing BART terminal facilities with a new station complex developed along and east of the Canyon Subdivision. Access to the new terminal area would be provided by an improved intersection along Decoto Road, and new street running south into the new parking areas and bus transit circulation roads.

The contemplated Union City plan includes the following inter-corridor rail connections:

- Just south of Decoto Road, a new 0.3-mile long rail connection would be built to connect the Hayward Line and Canyon Subdivision. Alternatively, a connection could be made farther north.
- In the area northwest of the Centerville/BART crossing, the connection would be built under the BART tracks, to link the Centerville Line passenger main with the Canyon Subdivision track, just south of the Alameda County Flood Control Channel bridge. This link is identical to that being considered by the UP.

With these connections, the Capitol Route trains could be re-routed to serve the new Union City transportation center. The trains would bypass the congestion at Niles Junction. Union City officials have provided SMCTA with preliminary concept plans for the contemplated transportation center.

Conversations with Hayward personnel indicate that Trans-Bay highway movements related primarily to the San Mateo Highway Bridge generate significant traffic congestion in Hayward. Much of this traffic is related to motorists who are not residents of Hayward. City staff endorsed the idea of terminating the Dumbarton rail service in the East Bay at a point where it can be fully integrated with BART. In particular, they saw the benefits of the Union City proposal for an intermodal facility on the Canyon Subdivision, as an extension of the BART station.

As a part of "what if" discussions with the City of Hayward, study staff asked, if Dumbarton Rail Corridor service came to Union City, and were to be extended north to Hayward initially or in a later phase, which existing rail corridor would be preferable from a community planning focus:

- The Canyon Subdivision, which literally passes through the existing BART station complexes at the South Hayward and Hayward stops, or
- The Hayward Line, which has intercity rail service stopping at the Amtrak Station that is west of downtown and the BART corridor?

Hayward officials saw merit in both routes.

### 3.0 MARKET ASSESSMENT AND RAIL SERVICE OPPORTUNITIES

Subsection 1.3 of this report outlined the overall approach undertaken by this study to define an initial service and capital investment strategy for the Dumbarton Rail Corridor. The study approach essentially involved reviewing prior work, conducting independent assessments of existing travel markets and physical conditions, identifying rail service patronage opportunities, and defining an initial plan which logically combined the findings of this investigation.

This section reports the planning aspects of this project development process.

#### 3.1 Prior Study Alternative Service Scenarios

Prior studies of this corridor have explored a host of service and capital investment alternatives. As these project development efforts tend to build upon one another, only the most recent study findings are referenced below.

The *Dumbarton Rail Corridor Study*, completed in 1997, evaluated a no-build and four build alternatives illustrated on **Figure 3-1 Dumbarton Rail Corridor Study Alternatives** (page 3-2).

Build Alternative One would originate westbound AM service in Livermore, cross the Dumbarton Railroad Bridge running to the Redwood Junction, and continue south to San Jose. Trains would return to Livermore via the Coast Line (through Alviso and Newark) for a second peak directional trip.

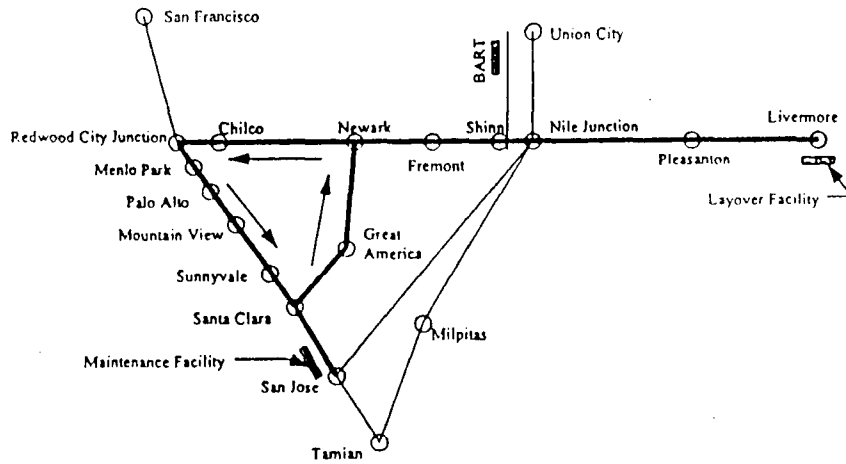
Build Alternative Two covered the same track sections but operated westbound in the AM from Livermore to Newark, south over the Coast Line to San Jose (same as ACE), then north on the Peninsula line to Redwood Junction before turning east for a return (deadhead) trip to Livermore.

Build Alternative Three would originate westbound AM service in Union City at the BART station, cross the Dumbarton railroad bridge running to the Redwood Junction, and continue north on the Peninsula line into San Francisco.

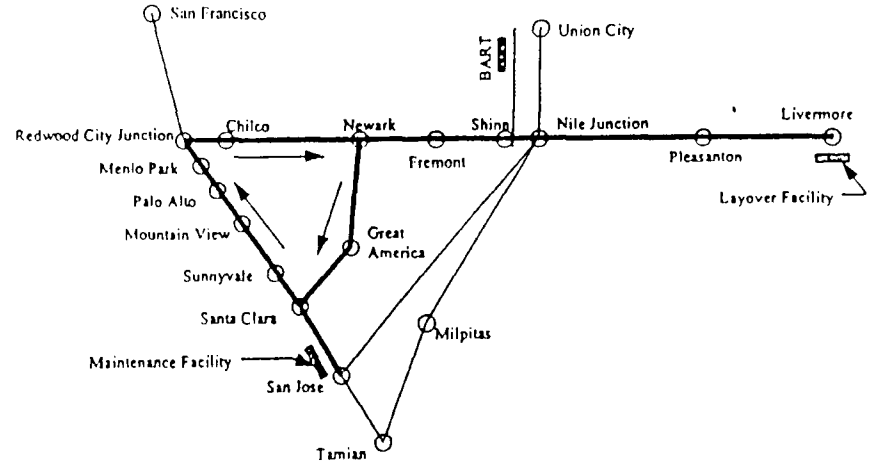
Build Alternative Four would originate service in Union City, run westerly to Redwood Junction, southerly to San Jose, and northerly to Union City operating over one of UP's freight lines running through Milpitas and Fremont.

Subsequent to the development and testing of these alternatives, several public meetings were held as part of the *Dumbarton Rail Concept Plan* effort to discuss the *Dumbarton Rail Corridor Study* results. Based on this public input, two additional alternative operating plans were developed. Both alternatives assumed that trains would operate every 15 minutes from the East Bay in the AM peak direction (westbound), and would split into northbound and southbound trains when they reached the Peninsula Caltrain tracks at Redwood Junction. Under Alternative A, the northbound trains would terminate in San Francisco and the southbound trains in San Jose. Under Alternative B, the

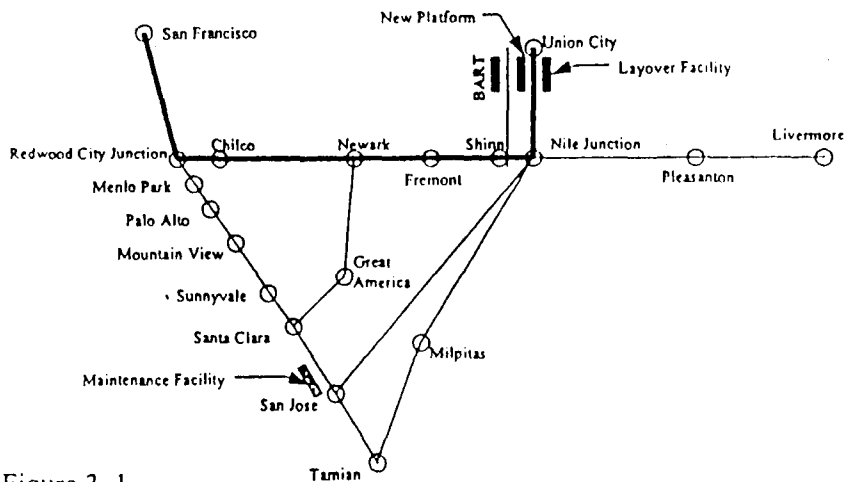
### Alternative 1 Livermore to San Jose



### Alternative 2 San Jose to Livermore



### Alternative 3 Union City to San Francisco



### Alternative 4 Union City to San Jose/Milpitas

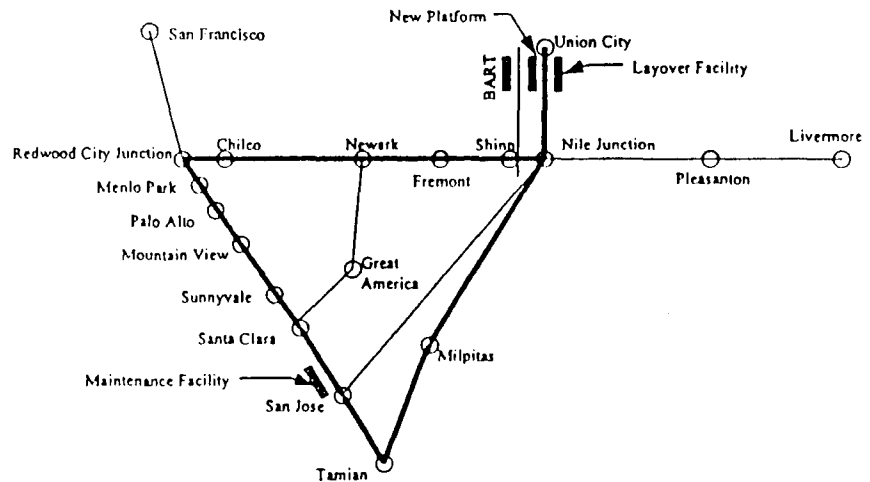


Figure 3-1  
DUMBARTON RAIL CORRIDOR STUDY ALTERNATIVES

Source: Parsons Brinkerhoff Quade & Douglas and HDR Engineering, January 14, 1997



northbound trains would terminate in Millbrae and the southbound trains would terminate in Sunnyvale.

Insofar as the East Bay train origin, incremental service options were identified to include a park and ride lot located just west of the Newark “wye”, the Fremont Amtrak and ACE station, and the Union City BART station.

This prior alternative development, evaluation and refinement effort provided the foundation for the project development effort undertaken by this analysis.

### **3.2 Assessment of Travel Market**

To begin the project development effort, the study team undertook an independent and comprehensive assessment of the Peninsula/East Bay travel market so as to not overlook or over anticipate potential customers for the Dumbarton passenger rail service.

As a starting point, the auto traveler market was investigated, given limited existing transit service over the Dumbarton Bridge. The Alameda County CMA transportation forecast model was used as the primary tool to derive preliminary vehicle market estimates for the Dumbarton Highway Bridge (Route 84). The results of these forecasts were then compared to the forecasts from the San Mateo County CCAG model, which corroborated the forecast of traffic across the Dumbarton Highway Bridge.

The peak hour traffic data resulting from the Alameda County CMA model shows a highly directional AM westbound commute followed by a highly directional PM eastbound commute. Results from this data indicate that the Dumbarton market centers are adjacent cities, clustered near Route 84 on both sides of the Bay. The majority of the Peninsula market (AM destinations and PM origins) is composed of East Menlo/East Palo Alto, Redwood City, Menlo Park, and Palo Alto. The majority of the East Bay market (AM origins and PM destinations) is comprised of North Fremont, Union City, Newark, and Hayward. The San Mateo model supports the data from the Alameda County CMA model.

#### **Model Methodology**

The San Mateo County CCAG model has a well-defined zone system along the Peninsula. The zones become larger and less refined as distance from San Mateo County increases. This decreasing refinement becomes more evident as model results from zones in the East Bay are viewed. The model does not adequately address the zone structure in the East Bay, which are large and connected by a sparse network which cannot precisely reflect travel patterns to and from the large, individual zones. The San Mateo model accurately depicts travel patterns in San Mateo County and, therefore, is the model which provides the most accurate picture of origins and destinations in the market area along the Peninsula which is served by the Dumbarton Highway Bridge, i.e., Route 84. The San Mateo County CCAG model was utilized as follows:

1. The year 2000 Forecasts were used to determine the Peninsula origins and destinations of East Bay traffic traveling across Dumbarton Bridge. The year 2000 was chosen as the horizon year in order to form a close comparison to the forecast year of the Alameda County CMA model. From the results, market area and share of market could be identified.
2. Peak hour select link analyses were performed on the Dumbarton Bridge to determine the number and distribution of vehicle trips crossing the Bay in both directions.

A different model — the Alameda County CMA model — was used to determine the Dumbarton travel market in the East Bay. The Alameda County model also has detailed zone structures, which, by design, become larger and less refined as distance from Alameda County increase. This decreasing refinement becomes more evident as model results to/from zones on the Peninsula are viewed. In this model, it is the zones on the Peninsula that have sparse network and zone structures. These more distant zones (from Alameda County) are not designed to precisely reflect travel patterns to and from the individual zones on the Peninsula. The CMA model accurately depicts travel patterns within Alameda County and, therefore, is the model which provides the most accurate picture of origins and destinations in that market area of the East Bay which is served by the Dumbarton Highway Bridge, i.e., Route 84. The Alameda County CMA model was utilized as follows:

1. The year 2005 Forecasts were used to determine the East Bay origins and destinations of traffic traveling across Dumbarton Bridge. The year 2005 horizon year is the closest year to the current year and was selected for this reason. From the results, market area and share of market could be identified.
2. Peak hour select link analyses were performed on the Dumbarton Bridge to determine the number and distribution of vehicle trips crossing the Bay in both directions.

Because each of the two models have different strengths related to separate sides of the Bay, it is reasonable to utilize both models according to the specific markets being studied. Both of the two models described use *Projections 98*, the latest land use projections from ABAG. Although these models are generally similar, they are not designed to operate as a single entity.

### **Alameda County CMA Model Forecast**

**Table 3-1 AM Peak Hour Westbound Traffic Across Dumbarton Highway Bridge** (page 3-5) shows the distribution of westbound, morning commuters traveling across the Dumbarton Highway Bridge. The data shows that the majority (71%) of westbound morning traffic originates in North Fremont, Union City, Newark, and Hayward. North Fremont, as divided from South Fremont by Stevenson Boulevard, originates the most trips, 1,576, or 28% of the total. Hayward, Newark, and Union City each generate from 13% to 16% of the total trips.

**Table 3-1  
AM PEAK HOUR WESTBOUND TRAFFIC  
ACROSS DUMBARTON HIGHWAY BRIDGE**

	Peak Hr Trips	% of Total
<b>Origins: East Bay Market</b>		
Livermore / Pleasanton	293	5%
South Fremont	432	8%
<b>North Fremont</b>	<b>1576</b>	<b>28%</b>
Newark	791	14%
Union City	938	16%
Hayward	732	13%
San Leandro	138	2%
Rest of Alameda County	481	8%
Other Bay Area Counties	319	6%
<b>Total</b>	<b>5700</b>	<b>100%</b>
<b>Destinations: Peninsula Market</b>		
San Francisco County	43	1%
Daly City / San Bruno	282	5%
San Mateo / Foster City	400	7%
<b>Redwood City / Menlo Park</b>	<b>1945</b>	<b>34%</b>
<b>Palo Alto / Los Altos</b>	<b>2665</b>	<b>47%</b>
Sunnyvale / Mountain View	297	5%
Rest of Santa Clara County	68	1%
<b>Total</b>	<b>5700</b>	<b>100%</b>
Source: Alameda County CMA Model: Year 2005 Vehicle Trips		

The AM westbound Dumbarton traffic destined for the Peninsula market shows that Redwood City/Menlo Park and Palo Alto/Los Altos account for a combined 81% of all destinations. Palo Alto/Los Altos captures 47% of the trips, while Redwood City/Menlo Park receives 34%. The less active market areas are San Mateo/Foster City with 7%, followed by Sunnyvale/Mountain View (5%), and Daly City/San Bruno, also with 5%.

**Table 3-2 PM Peak Hour Eastbound Traffic Across Dumbarton Highway Bridge** (page 3-6) shows that 72% of the PM peak hour, peak direction (eastbound) commuters crossing the Dumbarton Bridge originate in Redwood City, Menlo Park, and Palo Alto/Los Altos. These commuters return to the East Bay market, primarily North Fremont, Union City, Newark, and Hayward; which comprise 68% of the total destinations.

#### **Peninsula Travel Market / San Mateo County Model**

Data from the San Mateo model indicate that westbound trips across Dumbarton Highway Bridge, during the AM peak commute, show a strong preference for destinations located in Redwood City, Menlo Park, and Palo Alto. The data resulting from the model is presented in **Table 3-3 AM Peak Hour Westbound Traffic Across Dumbarton Highway Bridge** (page 3-7). Note that Redwood City, Menlo Park, Palo Alto, and East Palo Alto account for 83% of the weekday trips in the morning peak, crossing the Dumbarton Bridge westbound.



**Table 3-2  
PM PEAK HOUR EASTBOUND TRAFFIC  
ACROSS DUMBARTON HIGHWAY BRIDGE**

	Peak Hr Trips	% of Total
<b>Origins: Peninsula Market</b>		
San Francisco County	27	0%
Daly City / San Bruno	323	5%
San Mateo / Foster City	340	5%
<b>Redwood City / Menlo Park</b>	<b>1893</b>	<b>28%</b>
<b>Palo Alto / Los Altos</b>	<b>2920</b>	<b>44%</b>
Sunnyvale / Mountain View	925	14%
Rest of Santa Clara County	257	4%
<b>Total</b>	<b>6685</b>	<b>100%</b>
<b>Destinations: East Bay Market</b>		
Livermore / Pleasanton	347	5%
South Fremont	734	11%
<b>North Fremont</b>	<b>1743</b>	<b>26%</b>
<b>Newark</b>	<b>913</b>	<b>14%</b>
<b>Union City</b>	<b>1092</b>	<b>16%</b>
<b>Hayward</b>	<b>828</b>	<b>12%</b>
San Leandro	150	2%
Rest of Alameda County	539	8%
Other Bay Area Counties	339	5%
<b>Total</b>	<b>6685</b>	<b>100%</b>
Source: Alameda County CMA Model: Year 2005, Vehicle Trips		

Over 60% of the total trips are traveling to cities south of Route 84. Redwood City is the only major market component north of Route 84. According to the data, traffic captured by cities north of Redwood City do not amount to a significant portion of the overall auto dominated market at this time (using the Dumbarton Highway Bridge).

**Table 3-4 PM Peak Hour Eastbound Traffic Across Dumbarton Highway Bridge** (page 3-8), presents the peak directional evening commute. The same four cities that comprise the AM Peninsula market are now the major points of PM origins, rather than destinations. As shown, the four cities originate 77% of the eastbound trips during the peak evening commute. Palo Alto represents the strongest market area. The Peninsula cities north of Redwood City represent only 16% of the Dumbarton auto traveler market.

**Table 3-3  
AM PEAK HOUR WESTBOUND TRAFFIC  
ACROSS DUMBARTON HIGHWAY BRIDGE**

	Peak Hr Trips	% of Total
<b>Destinations: Caltrain Station Cities</b>		
Downtown San Francisco	38	1%
Burlingame	56	1%
Millbrae	10	0%
South San Francisco	60	1%
San Francisco Airport	79	2%
San Bruno	11	0%
San Mateo/Foster City	217	4%
Belmont	61	1%
San Carlos	260	5%
Atherton	85	2%
<b>Redwood City</b>	<b>1069</b>	<b>22%</b>
<b>Menlo Park</b>	<b>1370</b>	<b>28%</b>
<b>East Palo Alto</b>	<b>352</b>	<b>7%</b>
<b>Palo Alto</b>	<b>1267</b>	<b>26%</b>
<b>Total</b>	<b>4935</b>	<b>100%</b>
Source: San Mateo County Model: Year 2000, Vehicle Trips		

In summary, the San Mateo model forecast indicates a Peninsula market focused in four, adjacent areas to the Dumbarton Bridge: East Menlo/East Palo Alto, Redwood City, Menlo Park, and Palo Alto.

### 3.3 Passenger Rail Patronage Opportunities

The independent assessment of travel markets reported in Subsection 3.2 supports the findings of the *Dumbarton Rail Concept Plan*, prepared by the San Mateo County Transportation Authority in November, 1998.

As mentioned in that report, a peak directional service, crossing the Dumbarton rail bridge and running both north and south on the Peninsula appears to offer the greatest opportunity to attract rail patronage, thereby relieving traffic congestion over the State Route 84 Dumbarton highway bridge and approach roadways. On the Peninsula, destinations for East Bay commutes lay both north and south of the Dumbarton rail corridor which joins the Peninsula rail corridor at Redwood Junction. The primary question to address is how far to the north and how far to the south should Dumbarton corridor trains operate to achieve the optimal mix of patronage and fare revenue for operating cost and capital investment tradeoffs.

**Table 3-4  
PM PEAK HOUR EASTBOUND TRAFFIC  
ACROSS DUMBARTON HIGHWAY BRIDGE**

	Peak Hr Trips	% of Total
<b>Origins: Caltrain Station Cities</b>		
Downtown San Francisco	35	1%
Burlingame	54	1%
Millbrae	12	0%
South San Francisco	55	1%
San Francisco Airport	75	2%
San Bruno	14	0%
San Mateo/Foster City	257	6%
Belmont	66	2%
San Carlos	135	3%
Atherton	50	1%
<b>Redwood City</b>	<b>561</b>	<b>13%</b>
<b>Menlo Park</b>	<b>693</b>	<b>16%</b>
<b>East Palo Alto</b>	<b>221</b>	<b>5%</b>
<b>Palo Alto</b>	<b>1894</b>	<b>43%</b>
Mt. View/Sunnyvale	77	2%
Other Santa Clara County	170	4%
<b>Total</b>	<b>4369</b>	<b>100%</b>
Source: San Mateo County Model: Year 2000, Vehicle Trips		

The situation is similar in the East Bay. The market assessment indicates that the vast majority of commuters using the Dumbarton Bridge (SR84) live in Newark, Fremont, Union City and Hayward. The question again is primarily one of patronage gained by extending service east of the Newark Junction to Fremont, Union City and Hayward in comparison with capital investments and operating costs.

To develop estimates of line patronage, the Alameda County CMA model was used and enhanced with minor network coding adjustments to improve the representation of walk and park and ride access. The Alameda County model was used for this analysis instead of the San Mateo County model because virtually all of the Dumbarton Rail corridor patrons will be "home-based" in Alameda County. Alternative Dumbarton Passenger Rail line termini were tested to ascertain the value of extending service north and south along the Peninsula and north easterly in the East Bay.

Thirty minute headways were assumed for trains running northbound toward San Francisco and (separately) southbound toward San Jose. Combined, these trains would provide 15 minute headways across the Dumbarton Rail Bridge.

A timed transfer was assumed to occur at the Fremont Amtrak/ACE station to afford ACE patrons with a convenient transfer opportunity to and from Dumbarton rail service in the AM and PM respectively. Subsection 4.3 of this report outlines a prototypical schedule which would accomplish this objective.

**Figure 3-2 Dumbarton Rail Passenger Capture Rates** (page 3-10) illustrates the results of these ridership tests expressed in terms of capture rates for various line segments. East of the Bay, the graphic shows that 12.5 percent of the corridor’s potential ridership base would be captured if the line terminated in Newark. If the line extended to the Fremont Amtrak station, 40 percent of the corridor’s patronage could be captured in comparison to the 100 percent reported for a line extending to central Hayward.

On the Peninsula, 45 percent of the potential rail patronage was forecast to be attracted to a line extending to San Francisco while nearly, as many riders would use a line that terminated at Millbrae. Competition from East Bay BART service to San Francisco logically accounts for this small increment of added patronage captured by extending the line to San Francisco.

Traveling south of Redwood Junction, the Palo Alto segment (Atherton to Palo Alto) was forecast to attract 24 percent of the corridor patronage while extending the line south to Mountain View, Sunnyvale, Santa Clara and San Jose would attract an additional 31 percent (cumulative of 55 percent) of the rail patronage market.

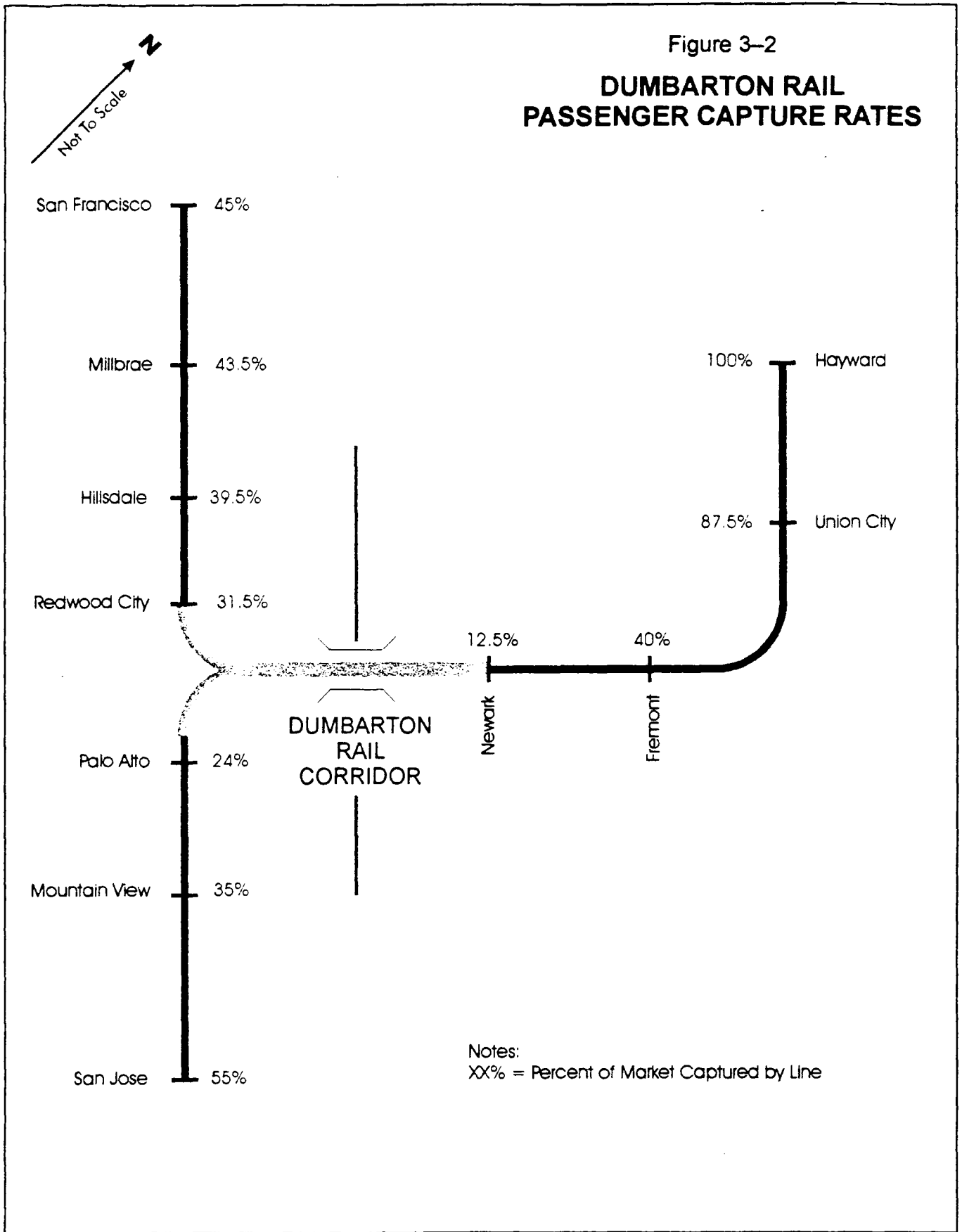
The forecast of patronage attracted to the Palo Alto segment was lower than would be indicated by the overall travel market assessment reported in Subsection 3.2. This prediction is logically attributable to the competition for transit patrons afforded by the Dumbarton Express Bus service that was retained (unchanged) in the travel forecasting runs.

**Table 3-5 Dumbarton Rail Passenger Capture Rates** (page 3-9) combines the Peninsula and East Bay Dumbarton passenger rail markets to indicate “capture rates” for sixteen combinations of line termini. These capture rates were computed by multiplying the patronage distributions for the East Bay termini by the collective north plus south Peninsula termini distributions. As reported in the table and depicted on Figure 3-2, patronage on the Dumbarton rail corridor will increase as the length of the service grows longer. The value or benefit of the incremental patronage therefore needs to be weighed against the capital investment required to generate the patronage.

**Table 3-5  
DUMBARTON RAIL PASSENGER CAPTURE RATES**

West End ⇐ East End ⇓	Redwood City/ Palo Alto	Hillsdale/Mt. View	Millbrae/San Jose	San Francisco/ San Jose
Newark	6.9%	9.3%	12.3%	12.5%
Fremont	22.0%	29.8%	39.4%	40%
Union City	48.6%	65.2%	85.2%	87.5%
Hayward	55.5%	74.5%	98.5%	100%
Notes: Percent of patronage market captured by line termini. Excludes inter Peninsula/inter East Bay trips.				





### 3.4 Screening of Alternative Service Routes

Capital investment and operating costs are reported later in this document for the recommended rail service plan as well as optional add-ons. All aspects of line improvement and station development are addressed on a segment by segment basis so that the incremental cost of line extensions may be isolated.

For the purpose of identifying the most cost effective line and station development investments, capital cost information contained in Subsection 5.2 has been summarized and used here to determine the effectiveness of incremental capital investments relative to patronage returns. For the purpose of this analysis, operating costs and fare box returns were ignored, as was inter Peninsula and inter East Bay patronage. Given the number of permutations being tested, this was merely a simplifying election that reflected the importance of capital investment and Trans-Bay patronage to the decision making process.

**Table 3-6 Dumbarton Rail Capital Costs** (page 3-12) reports the approximate levels of capital investment associated with each of the sixteen combinations of route termini that were selected for study. By way of explanation, these capital costs were “built up” as follows:

- \$63 million for upgrading rail, signaling and bridge work between Redwood Junction and the Newark wye.
- \$5 million for extending service to a Fremont station termini to include parking and a train storage facility.
- \$6 million of additional investment for extending service to Union City, opposite BART, and constructing the overnight train storage facility at that location in lieu of Fremont (Centerville).
- \$4 million of additional capital expense for extending service to Hayward.
- \$2 million for improving the northern leg of the Redwood Junction.
- \$5 million each for constructing a train layover/turnback at Palo Alto and Redwood City (\$10 million total), or Mountain View and Hillsdale.
- Zero Cost assumed for train layover/turnback facilities at San Jose, Millbrae, or San Francisco.

Details of these capital costs are reported in Subsection 5.2 of this document.

**Table 3-6**  
**DUMBARTON RAIL CAPITAL COSTS (\$M)**

West End ⇔ East End ⇓	Redwood City/ Palo Alto	Hillsdale/Mt. View	Millbrae/San Jose	San Francisco/ San Jose
Newark	75	75	65	65
Fremont	80	80	70	70
Union City	86	86	76	76
Hayward	90	90	80	80
Notes: Capital costs exclude rolling stock.				

All told, Table 3-6 indicates capital costs for initial Dumbarton passenger rail service ranging from \$65 million as a least cost investment to approximately \$90 million in current dollars.

These estimates do not include rolling stock which is assumed to be leased, nor rail access charges for use of UP's Centerville line between the Newark wye and Niles Junction, and UP's Hayward Line or Canyon Subdivision to Union City or Hayward. Please see Subsections 5.3 and 5.4 for discussion of these cost elements.

To ascertain capital cost effectiveness relative to patronage potentials, the capital costs reported in Table 3-6 were divided by the patronage "capture rates" reported in Table 3-5. A *relative value ratio* was thus derived to indicate relative capital investment per patron using the Trans-Bay Dumbarton passenger rail service. Inter Peninsula and inter East Bay passenger rail patronage was not counted in this computation so as to avoid masking the value of the Dumbarton rail corridor service.

**Table 3-7 Relative Value Ratio** (page 3-12) reports the computed "Relative Value Ratios" for each of the sixteen route termini combinations. This table and the supporting detail clearly indicate that in the East Bay, Dumbarton passenger rail service should originate in either Union City or Hayward. On the Peninsula, service should extend to San Jose in the South Bay and either Millbrae or San Francisco in the North Bay.

**Table 3-7**  
**RELATIVE VALUE RATIO (CAPITAL INVESTMENT PER RIDER)**

West End ⇔ East End ⇓	Redwood City/ Palo Alto	Hillsdale/Mt. View	Millbrae/San Jose	San Francisco/ San Jose
Newark	10.9	8.1	5.3	5.2
Fremont	3.6	2.7	1.8	1.8
Union City	1.8	1.3	0.9	0.9
Hayward	1.6	1.2	0.8	0.8
Notes: Lower value indicates more cost effective investment. Capital cost excludes rolling stock. Ridership excludes inter Peninsula/inter East Bay trips.				

### 3.5 East Bay Terminus: Union City vs. Hayward

The relative ratios of capital investment to patronage potentials reported in Table 3-7 do not clearly differentiate the cost/benefit between originating Dumbarton rail service in Union City versus central Hayward. To address this issue, additional analysis was undertaken to identify near term implementation opportunities and constraints associated with extending service from Union City to Hayward.

The study effort identified three possibilities for extending Dumbarton Rail service north from the proposed Union City transportation center to Hayward:

- **Option H1:** Continue north on the Canyon Subdivision and create a new terminal commuter rail station in the center of the existing Hayward BART station complex.
- **Option H2:** Build a 0.3 mile long rail connection just south of Decoto Road (as shown on Union City concept plans) and run commuter rail service north on the Hayward Line to a terminal at the existing Hayward Amtrak Station.
- **Option H3:** Construct a new rail connection just south of Industrial Parkway (as recently proposed by UP as part of a concept to abandon part of the Hayward Line south of Industrial Boulevard), and run commuter rail service north on the Hayward Line.

Because all three options would provide adequate rail service to Hayward, judgement indicated that the same level of patronage could be expected with any of the options.

In terms of initial capital costs, the options would involve tradeoffs between line improvements and station improvements:

- With H1, no significant line improvements would be needed; however, it might be expensive to adjust the existing Hayward BART Station complex to introduce a commuter rail station and added parking.
- With H2 and H3, the Dumbarton project would need to pay for in whole or part the cost of an inter-corridor rail connection; however, it would be possible to make full use of the Hayward Amtrak facilities, where additional parking could be provided easier than with the BART station complex.

Either of the inter-corridor rail connections would be needed to allow the UP to abandon a part of the Hayward Line and to redirect Capitol Corridor trains through the new Union City Transportation Center. However, partial abandonment of the Hayward Line as envisioned by the UP would also require double tracking the Canyon Subdivision and probably a new bridge over the Alameda County Flood Control Channel.

If implemented, Option H1 would provide a commuter rail station that would literally be part of the Hayward BART Station, which is essentially in downtown Hayward. Both AC Transit and SamTrans Trans-Bay buses focus on this location. Although H2 and H3 provide the commuter rail stop about a half mile from downtown Hayward where there are now no major bus transit ties, Dumbarton rail commuters using their private automobiles might find access to the Hayward Amtrak Station to be more convenient.

Subsection 2.2 of this document reported that the introduction of commuter rail service is being planned between Union City and San Jose. One element of this plan involves acquiring UP Railroad's "Western Pacific" line, potentially between San Jose and Oakland. North of Niles Junction, this rail corridor is referred to as the Canyon Subdivision, i.e. the alignment followed by the H1 extension to Hayward and a portion of the H3 option.

In conjunction with this rail corridor acquisition plan, the Union Pacific Railroad has made known its desire to shift future expansions of the Capitol Corridor Amtrak service to at least portions of the Canyon Subdivision, and the possible abandonment of the Hayward Line south of Industrial Boulevard to Niles Junction.

In light of all these possibilities for passenger rail and freight service expansions and consolidations in the East Bay, this study effort recommends that the initial Dumbarton Corridor passenger rail service begin in Union City, and preserve all opportunities to extend service north to Hayward at a later date.

## 4.0 RECOMMENDED RAIL SERVICE PLAN

The market assessment and evaluation of service opportunities in Section 3.0 conclude the recommended Dumbarton Corridor rail should be based on providing new commuter rail service between Union City and Millbrae, and Union City and San Jose. This report section defines the recommended rail service plan, in terms of train frequency, stations and supporting facilities. Preliminary timetables are presented in Section 4.3.

### 4.1 Overview of Operations

**Figure 4-1 Recommended Dumbarton Rail Service Routes** (page 4-2) shows the suggested initial rail service plan's terminal points and new intermediate stations. It is proposed to run Dumbarton train service on two routes:

- Between Union City and Millbrae (30.0 miles, approximately a 60-minute run), and
- Between Union City and San Jose Diridon (37.8 miles, approximately a 75-minute run).

In line with the guidelines described in SMCTA's *Dumbarton Corridor Transit Concept Plan* and current Parsons Transportation Group patronage forecasts, it is proposed to operate twelve Dumbarton train runs each non-holiday weekday, as described below:

- In the morning peak commuter hours, three trains will provide service between Union City and Millbrae, and layover in Millbrae. In the evening peak commuter hours, the three trains will provide the reciprocal service between Millbrae and Union City.
- In the morning peak commuter hours, three trains will run between Union City and downtown San Jose (Diridon), and layover in San Jose. In the evening peak commuter hours, the three trains will provide the reciprocal service between San Jose and Union City.

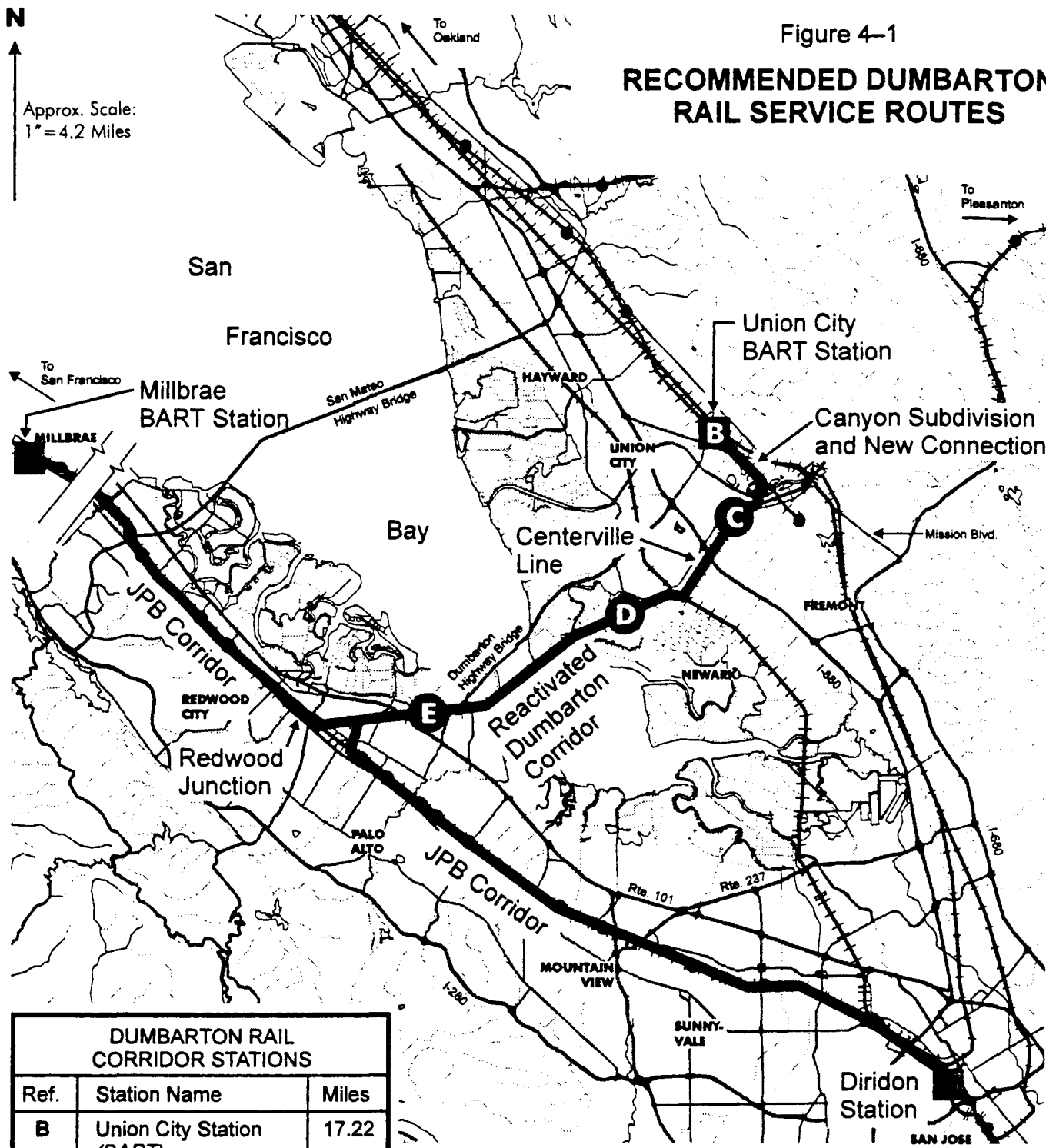
Each run will use four existing rail corridors:

- The JPB Peninsula Line and selected stations, between Redwood Junction and Millbrae or San Jose,
- A rehabilitated SamTrans-owned Dumbarton Corridor between Redwood Junction and Newark Junction, including new stations at Chilco Street and in western Newark,
- The Union Pacific Centerville Line trackage within approximately 3.9 miles east of Newark Junction, including the existing Fremont Centerville Station now serving the Altamont Commuter Express (ACE) and Amtrak Capitol Route trains, and
- The Union Pacific's Canyon Subdivision, within approximately 2.2 miles north of the Alameda County Flood Control Channel, north until a new commuter rail station, functionally integrated with the existing Union City BART Station, about a third of a mile south of Decoto Road.

The Dumbarton project will include constructing a new 0.3-mile long track connection between the Centerville Line and Canyon Subdivision, immediately south of the Alameda County Flood Control Channel. The connection will include a new structure carrying the existing BART Line over the new rail connection. It is assumed that this connection will be transferred to the UP, as part of negotiations, in exchange for trackage rights for the Dumbarton service.

Figure 4-1

**RECOMMENDED DUMBARTON RAIL SERVICE ROUTES**



DUMBARTON RAIL CORRIDOR STATIONS		
Ref.	Station Name	Miles
B	Union City Station (BART)	17.22
C	Fremont Centerville (ACE/Amtrak)	13.72
D	Newark (Area Two)	10.02
E	Chilco Street	3.25

Miles are referenced to Redwood Junction, where south wye joins JPB Line.

- Notes:
1. The Dumbarton Trains will also make stops at certain existing Caltrain Stations.
  2. Night-time storage of Dumbarton Corridor rolling stock will be at Union City.

North and south of Redwood Junction the added Dumbarton trains will stop at selected Caltrain Stations, similar to existing Caltrain service. The specifics of which Dumbarton trains will stop where on the Peninsula Line have not been determined at this time. In line with the market assessment, if the overall scheduling constraints allow, new trains between the East Bay and Millbrae should stop in Redwood City and San Carlos, and the San Jose-bound trains should stop at Atherton, Menlo Park, Palo Alto and California Avenue. Although the initial expected patronage level at Chilco Street is small and could be served without having all Dumbarton trains stop at this station, for planning purposes it is assumed all Dumbarton trains will drop off and pick-up passengers at Chilco Street.

#### 4.2 Stations and Supporting Facilities

**Table 4-1 Proposed Dumbarton Corridor Station Facilities** (page 4-4) lists new or expanded station complexes that will be needed to support the recommended Dumbarton Corridor rail service. The table describes concepts for restructuring current transit service and adding employer shuttles to induce commuter rail patronage. Parking requirements are also shown in the table. A summary of proposed stations and supporting facilities follows. Additional information can be found in *Improvements East of Newark Junction, Stations and Supporting Facilities; Capital Investments Working Paper*, Parsons Transportation Group, July 1999.

In the East Bay, Dumbarton train runs will commence and end revenue service on the Canyon Subdivision at a new commuter rail station to be built either as an independent commuter rail station development, or as a component of the contemplated Union City Intermodal Center. Under either scenario, the Union City Station will be functionally the most important East Bay stop associated with the Dumbarton Corridor commuter rail service. Cost estimates discussed in Subsection 5.2 are based on an independent station development located adjacent to and connected with the existing Union City BART Station complex, as described in Table 4-1. It is further assumed that the Dumbarton rolling stock will be cleaned and stored nightly at Union City. However, it is expected that washing and fleet maintenance will occur in San Jose, in conjunction with Caltrain operations.

In Fremont, the proposed rail service will use existing station facilities and infrastructure (i.e., the Fremont Centerville ACE/Amtrak Station). However, it is assumed additional parking will be constructed. Preliminary evaluations indicate that the single platform now on the north side of the passenger main will be adequate for handling the patronage that is expected to transfer between ACE and the Dumbarton trains.

The Newark Station will be as proposed by the Area Two Plan (see Subsection 2.5 for details). Cost estimates presented in Subsection 5.2 assume the Dumbarton rail service project will build a station and parking lot, but not be involved in constructing new arterial streets.



**Table 4-1  
PROPOSED DUMBARTON CORRIDOR  
STATION FACILITIES**

Ref.	Station Name	Station Development Scenario	Number of Added Parking Spaces Required
B	Union City Station (BART)	It is assumed that the new commuter rail station will come first, and a larger intermodal complex developed by others in phases. The initial station complex would include a platform and walkway to connect with the existing BART station complex. Decoto Road would be improved to provide a signalized intersection for a new access road leading south to the new station parking lot and bus transit facilities. Train storage and support facilities will be developed at this location. AC Transit and SamTrans Trans-Bay bus service will be modified to serve the east side of the BART station complex.	370
C	Fremont Centerville (ACE/ Amtrak)	The existing station handles six Amtrak trains and four ACE trains, with two (or four) more expected. Three AC Transit routes already serve this station. The Dumbarton train service will use the existing station complex and construct additional parking for the expected patronage.	200
D	Newark (Area Two)	This station should be developed in consort with the Area Two Plan, which calls for additional streets and other infrastructure. Because this is a new area for businesses, there is no AC Transit service. Added AC Transit is anticipated to serve primarily the Area Two developments. It is assumed that the Dumbarton rail service project will construct a station and parking area, but not be involved in constructing new arterial streets.	250
E	Chilco Street	This will be a new station, tailored primarily to serve East Bay residents employed in the area surrounding the station. Local SamTrans service could be expanded to serve this station. Employee shuttles should be promoted. The station will be constructed and Chilco Street improved to include bus and shuttle turnouts and added sidewalk leading to the improved street system immediately to the north.	None

Note: In subsequent capital cost estimates it has been assumed that right-of-way will be acquired initially for the number of parking spaces shown. However, initially, only one-half of the indicated number of spaces will be constructed.

North and south of Redwood Junction the added Dumbarton trains will stop at selected Caltrain Stations, similar to existing Caltrain service. The specifics of where Dumbarton trains will stop on the Peninsula Line have not been determined at this time. In line with the market assessment, if the overall scheduling constraints allow, new trains between the East Bay and Millbrae should stop in Redwood City and San Carlos, and the San Jose-bound trains should stop at Atherton, Menlo Park, Palo Alto and California Avenue. Although the expected initial patronage level at Chilco Street is small and could be served without having all Dumbarton trains stop at this station, for planning purposes it is assumed all Dumbarton trains will drop off and pick-up passengers at Chilco Street.

The existing Caltrain stations along the Peninsula Line are assumed to be adequate for handling the added patronage associated with Trans-Bay Dumbarton trips. As discussed in Subsection 5.1, the Dumbarton trains are expected to generate new patronage associated with passengers traveling between points on the Peninsula. This will offset in part the operating expenditures associated with the recommended Dumbarton service. It is expected that sufficient added train layover capacity will be provided at Millbrae and in San Jose, as a part of other planned improvements.

It is unlikely that additional patronage on the Peninsula can be generated without adding parking at existing Caltrain stations. Station parking needs and layover of additional trains on the Peninsula Line are being addressed separately as part of overall Caltrain service improvements throughout the JPB Corridor from San Francisco to Gilroy. Consequently, this Dumbarton Rail Corridor Study did not investigate the details of where and how parking should be added to existing Caltrain stations, or exactly where Dumbarton trains will layover during mid-day periods. The capital cost estimates discussed in Subsection 5.2 do not include any allowance for added parking or layover facilities on the Peninsula.

### **4.3 Preliminary Train Schedules**

The running times for each Dumbarton Corridor train between Union City and Redwood City or Atherton were estimated by considering the spacing between stations, the allowable maximum operating speeds, other rail traffic, and expected dwell times. A significant number of rail commuters will board or exit at Fremont Centerville; thus, a longer dwell time could occur. For preliminary timetable planning purposes, eight minutes were allowed for Dumbarton trains to travel between Union City and Fremont Centerville, including dwell time in Fremont.

It is estimated that the 18.5-mile run between Union City and Atherton will take about 35 or 36 minutes (an overall trip speed of approximately 31.2 miles per hour, including stops). In comparison, the existing Caltrain runs between Menlo Park and San Jose Diridon require about 34 to 35 minutes for the 18-mile segment, which equates to an overall trip speed of 31 to 32 miles per hour. As shown on Figure 4-1, between Union City and Atherton, station spacings will be 3.5, 3.7, 6.8 and 4.5 miles (an average spacing of 4.6 miles). East of Redwood Junction, the Dumbarton trains will reach maximum speeds of 79 miles per hour over the Dumbarton Bridge. The running times of Dumbarton trains on the JPB Peninsula Line were assumed to be the same as with current Caltrain operations, with the exceptions that slightly longer dwell times (about one minute more) were assumed at the Menlo Park and Palo Alto Stations.

**Table 4-2 Proposed Weekday Timetable: Westbound Dumbarton Service** (page 4-7) illustrates a scheduling concept for coordinating ACE and Dumbarton service, while respecting existing Caltrain operations. Table 4-2 shows estimated departure times, except in San Jose and Millbrae, where the times relate to arrivals. The following criteria was used to develop the suggested westbound service schedule:

- Maintain the existing ACE schedule with one minor exception as noted below and minimize adjustments to Caltrain running times. (Subsection 2-3 presented selected existing timetable information for passenger rail service in the morning and evening peak periods.)
- Coordinate Dumbarton trains and ACE service to facilitate transfers at Fremont Centerville.
- Recognize that morning Dumbarton trains to San Jose must cross northbound Caltrain runs at Redwood Junction, and the morning Dumbarton trains to Millbrae must each enter the northbound JPB mainline either immediately after a limited-stop Caltrain run passes, or well before such existing trains.
- When practical, maintain a minimum of ten-minute headways.

For project development purposes, it was assumed that the first westbound ACE time in the morning could be adjusted so it runs three minutes earlier, and that the planned additional ACE train might run between the two existing ACE trains. On that basis, ACE trains would arrive at Fremont Centerville at approximately 5:58, 6:33 and 7:08 AM (35-minute headways), and each would leave about two minutes later. As a next step, it was assumed that two westbound Dumbarton trains would arrive at Fremont Centerville about eight and 13 minutes after the ACE trains depart. As shown in Table 4-2, the first of these Dumbarton trains (e.g., run D2, D6 or D10 in Table 4-2) would always continue to San Jose Diridon and the second train (runs D4, D8 or D12) would provide service to Millbrae. This pattern provided the best fit with both the existing northbound and southbound Caltrain service in the morning peak hours.

Under the preliminary timetables, the train trips between the Peninsula and the East Bay would range from about nine minutes for travel between Newark and Chilco Street, to about 58 minutes for travel between Union City and Millbrae, and 76 minutes for the Union City-to-San Jose journey.

Although a trial timetable for afternoon eastbound Dumbarton train service is not included in this report, preliminary analysis indicates it will be possible to develop a reciprocal schedule for afternoon commuter service so eastbound Dumbarton trains arrive at Fremont Centerville shortly before ACE trains. However, the existing Caltrain schedule will need to be adjusted. Also, currently the first afternoon ACE train now arrives at Fremont Centerville at about 4:43 PM. To accommodate Dumbarton-to-ACE transfers for this ACE train, it would require having a set of Dumbarton trains leave San Jose and Millbrae at about 3:15 and 3:30 PM respectively. This would be too early. The preliminary conclusion is that in the morning the Dumbarton service can be planned around the existing ACE and Caltrain service. However, in the afternoon, the ACE timetable may require a more significant adjustment to coordinate service with the Dumbarton trains.

**Table 4-2  
PROPOSED WEEKDAY TIMETABLE:  
WESTBOUND DUMBARTON SERVICE**

Station (Read Down)	Train Numbers (See notes below) (Times are A.M. departures, except as noted)													
	22	ACE 01	D2	D4	ACE 03	24	D6	D8	ACE 05	26	D10	D12	28	30
San Francisco	5:00				6:00				6:30				6:55	7:00
Pleasanton		5:37			6:12			6:47						
Union City			6:02	6:07			6:37	6:42			7:12	7:17		
Fremont Centerville		6:00	6:10	6:15	6:35		6:45	6:50	7:10		7:20	7:25		
Newark			6:18	6:23			6:53	6:58			7:28	7:33		
Chilco Street			6:28	6:33			7:03	7:08			7:38	7:43		
Atherton	5:53		6:37			-	7:12			7:24	7:47		-	7:53
Menlo Park	5:55		6:41			6:57	7:16			7:27	7:51		7:39	7:56
Palo Alto	5:58		6:45			7:00	7:20			7:30	7:55		7:42	7:59
California Avenue	6:01		6:48			7:03	7:23			7:33	7:58		7:45	8:02
						Intermediate Stops are Not Shown								
Arr. San Jose Diridon	6:30	6:40	7:18		7:15	7:33	7:53		7:50	8:03	8:28		8:14	8:31
Redwood City				6:41				7:16				7:51		
San Carlos				6:45				7:20				7:55		
						Intermediate Stops are Not Shown								
Arr. Millbrae				7:05				7:40				8:15		

ACE = Altamont Commuter Express; Am = Amtrak Capitol Route; other train numbers refer to existing Caltrain runs on JPB Peninsula Line. Trains D2, D4, D6, D8, D10 and D12 are contemplated Dumbarton Corridor rail passenger service.

#### 4.4 Rolling Stock Options

The *Caltrain Rapid Rail Study* comprehensively examined options and tradeoffs of alternative vehicle technologies for use over the Caltrain system and potentially additional routes to include the Dumbarton Rail Corridor. The following text is abridged from that document.<sup>1</sup> The discussion concludes with a recommendation to continue acquiring FRA compliant vehicles such as those currently operated over the Caltrain system. This recommendation and the reasoning behind it holds equally true for the Dumbarton Rail Corridor.

One of Caltrain's incentives for considering alternative railcar technologies is the potential for operating services off Caltrain tracks and onto other service providers (or vice-versa). Among the potential routes suggested for this type of inter-operability were:

- San Francisco Muni Metro.
- Santa Clara VTA's LRT system.
- Union Pacific: San Jose to Fremont BART connection.
- Caltrain/Altamont Commuter Express.
- Dumbarton Rail Corridor service.
- Caltrain—additional local service to Gilroy and beyond.

The ability to operate over different systems is limited by such factors as platform length, vehicular clearances, structural strength requirements, axle load limits, traction power characteristics and local noise and vibration limits. The most important factor is compliance with FRA regulations.

Compliance with Federal Railroad Administration (FRA) requirements for vehicle strength is a critical consideration in Caltrain's decision on future railcars. Especially critical is what is referred to as "buff" strength. Buff strength is the longitudinal strength of the railcar. (This is the strength that resists railcars from being crushed like an accordion). In general, the buff loads for multiple-unit and light rail vehicle types in foreign services fall into the following ranges:

• Diesel Multiple Units	200,000 – 600,000 lbs.
• Electric Multiple Units	200,000 – 600,000 lbs.
• Diesel Light Rail	150,000 – 200,000 lbs.
• Electric Light Rail	75,000 – 200,000 lbs.

Other than commuter rail operations in Dallas and Syracuse, the only FRA-compliant multiple unit vehicles in U.S. service currently are electric, therefore, their application would have to be part of a total system electrification. There is currently only one new, FRA-compliant DMU design in development for North American service, but no orders for it have yet been placed. Both Dallas and Syracuse's commuter rail system uses rehabilitated Budd RDCs (originally built in the 1950s and 1960s) which were built FRA compliant. Modifying the newer DMU vehicle designs for Caltrain service would be costly, due to the need for structural redesign.

Several suggestions have been made for using the new generation of Diesel Light Rail Vehicles (DLRV) or Diesel Multiple Units on both Caltrain and adjacent light rail properties. While no contemporary DLRV or DMU designs currently meet FRA buff strength requirements, increasing interest in this technology may result in a FRA compliant version for

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<sup>1</sup> Draft *Caltrain Rapid Rail Study*, 13.5 *Inter-operability*, Caltrain and STV Incorporated, October 1, 1998.

US service. Once Caltrain is electrified, EMUs might offer even better potential for operation on other transit service providers.

On the other hand, standard (FRA compliant) commuter rail systems are currently the transit industry's most popular investment. One look at the list of potentials for additional service presented above indicates that most of the opportunities would be for standard FRA compliant commuter rail equipment. This is because they would be operated on rail lines that currently and will likely continue – to offer freight service (e.g. ACE corridor, service to Monterey, and the Dumbarton Rail Corridor). Furthermore, operating this type of equipment provides the greatest possible flexibility for meeting the Peninsula's and region's future need for rail service.

Therefore, it is recommended that Caltrain does not obtain non-FRA compliant railcars which could be operated on light rail systems unless the FRA changes regulations concerning vehicle strength requirements.

Based on the above and the benefits of maintaining a fleet of similar equipment for maintenance, leasing and equipment-sharing opportunities, for this study it is assumed that conventional commuter rail rolling stock will be used for Dumbarton Rail Service.

## 5.0 ESTIMATED REVENUE AND COSTS

This section reports the estimated revenue and costs associated with the recommended rail service plan described in Section 4. The expected Trans-Bay patronage for the Dumbarton Rail Corridor is first presented along with associated farebox revenue. Capital improvements and the estimate of probable costs for these items are summarized next. That reporting is followed by a cost estimate for acquiring or leasing rolling stock, assuming the use of conventional, Caltrain-type equipment. Given this equipment selection and corresponding train crew requirements, annual operating costs are then computed and reported in this Section.

### 5.1 Expected Patronage and Revenue

The Alameda County CMA model was used to develop estimates of line patronage for the Dumbarton Corridor passenger rail service. This model was selected due to its availability and the supposition that most of the ridership would live in Alameda County, and would be best represented by a model calibrated on demographic characteristics of Alameda County residents.

Minor modifications were made to the model to improve the representation of walk access links and park and ride access links. No attempt was made to verify the trip generation, trip distribution or mode split performance of the model insofar as Trans-Bay travel due to scope and budget constraints.

The year 2005 ABAG demographic data set, transportation network, and MTC county to county commutation pattern was selected for testing ridership potentials. This timeframe best matched an implementation schedule that could be realistically delivered for the anticipated Dumbarton Corridor passenger rail service described in Section 4.

Using this model and the 2005 data set, initial Trans-Bay patronage is forecast to be 2500 to 2800 passengers (boardings) per day, with one-half traveling westbound in the morning and the other one-half returning home (eastbound) in the PM peak period. Over time, as worker/resident locational patterns adjust to take advantage of this commute alternative, patronage could double.

This estimate of ridership corresponds closely with estimates of Dumbarton Rail Corridor patronage forecast by the *Dumbarton Rail Corridor Study* by Parsons Brinkerhoff, Quade & Douglas of September, 1997. For the four build alternatives described earlier in Subsection 3.1 and illustrated in Figure 3-1, that study forecast a range of 1330 to 3380 daily transit trips traveling on the Dumbarton railroad bridge. **Table 5-1 Daily Volumes on the Dumbarton Railroad Bridge Year 2010** (page 5-2) is reproduced from that study's final report.

**Table 5-1**  
**DAILY VOLUMES ON THE**  
**DUMBARTON RAILROAD BRIDGE YEAR 2010**

Alternative	Low	High
1	1,330	2,630
2 <sup>1</sup>	204	640
3	2,200	3,380
4	2,480	2,640

<sup>1</sup> Eastbound volume

Source: Dumbarton Rail Corridor Study, Final Report: pg. 30, by Parsons Brinckerhoff, Quade & Douglas, Inc., September, 1997.

The Trans-Bay ridership by line segment is depicted on **Figure 5-1 Dumbarton Rail Daily Passenger Volumes** (page 5-3). These ridership counts are two-way (AM plus PM boardings) and do not include inter Peninsula or inter East Bay riders originating in, and destined to San Mateo County for example.

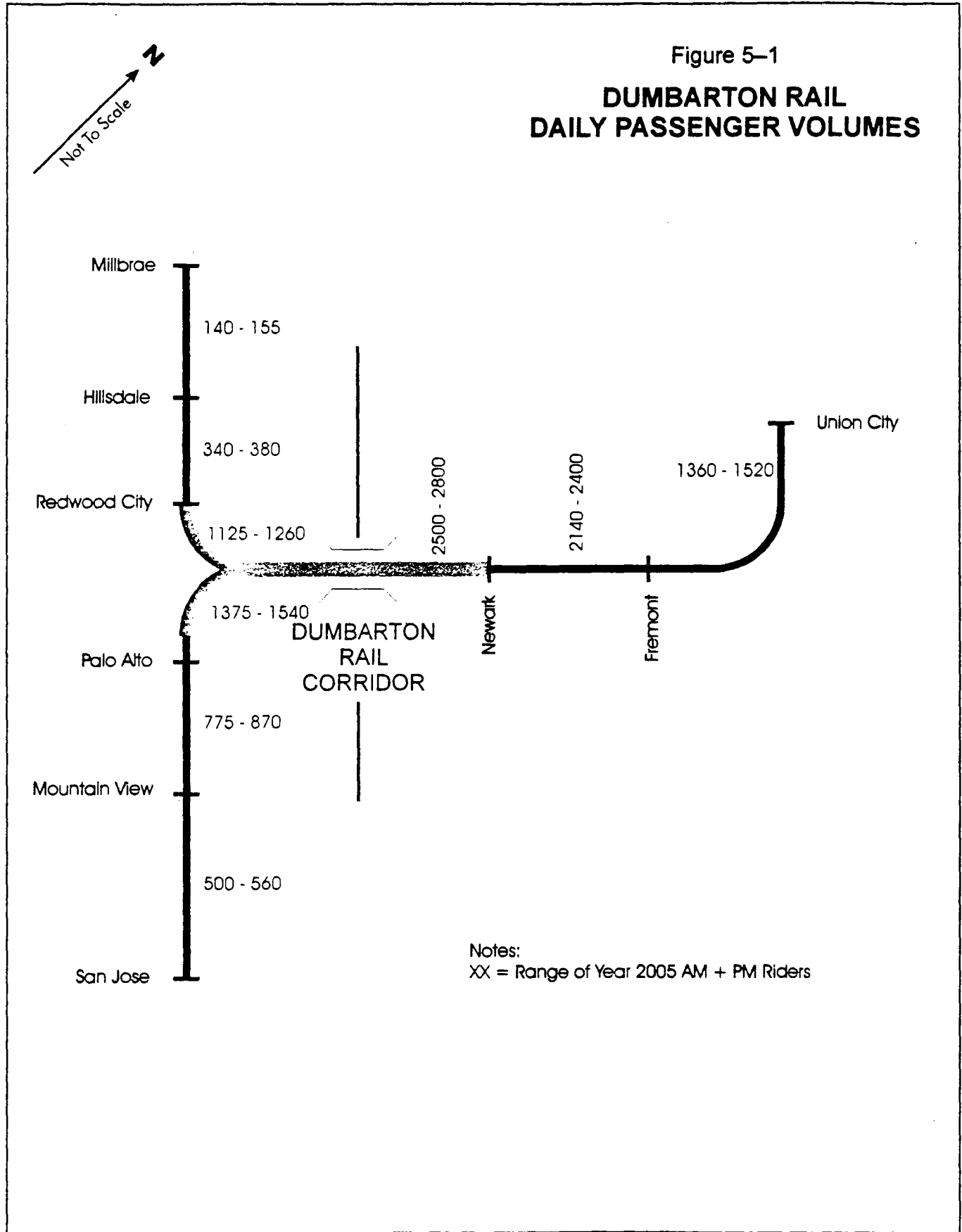
Based on a station by station trip matrix, daily and annual fare box revenue has been estimated. The basis for this estimate is the existing Caltrain fare structure. Newark and Fremont Centerville were assumed to be in Dumbarton Rail Corridor fare Zone 1 while Union City was assumed to be in Dumbarton Rail Corridor fare Zone 2. A trip from Union City to Menlo Park, Atherton, Redwood City or San Carlos (representing a maximum one-way travel distance of 20.4 miles) would thus represent a three-zone trip. A trip from Fremont to San Carlos would represent a two-zone trip.

The distribution of Trans-Bay trips by number of fare zones traveled is estimated as follows:

- Two Zones                   – 26.2%
- Three Zones               – 39.5%
- Four Zones                – 16.3%
- Five Zones                – 12.1%
- Six Zones                 – 5.9%

The corresponding daily revenue, assuming 1/40<sup>th</sup> of a monthly ticket as the average revenue per one-way trip, equals \$4,782 for the daily ridership volume of 2,500 passengers and \$5,356 at the 2,800 passenger per day level. Annual revenue, assuming 253 days of average revenue, would equal \$1,210,000 to \$1,355,700. Revenue derived from station parking and Trans-Bay “surcharges,” if any, would generate additional farebox return as would fares collected from inter Peninsula and inter East Bay travelers.





## 5.2 Required Capital Improvements

The market assessment analysis in Section 3.0 indicates a logical operating service will be to provide new Dumbarton commuter rail service between the Union City BART Station and both the Millbrae BART Station and downtown San Jose, by using a route composed of the following segments:

Segment Limits	Description	Length in Miles
Union City BART Station Complex to Alameda Creek	Acquire track rights on the existing Canyon Subdivision trackage, between the Union City BART Station and the Alameda County Flood Control Channel. It is assumed that a third main track will not be needed.	2.17
New Connection under BART, near Shinn	South of the existing Alameda County Flood Control Channel, construct a one-track connection running under BART to the Centerville Line.	0.24
End of New Connection to Newark Junction	Acquire track rights on the existing Centerville Line trackage. It is assumed that a third main will not be needed.	3.93
Newark Junction to JPB Corridor (Redwood Junction)	Renovate the Dumbarton Rail Corridor to provide one-track mainline operation. Maintain existing Dumbarton Corridor freight service near Redwood Junction and near Newark Junction.	11.00 (Millbrae) 10.88 (San Jose)
Redwood Junction north to the Millbrae BART Station and south to San Jose (Diridon Station)	Run on existing JPB trackage. It is assumed that the Dumbarton fleet will be part of the added train runs that are being planned, and adequate layover facilities will be provided by others at Millbrae and San Jose.	12.50 (Millbrae) 20.35 (San Jose)

Required station and supporting facilities were described in detail in Subsection 4.2. This Subsection 5.2 summarizes needed capital improvements and associated costs, based on the detailed evaluations and estimates provided in the following Parsons Transportation Group documents:

- *Corridor Rehabilitation, Redwood Junction to Newark Junction; Capital Investments Working Paper, July 1999.*
- *Improvements East of Newark Junction, Stations and Supporting Facilities; Capital Investments Working Paper, July 1999.*

**Table 5-2 Estimated Capital Costs** (page 5-5) summarizes the capital investments, by corridor. It is assumed that no additional improvements will be needed as a result of Dumbarton service in the JPB Corridor, beyond those that are already programmed or planned.

**Table 5-2  
ESTIMATED CAPITAL COSTS**

Category and Work Item	Estimated Costs, in millions, by Corridor			
	JPB Peninsula Line	Dumbarton Corridor	East of Newark Junction	Total
<b>Track and Roadway</b>				
• Track Upgrade		6.96		6.96
• New Track		1.70	0.38	2.08
<b>Signals</b>				
• Train Signals		3.09	0.36	3.45
<b>At-Grade Crossings</b>				
• Warning Devices		1.05	0.21	1.26
• Crossing Panels		0.47	0.01	0.48
<b>Structures</b>				
• Structures		21.67	2.37	24.04
<b>Stations</b>				
• Stations, Parking and Facilities		0.81	1.32	2.13
<b>Supporting Facilities</b>				
• Train Storage Area	See Note		1.00	1.00
<b>Construction Total</b>		<b>35.75</b>	<b>5.65</b>	<b>41.40</b>
<b>Right-of-Way Acquisition</b>				
• New Track Connection			1.16	1.16
• Station Areas		1.35	2.89	4.24
• Train Storage Area	See Note		0.63	0.63
<b>Right-of-Way Total</b>		<b>1.35</b>	<b>4.68</b>	<b>6.03</b>
• Contingencies		11.27	3.28	14.55
• Project Engineering, Administration; and Implementation		12.43	3.01	15.44
• Property Acquisition Reserve		1.35	7.47	8.82
<b>Total Project Cost</b>	See Note	<b>62.15</b>	<b>24.09</b>	<b>86.24</b>

Note: It is assumed that any supporting facilities needed in the JPB Corridor (i.e., mid-day layover facilities in Millbrae and San Jose) will be constructed as part of other programmed or planned improvements.

Costs are based on current year 1999 dollars.

The largest cost element identified in Table 5-2 is for structures. From west to east, the Dumbarton Corridor now includes ten bridge structures, as follows:

- U.S. 101 Underpass; steel through truss.
- West Timber Trestle on San Francisco Bay.
- West Concrete Trestle on San Francisco Bay.
- West Approach to Dumbarton Bridge; Concrete Trestle on San Francisco Bay.
- Dumbarton Bridge: six truss spans, three short deck girder transition spans, and one steel swing span, San Francisco Bay.
- East Approach to Dumbarton Bridge; Concrete Trestle on San Francisco Bay.
- East Approach to Dumbarton Bridge; Timber Trestle on San Francisco Bay.
- West Approach to Newark Slough; timber trestle.
- Newark Slough Bridge: one steel swing span and two steel deck girder transition spans.
- East Approach to Newark Slough; timber trestle.

The proposed improvements follow:

- Replace all timber trestles with precast prestressed concrete box girders on concrete pile bents.
- Replace Dumbarton Bridge steel trusses and deck girders with precast prestressed concrete box girders on concrete pile bents.
- Rehabilitate Dumbarton Bridge steel swing span and swing span mechanical system.
- Replace Newark Slough steel deck girders with precast prestressed concrete box girders on concrete pile bents.
- Rehabilitate Newark Slough steel swing span and swing span mechanical system.

The following track, roadway, and signal improvements are recommended as part of the capital improvement program:

- Trackway: Upgrade turnouts, replace switch ties, resurface and ballast the corridor, rebuild at-grade crossings, create bypass for Leslie Salt, improve Redwood Junction, and improve Newark Junction.
- Signals: Install CTC.

Most proposed stations are in areas experiencing commercial development. Potential for rapidly escalating real estate values warrants that a "property acquisition reserve" be established.

Table 5-2 summarizes all the capital improvements required to provide the physical facilities that will allow implementing the recommended rail service plan for reactivating the Dumbarton Rail Corridor. The total estimate of \$86.24 million (1999 dollars) consists of \$62.15 million for improvements for the Dumbarton Corridor, and \$24.09 million in improvements east of Newark Junction.

### 5.3 Equipment Leasing Cost

Subsection 4.4 summarized an evaluation of rolling stock options and concluded the Dumbarton service as now planned should be based on using conventional equipment, similar to the existing Caltrain fleet. The following cost estimate is prepared on that basis.

The initial Dumbarton fleet would allow for fielding of six train consists comprised of one locomotive, one or two passenger coaches, and one cab car. This fleet would provide an average load factor of 0.67 passengers per seat across the Dumbarton Railroad Bridge, assuming 2,800 passengers per day. The fleet is estimated to cost \$43 million (based on current prices). A cost breakdown for this fleet is as follows:

Number	Vehicle Type	Cost in millions of dollars	
		Unit Cost	Total Cost
6	Locomotives	\$ 2.10	\$ 12.60
9	Coach Cars	1.60	14.40
6	Cars with Cabs	1.75	<u>10.50</u>
	Subtotal =		\$ 37.50
	Equivalent of 15% Rolling Stock Spare Allowance		<u>5.63</u>
	<b>Total =</b>		<b>\$ 43.13</b>

Assuming the needed Dumbarton fleet could be leased for a 25-year period with an 8.25% interest rate, the uniform lease payments would be approximately \$4.13 million annually.

### 5.4 Annual Operating Costs

This report subsection is a summary of the operating and maintenance cost analyses documented in *Operating Costs Working Paper*, July 1999, by the Parsons Transportation Group. The four tables at the close of this subsection are reproduced from that working paper.

For purposes of this study, it is assumed that the Dumbarton Corridor operations will be an extension of the JPB's Caltrain service. Thus, in most cases, operating and maintenance expenditures will be similar to Caltrain's current per-train-mile experience, as shown in **Table 5-3 Current Caltrain Operating Costs** (page 5-11).

The current study first identified those cost items that would be similar to Caltrain operations, and then did independent estimate for unique items. **Table 5-4 Adjusted Train Operating Costs** (page 5-11) indicates, by operating corridor (i.e., JPB, Dumbarton and UP), where the train-mile rates may be applied, and where independent estimates are warranted. In the latter case, Table 5-4 indicates exceptions, which are explained in footnotes. The table also indicates the resulting "net per-train mile rates", if the following items are removed:

- Crew labor costs:
- Dumbarton station operating and maintenance costs, east of Redwood Junction.
- Bridge and maintenance-of-way costs in the Dumbarton Corridor (Redwood Junction to Newark Junction).

The October 1, 1998 *Caltrain Rapid Rail Study* discussed trackage rights for the Dumbarton service and, based on an industry comparison, assumed trackage rights would cost approximately \$5.76 per

train mile, which includes track maintenance and dispatching. ACE is currently paying about \$6.00 per train mile. The Dumbarton service will require closer coordination of trains by UP dispatchers and additional tracks will need to be maintained by the UP for passenger rail service. Thus, a \$7.00 track use fee has been assumed for the current study. The actual rate will need to be negotiated with the UP. Other factors such as the capital improvement connecting the Centerville Line and Canyon Subdivision will be involved in the negotiations.

The travel distances for each train (in miles) by corridor, will be as indicated below:

	<u>In JPB Corridor</u>	<u>In Dumbarton Corridor</u>	<u>Over UP Trackage</u>
• Between Union City and Millbrae	13.0	11.0	6.8
• Between Union City and San Jose	21.9	10.9	6.8

The revenue mileage on the JPB Line will be 12.5 and 20.4 miles for the runs to (or from) Millbrae and San Jose, respectively. It is estimated that the mid-day layovers will involve 0.5 mile and 1.5 miles of non-revenue travel per train run, at Millbrae and San Jose, respectively. Over UP trackage, the revenue run will be 6.5 miles; distances to/from storage in Union City were estimated to be 0.3 mile per train run.

If the net per-train-mile rates by corridor listed in Table 5-4 are multiplied by the associated distances, and totaled, the result is the following per-train cost, for the items included in the per-train-mile rates:

- Between Union City and Millbrae = approximately \$ 805 per train trip
- Between Union City and San Jose = approximately \$1,080 per train trip

Based on current labor agreements, Caltrain crew labor costs approximately \$94 per train hour, and crews are paid at half normal rates during mid-day breaks. These figures exclude agency overhead (approximately 31.5%). For preliminary costing purposes, it has been assumed that each of the six train crews will work a 12.5-hour day, with two 2.5-hour duty periods separated by a 7.5-hour break. This labor utilization will equate to 8.75 hours of compensation, or about 4.4 crew hours per train run. This staffing level will equate to a per-train-run labor cost of \$544, including the agency overhead allowance. Combining the per-train-mile costs with the per-train-run costs yields the following cost for daily train operations:

- Between Union City and Millbrae = \$1,349 per train trip times six trips per day = \$8,094
- Between Union City and San Jose = \$1,624 per train trip times six trips per day = \$9,744

Assuming service is provided weekdays except for seven annual holidays, the total annual operating costs (excluding stations east of Redwood Junction and Dumbarton Corridor maintenance) would be approximately \$4,513,000.

The JPB, with Amtrak as their contractor, is responsible for maintaining most of the Caltrain stations, including (typically) janitorial services inside station buildings, landscaping and exterior

trash removal, parking lot maintenance and revenue collection. In certain cases, cities also provide assistance in operating and maintaining station complexes. Although Amtrak also provides some security services, this is usually reinforced indirectly by the local municipal police as part of other routine duties. JPB Real Estate staff have suggested to the Parsons Transportation Group staff that it would be reasonable to assume that annual station maintenance costs will average approximately \$40,000 per station. Including an allowance of 31.5% for agency overhead, this equates to a fully burdened rate of \$53,000 per station. The Working Paper cited at the start of this subsection discusses the unique station operating and maintenance environments that will occur at each of the five Dumbarton Corridor stations, east of Redwood Junction. Overall, some stations will have lower than average costs and others will have more. Thus the estimated station operating and maintenance cost, based on \$53,000 per station for four stations, is \$212,000 per year.

Subsection 5.2 summarized the bridge and other physical plant improvements that will be required before the Dumbarton Corridor can be used for commuter rail service. Similar to other major facilities, after a number of decades, additional major renovations and repairs may be required. For purposes of estimating operating and maintenance costs, these future major repairs are not included.

**Table 5-5 Annual Operating and Maintenance Cost: Dumbarton Corridor Bridges** (page 5-12) summarizes the costs that will be associated with operating and maintaining the renovated and new bridges, including the Dumbarton Swing Span and Newark Slough Swing Span. The annual cost for operating and maintaining Dumbarton Corridor bridges is estimated to be \$229,000.

Both movable bridges must be maintained in accordance with Coast Guard regulations. The Coast Guard has recently indicated that each day, as many as 30 commercial fishing boats and several recreational vessels require opening the Dumbarton Swing Span. Barge trips, dredges, and construction rigs also occasionally require opening this span. The Newark Slough has minimal vessel traffic and needs to be opened about once a year for vessels related to levee construction, shore maintenance and U.S. Fish and Wildlife activities. The Alameda County Flood Control District, the National Wildlife Refuge, and other agencies have an interest in maintaining navigation through the Newark Slough, including the serviceability of the moveable bridge.

The Coast Guard has expressed willingness to consider special regulations for both bridges that are fair to all parties. It is noted that commercial fishing vessels commute to their work by waterway. Their schedules are controlled by factors such as tides, trip itinerary, and other business/personal interests. The Coast Guard has indicated that the Dumbarton Bridge could be under procedures that require the bridge to be opened at specific periods during the day, including brief periods during the commute hours. Alternatively, an agreement could be proposed that leaves the bridge open during non-commute hours and provides for a "call up" or notification to the bridge owner/operator to open the bridge during commute hours. The on-call bridge opening could be delayed by several minutes depending on the location of the next train. The Newark Slough Bridge could be regulated under a program that requires advance notice to the bridge owner/operator. The advance notice could be proposed as one month; however, a reasonable response would be given if emergency flood control or levee maintenance is required.

The costs shown in Table 5-5 reflect the following assumptions for the two moveable bridges.

- On weekdays, provide one bridge tender at the Dumbarton Swing Span, four hours in the morning, and four hours in the late afternoon.
- Four days a year, provide two bridge tender trips (four hours each trip) for the Newark Slough Bridge.
- Perform one mechanical/electrical inspection of both moveable bridges each year. Perform structural inspection of both bridges once every two years.

**Table 5-6 Annual Operating and Maintenance Cost: Dumbarton Corridor Track, Roadbed and Signals** (page 5-12) summarizes the expected expenditures for operating and maintaining the renovated trackway and supporting systems (e.g., grade crossings, communications and signals) between Redwood Junction and Newark Junction. The tabulated electrical costs are based on a monthly per-mile-month rate that is about half the Caltrain average, because the Dumbarton Corridor will have fewer at-grade crossings, will have no maintenance/layover facilities, and will have only two simple stations with limited parking/circulation areas. The other tabulated costs reflect the following assumptions:

- Inspections by a two-person party once a month.
- Track maintenance and clearing of right-of-way debris and foliage occurs 10 days per year, using a four-person crew.

The overall maintenance of way activities in the Dumbarton Corridor are expected to cost approximately \$349,000 per year.

Based on the above approach, the annual operating and maintenance expenses associated with the recommended Dumbarton Corridor service scenario are expected to cost, as follow:

• Train operations and related overall cost items.....	\$ 4.51 million
• Station operations (east of Redwood Junction).....	0.21
• Bridge operations and maintenance.....	0.23
• Dumbarton Corridor way maintenance and operations.....	<u>0.35</u>
Total =	\$ 5.30 million

These figures are based primarily on current Caltrain operating costs.



**Table 5-3  
CURRENT CALTRAIN OPERATING COSTS**

Category	Operating Cost Item	Total Cost	Cost Per Train Mile
Train Operations	• Train Operations (Crew)	\$ 12,600,000	\$ 12.49
	• Fuel	3,000,000	2.98
	• Train Dispatching	900,000	0.89
Equipment and Facilities	• Equipment Maintenance	7,700,000	7.63
	• Track/Facilities Maintenance Exterior Cleaning	5,500,000	5.45
	• Revenue Collection (Station)	2,000,000	1.98
	• Station Maintenance	900,000	0.89
Other Items	• General Manager Staff	1,600,000	1.59
	• Police	1,100,000	1.09
	• Revenue Accounting	400,000	0.40
	• Materials Control, Leases, Insurance, Marketing	400,000	0.40
	• Budget and Finance	400,000	0.40
	<b>Totals without Agency Overhead</b>	<b>\$36,500,000</b>	<b>\$ 36.19</b>
Agency Overhead	Approximately 31.5% of above items	11,500,000	11.40
	<b>Total Agency Cost</b>	<b>\$48,000,000</b>	<b>\$ 47.59</b>

Per train mile rates are based on 1,008,654 train miles.

Source: Woodside Consultants, July 1999

**Table 5-4  
ADJUSTED TRAIN OPERATING COSTS PER TRAIN MILE**

Category	Operating Cost Item	Net Cost Per Train Mile		
		In JPB Corridor	In Dumbarton Corridor	Over UP Trackage
Train Operations	• Interior Train Operations (Crew)	Excluded <sup>1</sup>	Excluded <sup>1</sup>	Excluded <sup>1</sup>
	• Fuel	\$ 2.98	\$ 2.98	\$ 2.98
	• Train Dispatching	0.89	0.89	Excluded <sup>2</sup>
Equipment and Facilities	• Equipment Maintenance	7.63	7.63	7.63
	• Track/Facilities Maintenance	5.45	Excluded <sup>4</sup>	Excluded <sup>3</sup>
	• Revenue Collection (Station)	1.98	Excluded <sup>4</sup>	Excluded <sup>4</sup>
	• Station Maintenance	0.89	Excluded <sup>4</sup>	Excluded <sup>4</sup>
Other Items		3.88	3.88	3.88
	<b>Totals without Agency Overhead</b>	<b>\$ 23.70</b>	<b>\$ 15.38</b>	<b>\$ 14.49</b>
Agency Overhead	Approximately 31.5% of above items	7.47	4.84	4.56
Track Use Charge		-	-	7.00
	<b>Total Agency Cost, per train mile</b>	<b>\$ 31.17</b>	<b>\$ 20.22</b>	<b>\$ 26.05</b>

<sup>1</sup> Per-train labor costs are not dependent on corridor.<sup>2</sup> Dispatching would be provided by UP with costs covered under trackage fees.<sup>3</sup> UP would perform maintenance with costs covered under trackage fee.<sup>4</sup> Dumbarton Corridor bridge and track operating and maintenance costs are calculated in a following table. Station operating and maintenance costs are identified elsewhere on a per station basis.

**Table 5-5  
ANNUAL OPERATING AND MAINTENANCE COST:  
DUMBARTON CORRIDOR BRIDGES**

Ref.	Bridge Type/Operating/Maintenance Activity	Estimated Annual Cost
<b>Dumbarton Swing Span and Newark Swing Span</b>		
1.	Dumbarton Bridge Tender: 2000 hrs. x \$50/hr.	\$100,000
2.	Newark Slough Bridge Tender: 2 x 16 hrs. x 50/hrs.	\$2,000
3.	Mechanical/Electrical Inspection \$10,000/year	\$10,000
4.	Structural Inspection: \$20,000 every two years	\$10,000
5.	Mechanical/Electrical Servicing and Fueling	\$10,000
6.	Painting: \$100,000/15 years	\$7,000
7.	Miscellaneous and Travel	<u>\$ 10,000</u>
	<b>Subtotal for Both Swing Span Bridges</b>	<b>\$149,000</b>
<b>Concrete Bridges</b>		
1.	Structural Inspections \$50,000 every two years	\$25,000
	<b>Agency Overhead (approximately 31.5%)</b>	<b>\$55,000</b>
	<b>Total Annual Maintenance for Bridges</b>	<b>\$229,000</b>

**Table 5-6  
ANNUAL OPERATING AND MAINTENANCE COST:  
DUMBARTON CORRIDOR TRACK, ROADBED AND SIGNALS**

Item/Analysis	Estimated Annual Cost
<b>Dumbarton Corridor Maintenance-of-Way</b>	
Annual Costs (Maintenance-of-Way)	
1. Inspections	
a. Labor: Hi-Rail and Walking; 2 men x 4 hrs. x 10 days/month x \$75/hr. x 12 months	\$ 72,000
b. Other Direct Cost: \$100/day x 10 days/month/12 months	<u>12,000</u>
Subtotal	\$ 84,000
2. Signals: Maintenance	
a. Labor:	\$ 100,000
b. Other Direct Costs:	<u>20,000</u>
Subtotal	\$ 120,000
3. Track Maintenance and Clearing of Foliage/Debris	
a. Labor: 4 men x 8 hrs. x 10 days x \$75	\$ 24,000
b. Other Direct Costs: \$200/day x 10 days	<u>2,000</u>
Subtotal	\$ 26,000
Items 1, 2, and 3 Subtotal	\$ 230,000
4. Allowance for Agency Overhead (approximately 31.5%)	\$ 72,000
5. Electrical Utility	
a. \$3,900/month x 12 months	\$ 47,000
<b>Total Annual Maintenance of Way Cost</b>	<b>\$ 349,000</b>

## **6.0 KEY FINDINGS AND CONCLUSIONS**

This Section summarizes key findings and conclusions.

### **1. Travel Market**

The strongest travel market for Dumbarton passenger rail service is between the East Bay cities of Newark, Fremont, Union City and Hayward and cities along the Peninsula corridor from San Jose to Millbrae.

### **2. Rail Service Plan**

Based on market studies and a preliminary analysis of the existing railroad network and station opportunities, the initial Dumbarton train service should serve commuters on weekdays as follows:

- In the morning peak commuter hours, three two-to-three car trains will provide service between Union City and Millbrae, and layover in Millbrae. In the evening peak commuter hours, the three trains will provide the reciprocal service between Millbrae and Union City.
- In the morning peak commuter hours, three two-to-three car trains will run between Union City and downtown San Jose (Diridon), and layover in San Jose. In the evening peak commuter hours, the three trains will provide the reciprocal service between San Jose and Union City.

### **3. Patronage Forecasts**

The initial rail service plan is estimated to attract 2,500 to 2,800 passengers per day crossing the Dumbarton Rail Bridge. This represents a peak period mode split of about 10 (ten) percent. This patronage level is expected to grow as the service matures.

### **4. Estimated Revenues**

Fares collected from Trans-Bay rail passengers are estimated at \$1.2 to \$1.4 million annually, exclusive of Trans-Bay "surcharges." Parking revenue and passenger fares collected from inter Peninsula and inter East Bay riders would provide additional revenues.

### **5. Line Improvements**

The following capital improvements are considered necessary to accommodate the initial passenger train service between Union City in the East Bay and the JPB Corridor via the Dumbarton Corridor:

- Replace the existing Dumbarton timber trestles with concrete structures;
- Rehabilitate the existing Dumbarton and Newark Slough swing span bridges and mechanical systems;
- Upgrade the road bed (ties and ballast), turnouts, grade crossings, and track along the Dumbarton Corridor; and
- Install centralized traffic control (CTC) along the Dumbarton Corridor.

- Construct a new connection between the Centerville Line and the Canyon Subdivision immediately south the Alameda Flood Control Channel including CTC, a BART underpass, and bike trail/maintenance road underpass.

**6. Stations and Supporting Facilities**

The following capital investments are considered necessary to accommodate the initial Dumbarton passenger train service:

- Build a commuter rail station (including platform, parking lots, bus stops, and roadway access) at the existing Union City BART station;
- Expand parking at the existing Fremont Centerville train station;
- Build new train stations at Newark and Chilco Street (East Menlo Park);
- Build a layover facility (storage tracks, and security fencing, and access) in the vicinity of the Union City station; and
- Improvements on the Peninsula JPB line would be required but are assumed to be programmed separately by the JPB. These improvements include layover and turnback tracks in San Jose and Millbrae, minor parking expansions at stations, and a mainline crossover at the Redwood Junction.

**7. Estimated Capital Costs**

A planning level capital cost estimate for improvements required to accommodate the Dumbarton rail service is provided below.

- Dumbarton Corridor (Redwood Junction to Newark Junction)

Track	\$ 8,660,000
Signals	3,090,000
Grade Crossings	1,520,000
Structures	21,670,000
Stations	<u>810,000</u>
Construction Subtotal	\$35,750,000
Right-of-Way	1,350,000
Contingencies	11,270,000
Project Development	12,430,000
Property Acquisition Reserve	<u>1,350,000</u>
Subtotal	\$62,150,000

- Newark Junction to Union City
 

Track	\$ 380,000
Signals	360,000
Grade Crossings	220,000
Structures	2,370,000
Stations	1,320,000
Layover Facility	<u>1,000,000</u>
Construction Subtotal	\$ 5,650,000
Right-of-Way	4,680,000
Contingencies	3,280,000
Project Development	3,010,000
Property Acquisition Reserve	<u>7,470,000</u>
Subtotal	\$24,090,000
  
- **Project Total** **\$86,240,000**

**8. Estimated Operating and Maintenance Costs**

Estimated annual operating and maintenance costs for the initial Dumbarton train service follow:

- Train Operations \$4,513,000
- Station Operations (east of Redwood Junction) 210,000
- Dumbarton Corridor Bridge Maintenance 229,000
- Dumbarton Corridor Maintenance-of-Way 349,000
- Total Annual Costs** **\$5,301,000**

**9. Estimated Farebox Recovery**

For the purpose of calculating farebox recovery, consistent with State practice, operating costs do not include equipment costs, marketing, and administration. However, for this study, since the portion of agency overhead associated with marketing and administration is not known, farebox recovery excludes equipment costs only. The estimated farebox recovery ratio attributable to Trans-Bay passenger fares (excluding surcharges and parking fees) is 23 to 26%. Fares collected from inter-Peninsula rides using Dumbarton corridor trains would increase this recovery ratio.

**10. Other Project Criteria**

The Dumbarton Rail Corridor Project would address criteria used by the Federal Transit Administration and other agencies when evaluating proposed major transportation capital investments. Although this study did not analyze these criteria, except for patronage, revenues, and capital and operating costs, it is apparent that the Dumbarton train service would address transit supportive land use policies, improve mobility, benefit air quality, and expand multimodal transportation systems.