

# Fremont-South Bay Corridor

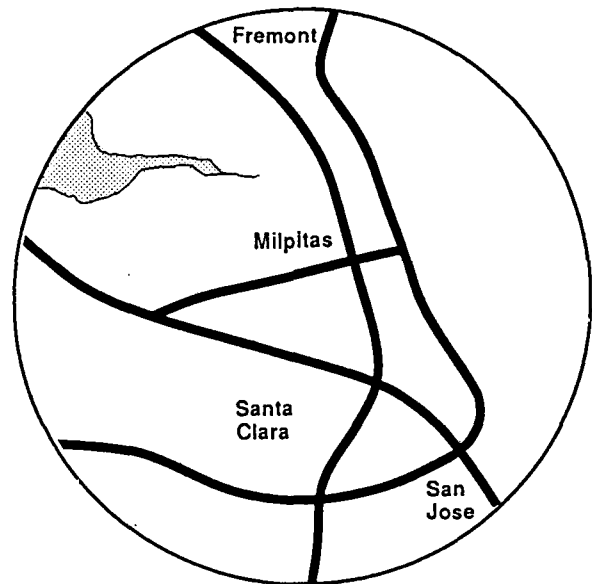
Interim Definition and Capital Cost Report  
Alternatives 1 through 4

*RELIABLE COST EST FEB OR MARCH*

prepared for  
Metropolitan Transportation  
Commission

by  
DKS Associates  
and associated consultants

January 19, 1994



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## Introduction

This interim summary report includes the definition of alternatives and capital costs for four of the eight alternatives developed by MTC, the Fremont-South Bay Technical Advisory Committee and the Fremont-South Bay Corridor Policy Advisory Committee that will be considered for further evaluation. The eight alternatives for the Fremont-South Bay Corridor are:

Included in this interim summary report:

- *Alternative 1: Express Bus*
- *Alternative 2: BART - Fremont to Warm Springs*
- *Alternative 3: Capitol Corridor*
- *Alternative 4: LRT - Fremont BART to Tasman LRT*

To be submitted in an expanded report:

- *Alternative 5: BART - Fremont to Tasman*
- *Alternative 6: LRT - Warm Springs BART to Tasman LRT*
- *Alternative 7: Alviso/Centerville Commuter Rail*
- *Alternative 8: UP/SP Commuter Rail*

Table 1 summarizes station locations and frequency of service for the different alternatives. The definitions of the alternatives presented in this report are in terms of alignment, station locations, frequency of service, and feeder bus routes and connections.

## Regional Transportation Setting

Existing transit conditions connecting the Fremont-South Bay area with the rest of the bay area region include BART connections from Fremont to the East Bay (Oakland, Richmond and Concord) and San Francisco; local bus service between Union City and Palo Alto via the Dumbarton Bridge; Santa Clara County Transit District bus service from Fremont to Downtown San Jose, Sunnyvale and Mountain View; CalTrain service on the Peninsula from Downtown San Jose to San Francisco; Amtrak service between Sacramento and Downtown San Jose; and Light Rail Transit (LRT) along the Guadalupe Corridor connecting Santa Clara, Downtown San Jose and Santa Teresa.

Programmed projects within the Fremont-South Bay Corridor include Tasman Corridor LRT, improved ACR-132 Capitol Corridor Rail Service, the extension of San Joaquin Amtrak service from Oakland to San Jose, and highway as well as transit improvements in the Transportation Improvement Program. These improvements include the addition of stations along Amtrak's Capitol Corridor between Union City and San Jose, upgrading State Route 237 to freeway standards between I-880 and U.S. 101, widening I-880 and I-680, and the installation of HOV lanes on I-880 and I-680.

**Table 1**  
**Station Locations, Service Levels and Fare Policies for**  
**Fremont-South Bay Corridor Alternatives 1 - 8**

*TRK I*  
*RAIL GAP*

*TRK II*  
*/ RAIL GAP CLOSURE*

	1 Express Bus				2 BART Fremont to Warm Springs	3 Capitol Corridor	4 LRT Fremont BART to Tasman LRT	5 BART Fremont to Tasman	6 LRT Warm Springs BART to Tasman LRT	7 Alviso/Centerville Commuter Rail	8 UP/SP Commuter Rail
	140	180A	180B	520							
<b>Mileage</b>	22	20	18	17	5.4	26.2	11.6	11.6	6.2	26.2	23-26.1
<b>Station Locations</b>					Warm Springs	Union City Fremont Great America Santa Clara Cahill Tamien	Fremont Irvington Warm Springs S. Warm Springs Calaveras Capitol/Montague or Great Mall	Irvington Warm Springs S. Warm Springs Calaveras Capitol/Montague or Great Mall	Warm Springs S. Warm Springs Calaveras Capitol/Montague or Great Mall	Union City Fremont Great America Santa Clara Cahill Tamien	Union City Irvington Warm Springs S. Warm Springs Calaveras Capitol/Montague or Great Mall Berryessa or Brokaw Julian or Mission Tamien or Cahill Cahill or Tamien
<b>Peak Hour Service (min)</b>	15	10	10	15	9	Hourly	10	9	10	15	15
<b>Mid-Day Service (min)</b>	Hourly	15	15 <sup>1</sup>	0 <sup>2</sup>	15	Every 2-3 Hours	15	15	15	60	60
<b>Evening Service (min)</b>	0	20	20	0	20	One Train Only	20	20	20	No Service	No Service
<b>Fare Policy</b>	\$1.50	\$1.50	\$1.50	\$2.00 Super Express	Minimum Fare: Fremont to Warm Springs - \$0.80 Average Fare: Per station increment over minimum fare - \$0.20 (Based on BART distance based fare policy)	Variable: \$2.50 Fremont to San Jose	\$1.00	Minimum Fare: Fremont to Warm Springs - \$0.80 Average Fare: Per station increment over minimum fare - \$0.20 (Based on BART distance based fare policy)	\$1.00	Fare structure similar to CalTrain Same zone: \$1.00 Two zone: \$1.75 Zone increment after two: \$0.50 (Two to three fare zones between Union City and Tamien, roughly)	Fare structure similar to CalTrain Same zone: \$1.00 Two zone: \$1.75 Zone increment after two: \$0.50 (Two to three fare zones between Union City and Tamien, roughly)

<sup>1</sup> 30 minute service between Tasman LRT and Cahill

<sup>2</sup> Mid-day service is available via Tasman LRT

## **Alternative Definitions**

### **Alternative 1: Express Bus**

#### **Summary**

Alternative 1 consists of improved Santa Clara County Transit District express bus service from the Fremont BART Station to Santa Clara County, and more frequent Amtrak service along Capitol Corridor. One new express bus route serving the corridor is added to the existing routes and three existing routes are improved by adding more frequent service and route modifications to take advantage of the HOV lanes on I-880. These four routes provide new commute service between Fremont BART and downtown San Jose, as well as Fremont to the expanding employment base in the Route 237 corridor in Milpitas, northern San Jose, Santa Clara, and Sunnyvale.

Amtrak service along Capitol Corridor is increased from three round trips per day, between Sacramento and the San Francisco Bay Area, to six round trips per day. Figure 1 displays the Alternative 1 alignment.

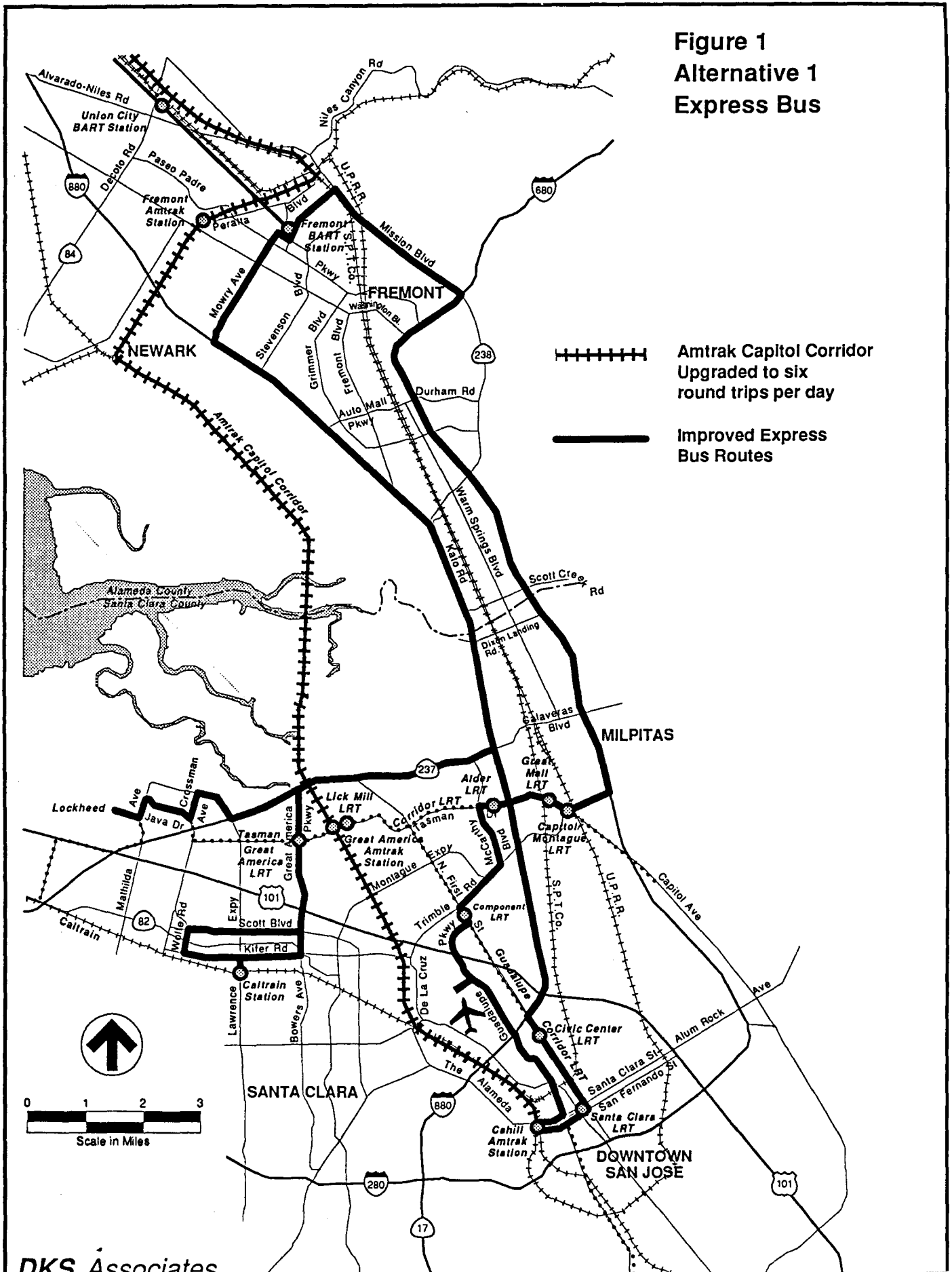
#### **Express Bus Design Criteria**

Several assumptions regarding route design are made to guide the optimum development of an express bus alternative which will tend to maximize transit ridership. To be attractive to commuters, service should be:

- Sufficient in service frequency to be perceived convenient and reliable by commuters.
- Sufficient in capacity to provide all express bus passengers with a seat.
- Scheduled to operate with running times which are as comparable as possible to similar trips made by automobile.
- Well-coordinated with major employment shift times and intermodal transfer requirements, to capture estimated peak direction patronage and to stimulate reverse commute patronage.

It is assumed that most passengers using the express bus system would gain access to bus service via intermodal transfer from the Fremont BART station, LRT stations, Park-and-Ride facilities or one of the several CalTrain stations. Use of such facilities as terminal points for express bus routes may create opportunities for patronage which is not presently available on express routes serving the area, while also integrating the express bus system into a cohesive regional transit network.

**Figure 1  
Alternative 1  
Express Bus**



Express bus would receive priority service over autos in this corridor. Express bus routes would travel along expressways or freeways with HOV/commuter lanes, with routing along local streets only for access and destinations. Consideration of a freeway to freeway HOV connector ramp between State Route 237 and I-880 is desirable for providing preferential treatment for express buses traveling between Fremont and the northern Santa Clara employment base.

## **Transit Improvements**

As a basis for developing cost, travel time and ridership estimates, the four routes defined for the express bus system are:

- Route 140 (modified): between Fremont BART and Oakmead/Great America
- Route 180A (modified): between Fremont BART and Downtown Transit Mall
- Route 180B (new): between Fremont BART and Cahill/Arena
- Route 520 (modified): between Fremont BART and Lockheed/Moffett Industrial Park

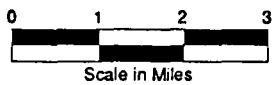
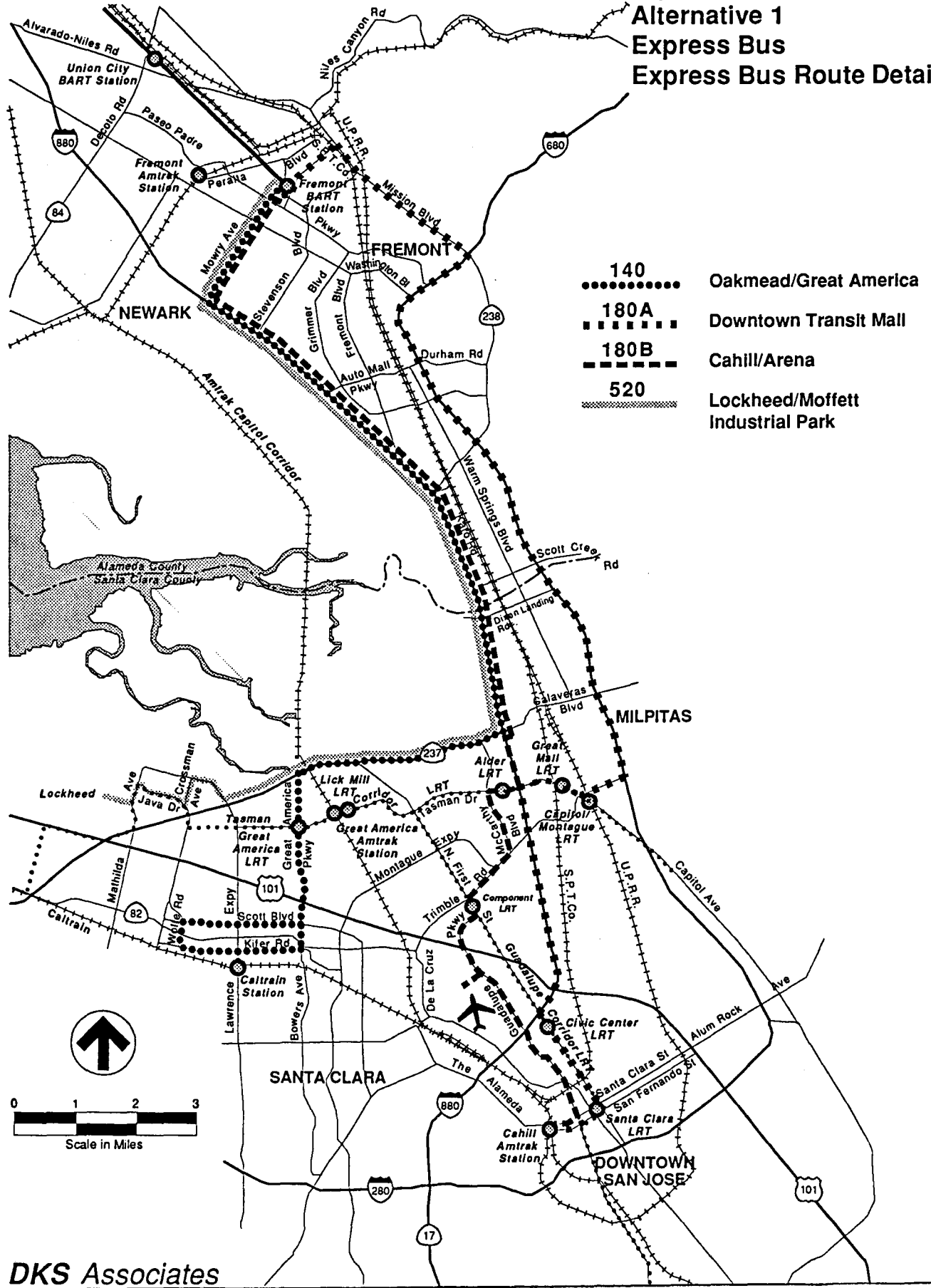
Figure 2 displays the alignments.

**Route 140.** Currently, buses traveling on Route 140 travel southbound on I-680, exit at Scott Creek Road, stop at the Milpitas Park and Ride Lot, then continue to westbound State Route 237. In order to take advantage of HOV lanes on I-880, the express bus exits Fremont BART Station and travels northbound on Civic Center Drive to westbound Mowry Avenue to southbound I-880, in HOV lane, to westbound State Route 237, in HOV lane, to southbound Great America Parkway to southbound Bowers Avenue to westbound Scott Boulevard to southbound Wolfe Road to eastbound Kifer Road to southbound Lawrence Expressway to CalTrain Station, back to eastbound Kifer Road to northbound Bowers Avenue to northbound Great America Parkway to Guadalupe LRT. This route covers a distance of 22 miles and currently operates about three to four trips during A.M. and P.M. peak direction only. Service will be 15 minute frequency during the A.M. and P.M. peak hour, peak direction only with hourly mid-day service.

**Route 180A.** This is a modification of existing Route 180. Buses currently travel southbound on I-680, exit at Jacklin, stop at the Milpitas Park and Ride Lot, then continue to southbound I-880. Express bus no longer stops at the park and ride lot and instead remains on I-680 to westbound Montague Expressway. The alignment for Route 180A consists of an express bus exiting Fremont BART Station and traveling eastbound on Walnut Avenue to southbound Mission Boulevard to southbound I-680 to westbound Montague Expressway to Capitol Avenue to southbound I-880, in HOV lane, to southbound First Street to westbound San Fernando to Cahill Amtrak/CalTrain Station. This route covers a distance of 20 miles with two-way, 10 minute peak, 15 minute mid-day, and 20 minute evening headways.



**Figure 2  
Alternative 1  
Express Bus  
Express Bus Route Details**



**Route 180B.** This is a new alignment in which the express bus exits Fremont BART Station and travels northbound on Civic Center Drive to westbound Mowry Avenue to southbound I-880, in HOV lane, to westbound Tasman Drive to southbound McCarthy Boulevard to westbound Montague Expressway to westbound Trimble Road to southbound First Street to southbound Guadalupe Parkway to San Jose Airport, returns to Guadalupe Parkway to westbound Santa Clara Street to Cahill Amtrak/CalTrain Station. This route covers a distance of 18 miles with two-way service between Fremont and Tasman LRT with 10 minute peak, 15 minute mid-day, and 20 minute evening headways; and 30 minute all-day service between Tasman LRT and Cahill, which includes the San Jose Airport.

**Route 520.** Currently, buses traveling on Route 520 travel southbound on I-680 to westbound Scott Creek Road, stop at the Milpitas Park and Ride Lot, and continue to westbound State Route 237. In order to take advantage of HOV lanes on I-880, the express bus exits Fremont BART Station and travels northbound on Civic Center Drive to westbound Mowry Avenue to southbound I-880, in HOV lane, to westbound State Route 237, in HOV lane, to northbound Lawrence Expressway to southbound Crossman Avenue to westbound Java Drive to southbound Mathilda Avenue to Lockheed/Moffett Industrial Park. This route covers a distance of 17 miles and currently operates about three to four trips during A.M. and P.M. peak direction only. Service will be 15 minute frequency during the A.M. and P.M. peak hour, peak direction only. Mid-day service will not be available on this route, however Tasman LRT provides mid-day service to this location.

## **Rail Improvements**

Service along Amtrak's Capitol Corridor is upgraded from three round trips to six round trips per day between Fremont and San Jose due to an upgrade of round trips between Sacramento and the San Francisco Bay Area. The existing station locations in the Fremont-South Bay Corridor are as follows:

- Fremont
- Great America
- Cahill

The distance traveled is 26.2 miles with approximately one train every two hours for a 12 hour period, to include A.M. and P.M. peak. This upgrade consists of strictly adding more trains along an existing corridor.

## **Alternative 2: BART - Fremont to Warm Springs**

### **Summary**

Alternative 2 consists of extending BART one station to Warm Springs and improved Santa Clara County Transit District express bus service from the Warm Springs BART Station to Santa Clara County. The BART extension begins at the existing Fremont BART Station and extends southeasterly, through Fremont Central Park to a new station in Warm Springs, located south of South Grimmer Road. Service is 9 minute frequency during peak periods; 15 minute frequency mid-day; and 20 minute evening service.

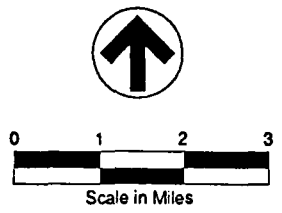
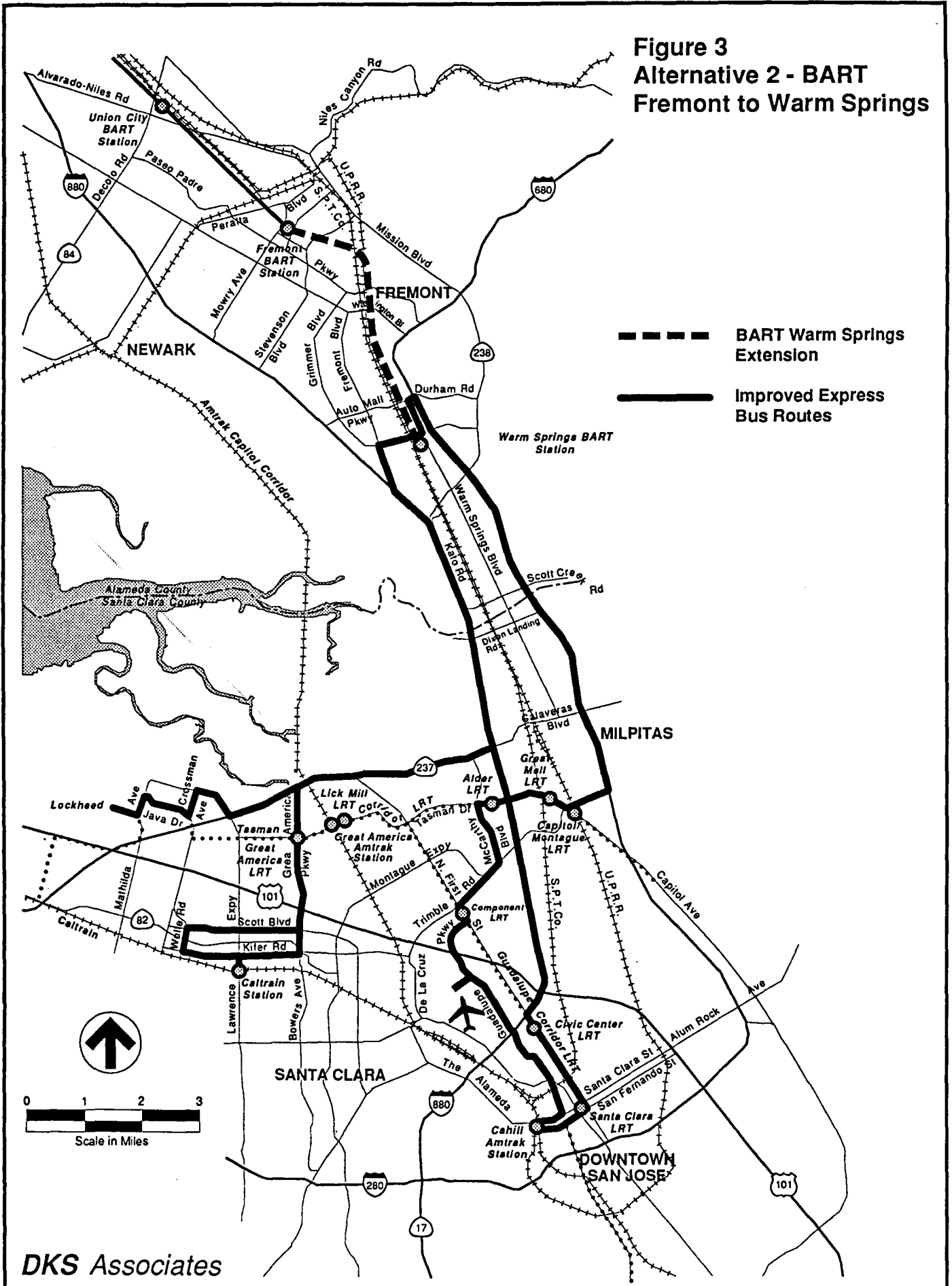
One new express bus route serving the corridor is added to the existing routes and three existing routes are improved by adding more frequent service. These four routes provide new commute service between the new Warm Springs BART Station and downtown San Jose, as well as Fremont to the expanding employment base in the Route 237 corridor in Milpitas, northern San Jose, Santa Clara, and Sunnyvale. Figure 3 displays Alternative 2 alignment.

### **BART Warm Springs Extension**

The Fremont line of the existing BART system terminates at the Fremont Station, about 2.5 miles south of the northern boundary of the City. The 5.4 mile Warm Springs extension begins at the existing elevated Fremont BART Station and extends southeasterly on a raised embankment over Walnut Avenue. About midway between Walnut Avenue and Stevenson Boulevard, BART moves either onto an aerial structure or into a tunnel to pass through Fremont Central Park, east of Lake Elizabeth. From Lake Elizabeth, the BART alignment continues aerial (or in a tunnel) over the Southern Pacific Transportation Company (SPTCo) tracks, then runs adjacent to the SPTCo and Union Pacific Railroad (UPRR) tracks, and crosses over Paseo Padre Parkway with a design option consisting of BART at-grade, and Paseo Padre Parkway going over the BART, SPTCo and UPRR tracks. The BART alignment then continues on an aerial structure crossing over Washington Boulevard with a design option of going under Washington Boulevard. The alignment continues and crosses Blacow Road and Auto Mall Parkway. From Auto Mall Parkway, the alignment crosses over to the east side of the UPRR tracks, over South Grimmer Boulevard, and into to the elevated Warm Springs Station.

The Warm Springs Station consists of an aerial center platform with an at-grade concourse, and parking. The station site includes approximately 34 acres extending about 2,000 feet south of South Grimmer Boulevard between Warm Springs Boulevard and the SPTCo and UPRR tracks, and a three-acre parcel at the southwest corner of South Grimmer and Warm Springs Boulevards. Warm Springs Boulevard provides primary access into the station site and parking lot.

**Figure 3  
Alternative 2 - BART  
Fremont to Warm Springs**



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## **Express Bus Design Criteria**

Several assumptions regarding route design are made to guide the optimum development of an express bus alternative which will tend to maximize transit ridership. To be attractive to commuters, service should be:

- Sufficient in service frequency to be perceived convenient and reliable by commuters.
- Sufficient in capacity to provide all express bus passengers with a seat.
- Scheduled to operate with running times which are as comparable as possible to similar trips made by automobile.
- Well-coordinated with major employment shift times and intermodal transfer requirements, to capture estimated peak direction patronage and to stimulate reverse commute patronage.

It is assumed that most passengers using the express bus system would gain access to bus service via intermodal transfer from the Warm Springs BART station, LRT stations, Park-and-Ride facilities or one of the several CalTrain stations. Use of such facilities as terminal points for express bus routes may create opportunities for patronage which is not presently available on express routes serving the area, while also integrating the express bus system into a cohesive regional transit network.

Express bus would receive priority service over autos in this corridor. Express bus routes would travel along expressways or freeways with HOV/commuter lanes with routing along local streets only for access and destinations. Consideration of a freeway to freeway HOV connector ramp between State Route 237 and I-880 is desirable for providing preferential treatment for express buses traveling between Fremont and the northern Santa Clara employment base.

## **Transit Improvements**

As a basis for developing cost, travel time and ridership estimates, the four routes defined for the express bus system are:

- Route 180A (modified): between Warm Springs BART and Downtown Transit Mall
- Route 180B (new): between Warm Springs BART and Cahill/Arena
- Route 140 (modified): between Warm Springs BART and Oakmead/Great America
- Route 520 (modified): between Warm Springs BART and Lockheed/Moffett Industrial Park

Figure 4 displays the alignments.

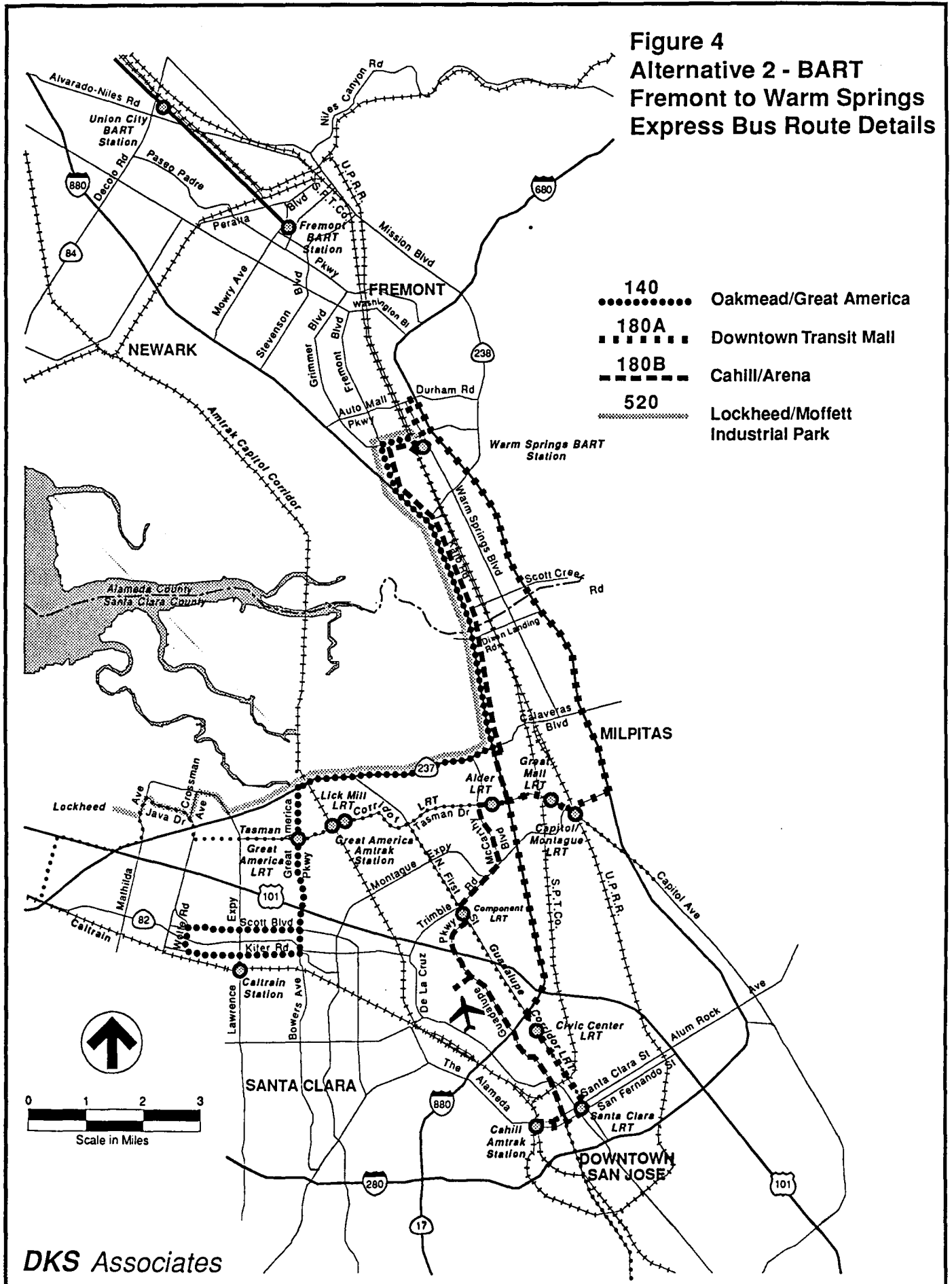
**Route 140.** Currently, buses traveling on Route 140 travel southbound on I-680, exit at Scott Creek Road, stop at the Milpitas Park and Ride Lot, then continue to westbound State Route 237. In order to take advantage of HOV lanes on I-880, the express bus exits Warm Springs BART Station and travels westbound on South Grimmer Boulevard to southbound Fremont Boulevard to southbound I-880, in HOV lane, to westbound State Route 237, in HOV lane, to southbound Great America Parkway to southbound Bowers Avenue to westbound Scott Boulevard to southbound Wolfe Road to eastbound Kifer Road to southbound Lawrence Expressway to CalTrain Station, back to eastbound Kifer Road to northbound Bowers Avenue to northbound Great America Parkway to Guadalupe LRT. This route covers a distance of 18 miles and currently operates about three to four trips during A.M. and P.M. peak direction only. Service will be 15 minute frequency during the A.M. and P.M. peak hour, peak direction only with hourly mid-day service.

**Route 180A.** This is a modification of existing Route 180. Buses currently travel southbound on I-680, exit at Jacklin, stop at the Milpitas Park and Ride Lot, then continue to southbound I-880. Express bus no longer stops at the park and ride lot and instead remains on I-680 to westbound Montague Expressway. The alignment for Route 180A consists of an express bus exiting Warm Springs BART Station and traveling northbound on Warm Springs Boulevard to eastbound Auto Mall Parkway (to avoid unnecessary delay at the intersection of Warm Springs Boulevard/Mission Boulevard) to southbound I-680 to westbound Montague Expressway to Capitol Avenue to southbound I-880, in HOV lane, to southbound First Street to westbound San Fernando to Cahill Amtrak/CalTrain Station. This route covers a distance of 16 miles with two-way, 10 minute peak, 15 minute mid-day, and 20 minute evening headways.

**Route 180B.** This is a new alignment in which the express bus exits Warm Springs BART Station and travels westbound on South Grimmer Boulevard to southbound Fremont Boulevard to southbound I-880, in HOV lane, to westbound Tasman Drive to southbound McCarthy Boulevard to westbound Montague Expressway to westbound Trimble Road to southbound First Street to southbound Guadalupe Parkway to San Jose Airport, returns to Guadalupe Parkway to westbound Santa Clara Street to Cahill Amtrak/CalTrain Station. This route covers 14 miles with two-way service between Fremont and Tasman LRT with 10 minute peak, 15 minute mid-day, and 20 minute evening headways; and 30 minute all-day service between Tasman LRT and Cahill, which includes the San Jose Airport.

**Route 520.** Currently, buses traveling on Route 520 travel southbound on I-680 to westbound Scott Creek Road, stop at the Milpitas Park and Ride Lot, and continue to westbound State Route 237. In order to take advantage of HOV lanes on I-880, the express bus exits Warm Springs BART Station and travels westbound on South Grimmer Boulevard to southbound Fremont Boulevard to southbound I-880, in HOV lane, to westbound State Route 237, in HOV lane, to northbound Lawrence Expressway to southbound Crossman Avenue to westbound Java

**Figure 4**  
**Alternative 2 - BART**  
**Fremont to Warm Springs**  
**Express Bus Route Details**



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Drive to southbound Mathilda Avenue to Lockheed/Moffett Industrial Park. This route covers a distance of 13 miles and currently operates about three to four trips during A.M. and P.M. peak direction only. Service will be 15 minute frequency during the A.M. and P.M. peak hour, peak direction only. Mid-day service will not be available on this route, however Tasman LRT provides mid-day service to this location.



## **Alternative 3: Capitol Corridor**

### **Summary**

Alternative 3 consists of improved Amtrak service along Capitol Corridor and improved Santa Clara County Transit District express bus service from the existing Fremont BART Station to Santa Clara County. Amtrak service along Capitol Corridor is increased from three round trips per day, between Sacramento and the San Francisco Bay Area, to ten round trips per day. Three new stations are added to the corridor in Union City at the Union City BART station, in Santa Clara and in San Jose at the Tamien Amtrak Station.

One new express bus route serving the corridor is added to the existing routes and three existing routes are improved by adding more frequent service. These four routes provide new commute service between Fremont BART and downtown San Jose, as well as Fremont to the expanding employment base in the Route 237 corridor in Milpitas, northern San Jose, Santa Clara, and Sunnyvale. Figure 5 displays Alternative 3 alignment.

### **Rail Improvements**

Service along Amtrak's Capitol Corridor is upgraded from three round trips to ten round trips per day, between Fremont and San Jose, due to an upgrade of round trips between Sacramento and the San Francisco Bay Area. The following are programmed station locations under this improvement:

- Union City
- Fremont
- Great America
- Santa Clara
- Cahill
- Tamien

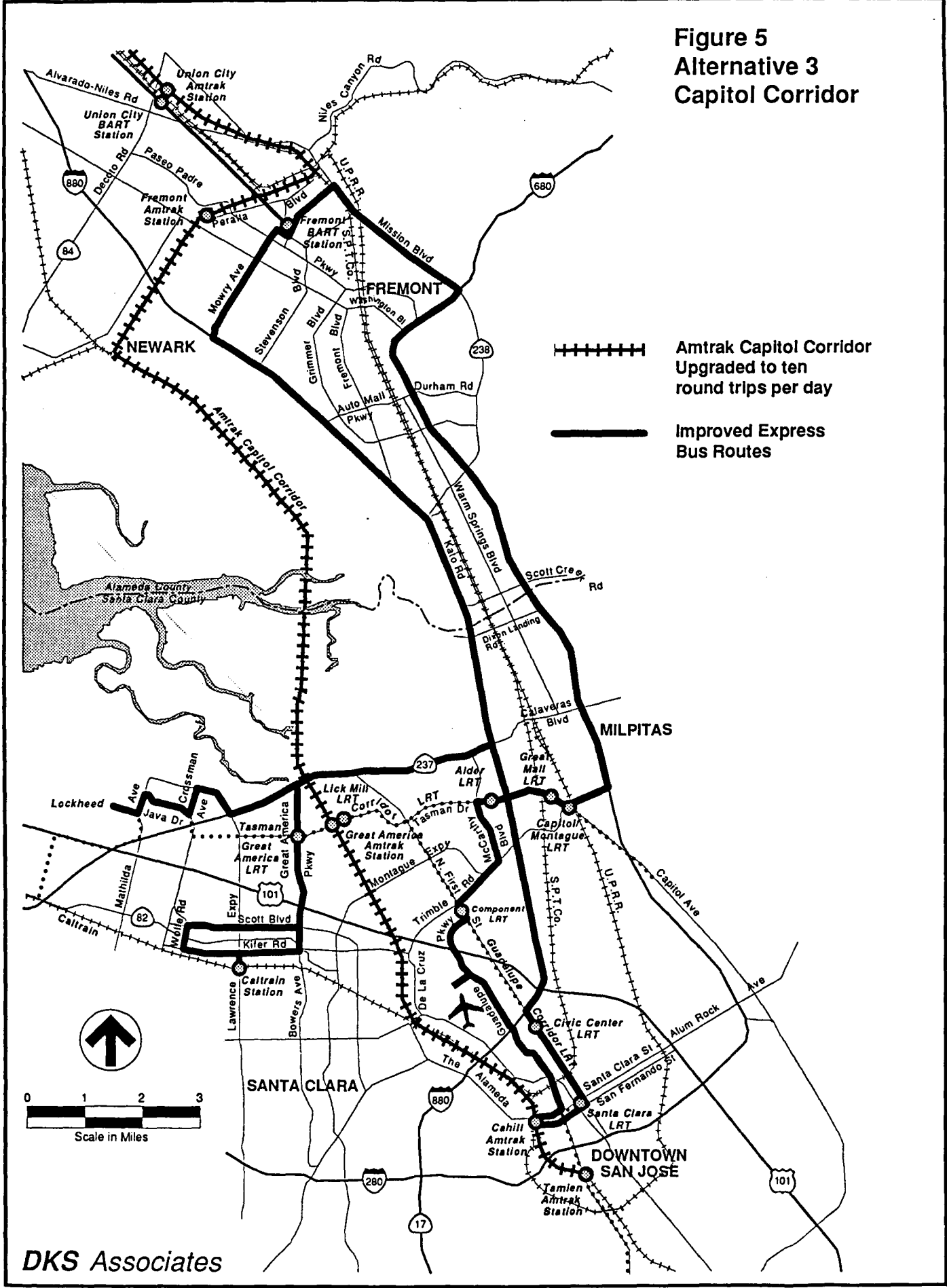
The distance traveled is 26.2 miles with approximately one train every 1.25 hours for a 12 hour period to include A.M. and P.M. peak.

### **Express Bus Design Criteria**

Several assumptions regarding route design are made to guide the optimum development of an express bus alternative which will tend to maximize transit ridership. To be attractive to commuters, service should be:

- Sufficient in service frequency to be perceived convenient and reliable by commuters.
- Sufficient in capacity to provide all express bus passengers with a seat.

**Figure 5  
Alternative 3  
Capitol Corridor**



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- Scheduled to operate with running times which are as comparable as possible to similar trips made by automobile.
- Well-coordinated with major employment shift times and intermodal transfer requirements, to capture estimated peak direction patronage and to stimulate reverse commute patronage.

It is assumed that most passengers using the express bus system would gain access to bus service via intermodal transfer from the Fremont BART station, LRT stations, Park-and-Ride facilities or one of the several CalTrain stations. Use of such facilities as terminal points for express bus routes may create opportunities for patronage which is not presently available on express routes serving the area, while also integrating the express bus system into a cohesive regional transit network.

Express bus would receive priority service over autos in this corridor. Express bus routes would travel along expressways or freeways with HOV/commuter lanes with routing along local streets only for access and destinations. Consideration of a freeway to freeway HOV connector ramp between State Route 237 and I-880 is desirable for providing preferential treatment for express buses traveling between Fremont and the northern Santa Clara employment base.

## **Transit Improvements**

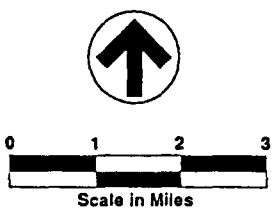
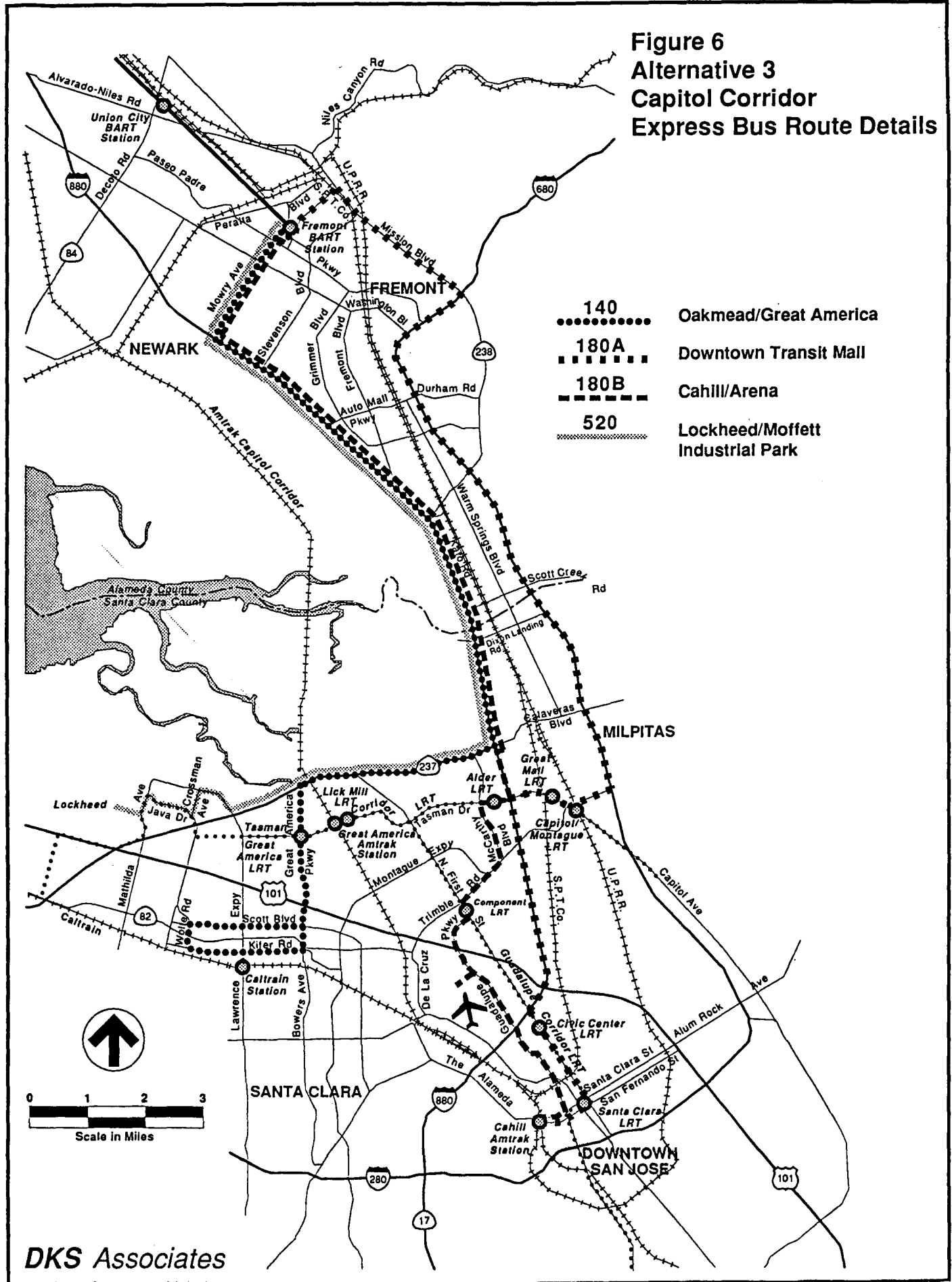
As a basis for developing cost, travel time and ridership estimates, the four routes defined for the express bus system are:

- Route 180A (modified): between Fremont BART and Downtown Transit Mall
- Route 180B (new): between Fremont BART and Cahill/Arena
- Route 140 (modified): between Fremont BART and Oakmead/Great America
- Route 520 (modified): between Fremont BART and Lockheed/Moffett Industrial Park

Figure 6 displays the alignments.

**Route 140.** Currently, buses traveling on Route 140 travel southbound on I-680, exit at Scott Creek Road, stop at the Milpitas Park and Ride Lot, then continue to westbound State Route 237. In order to take advantage of HOV lanes on I-880, the express bus exits Fremont BART Station and travels northbound on Civic Center Drive to westbound Mowry Avenue to southbound I-880, in HOV lane, to westbound State Route 237, in HOV lane, to southbound Great America Parkway to southbound Bowers Avenue to westbound Scott Boulevard to southbound Wolfe Road to eastbound Kifer Road to southbound Lawrence Expressway to CalTrain Station, back to eastbound Kifer Road to northbound Bowers Avenue to northbound

**Figure 6  
Alternative 3  
Capitol Corridor  
Express Bus Route Details**



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Great America Parkway to Guadalupe LRT. This route covers a distance of 22 miles and currently operates three to four trips during A.M. and P.M. peak direction only. Service will be 15 minute frequency during the A.M. and P.M. peak hour, peak direction only with hourly mid-day service.

**Route 180A.** This is a modification of existing Route 180. Buses currently travel southbound on I-680, exit at Jacklin, stop at the Milpitas Park and Ride Lot, then continue to southbound I-880. Express bus no longer stops at the park and ride lot, and instead remains on I-680 to westbound Montague Expressway. The alignment for Route 180A consists of an express bus exiting Fremont BART Station and traveling eastbound on Walnut Avenue to southbound Mission Boulevard to southbound I-680 to westbound Montague Expressway to Capitol Avenue to southbound I-880, in HOV lane, to southbound First Street to westbound San Fernando to Cahill Amtrak/CalTrain Station. This route covers a distance of 20 miles with two-way, 10 minute peak, 15 minute mid-day, and 20 minute evening headways.

**Route 180B.** This is a new alignment in which the express bus exits Fremont BART Station and travels northbound on Civic Center Drive to westbound Mowry Avenue to southbound I-880, in HOV lane, to westbound Tasman Drive to southbound McCarthy Boulevard to westbound Montague Expressway to westbound Trimble Road to southbound First Street to southbound Guadalupe Parkway to San Jose Airport, returns to Guadalupe Parkway to westbound Santa Clara Street to Cahill Amtrak/CalTrain Station. This route covers a distance of 18 miles with two-way service between Fremont and Tasman LRT with 10 minute peak, 15 minute mid-day, and 20 minute evening headways; and 30 minute all-day service between Tasman LRT and Cahill, which includes the San Jose Airport.

**Route 520.** Currently, buses traveling on Route 520 travel southbound on I-680 to westbound Scott Creek Road, stop at the Milpitas Park and Ride Lot, and continue to westbound State Route 237. In order to take advantage of HOV lanes on I-880, the express bus exits Fremont BART Station and travels northbound on Civic Center Drive to westbound Mowry Avenue to southbound I-880, in HOV lane, to westbound State Route 237, in HOV lane, to northbound Lawrence Expressway to southbound Crossman Avenue to westbound Java Drive to southbound Mathilda Avenue to Lockheed/Moffett Industrial Park. This route covers 17 miles and currently operates about three to four trips during A.M. and P.M. peak direction only. Service will be 15 minute frequency during the A.M. and P.M. peak hour, peak direction only. Mid-day service will not be available on this route, however Tasman LRT provides mid-day service to this location.

## **Alternative 4: LRT - Fremont BART to Tasman LRT**

### **Summary**

Alternative 4 consists of Light Rail Transit (LRT) from the existing Fremont BART Station in the City of Fremont to the programmed Tasman Corridor LRT extension in the City of Milpitas, along either the Union Pacific Railroad (UP) or the Southern Pacific Transportation Company (SP) alignment. The extension begins at the Fremont BART Station and ends at either the Capitol/Montague (following UP alignment) or the Great Mall (following SP alignment) LRT. Service is 10 minute frequency during peak periods; 15 minute frequency mid-day; and 20 minute evening service. Figure 7 displays Alternative 4 alignment.

### **LRT Extension**

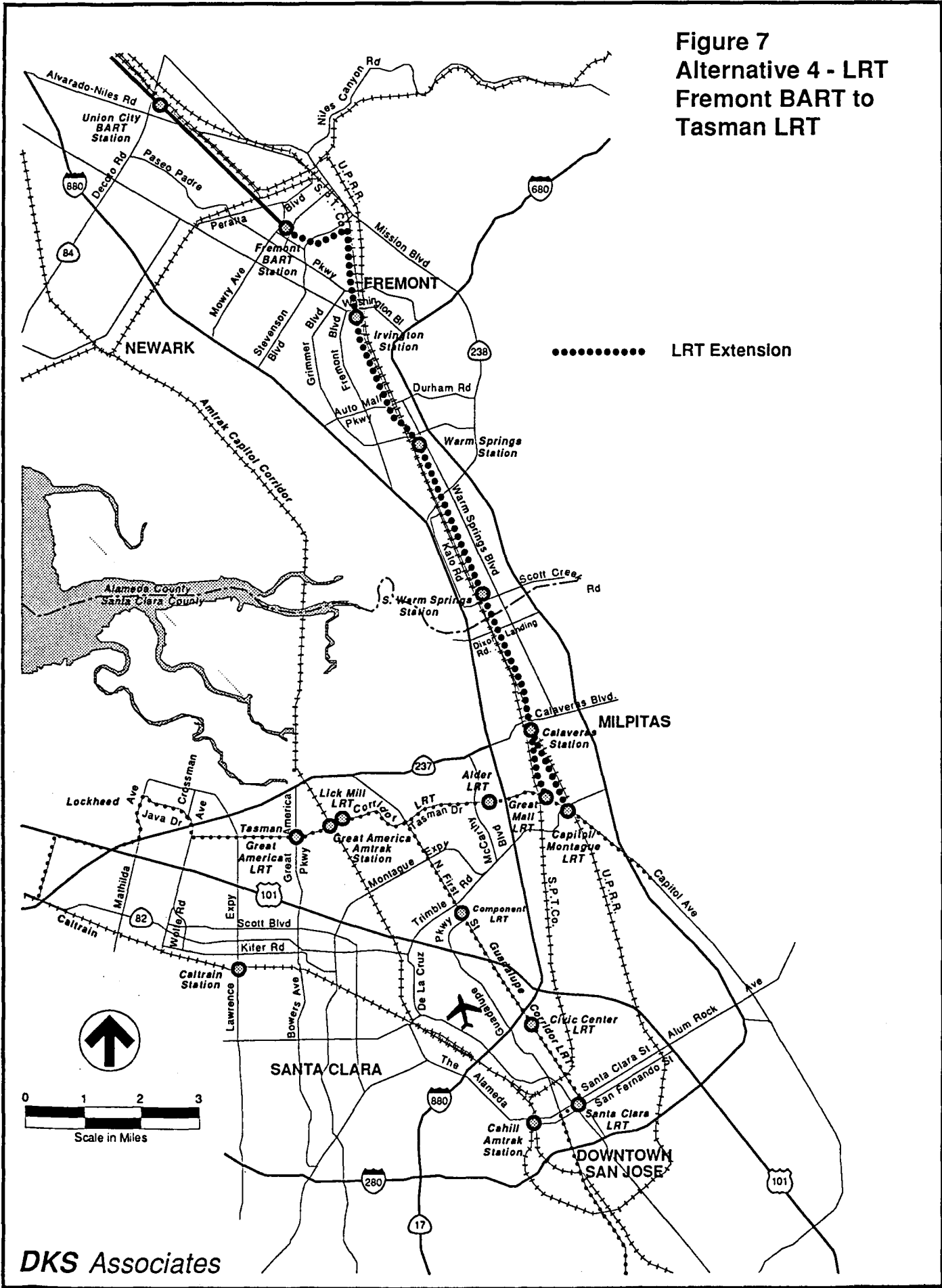
The 11.6 mile LRT extension begins at the Fremont LRT Station which is located at parking lot level adjacent to the west side and slightly south of the existing Fremont BART Station. This location provides a transfer between the two systems while minimizing walking distance between the LRT platform and BART. This station is a two-track center platform station with a third parallel track for train storage.

**Fremont to Irvington:** All three LRT tracks extend south from the station, parallel to the existing BART alignment, and continue at-grade across Walnut Avenue. On the south side of Walnut Avenue, the storage track connects to the in-bound track and two tracks continue at-grade south, curving toward the east to avoid an existing condominium complex. The tracks continue in a southeasterly direction and curve east to cross Stevenson Boulevard and then run along the south side of Stevenson, abutting Fremont Central Park. The line curves south at the existing SP track and continues along the west side of the track, crossing Paseo Padre Parkway and Washington Boulevard, with an option to grade separate under Washington Boulevard, to the Irvington Station. The Irvington Station is located south of Washington Boulevard at its intersection with Osgood Road.

**Irvington to Warm Springs:** Extending south from the Irvington Station the tracks continue at-grade across Blacow Road and under the existing Auto Mall Parkway overpass. South of Auto Mall Parkway, the line begins to ascend and transitions to an aerial structure, crossing over an existing drainage channel and the existing UPRR and SPTCo tracks. The alignment begins to descend, to an at-grade section, south of South Grimmer Boulevard to the Warm Springs Station, located about 900 feet south of South Grimmer Boulevard. South Grimmer and Warm Springs Boulevards are the main access routes to the station.

**Warm Springs to South Warm Springs:** The tracks leave the Warm Springs Station at-grade and cross Mission Boulevard on an aerial structure. South of Mission Boulevard, the line continues at-grade across Warren Avenue and an existing drainage ditch to the South Warm Springs Station.

**Figure 7  
Alternative 4 - LRT  
Fremont BART to  
Tasman LRT**



**DKS Associates**

The South Warm Springs Station is located north of Kato Road between Warm Springs Boulevard and the UP and SP tracks. Scott Creek Road and Kato Road provide east-west access, while Warm Springs Boulevard provides north-south access to the station. The accesses into the station site and parking lot are from Warm Springs Boulevard and Kato Road.

**South Warm Springs to Calaveras:** South of the station, the line continues at-grade across Kato and Dixon Landing Roads. The line then begins to ascend to an aerial structure to cross over the UP alignment to run between the SP and UP alignments. The line descends and goes under Abel Street overpass and over an existing drainage channel. The line parallels the SP alignment and crosses Railroad Avenue and into the Calaveras Station. The Calaveras Station is located south of Calaveras Boulevard and east of the SP alignment and Main Street.

**Calaveras to Great Mall or Capitol/Montague:** South of the Calaveras Station, the line continues at-grade on the west edge of and parallel to Hammond Avenue. The line continues at-grade and crosses Curtis Avenue then goes aerial to connect to the Great Mall Station. The station assumes the Tasman Corridor LRT extension is aerial at the Great Mall Station.

Alternatively, the LRT could parallel the UP tracks, at-grade, and join the Tasman Corridor LRT extension at the Capitol/Montague Station.



## Capital Cost Estimates

The capital cost estimates are prepared from several different reports and are noted in each section. The capital costs in this report are conceptual engineering level estimates only and are presented in FY 93-94 price levels without escalation to construction period. A summary of the capital cost estimates is provided in Table 2.

**Table 2**  
**Summary of Capital Costs in Millions of 1994 Dollars**  
**(Rounded to Nearest \$10 Million)**

	Alt. 1 Express Bus	Alt. 2 BART (5.4 miles)	Alt. 3 Capitol Corridor (26 miles)	Alt. 4 LRT (11.6 miles)
Rail Component	--	\$430-\$450	\$90	\$670*
Bus Component	<u>\$10</u>	<u>\$10</u>	<u>\$10</u>	--
Total	\$10	\$440-\$460	\$100	\$670*

Note: The different BART costs represent above ground and below ground construction, respectively.

\* Preliminary will be revised downward when patronage is projected.

### Alternative 1: Express Bus

There are four proposed bus routes:

- *Route 140* between Fremont BART and Oakmead/Great America. (15-minute frequency during peak periods in peak direction only.)
- *Route 180A* between Fremont BART and Downtown Transit Mall. (10-minute frequency in peak period, 15-minute mid-day, and 20-minute evening headways with service in both directions.)

- *Route 180B* between Fremont BART and Cahill/Arena (Service between Fremont BART and Tasman LRT at I-880 is 10-minute frequency in peak period, 15-minute mid-day, and 20-minute evening headways; and 30-minute frequency all day between Tasman LRT at I-880 and Cahill/Arena. Service is in both directions.)
- *Route 520* between Fremont BART and Lockheed/Moffett Industrial Park. (15-minute frequency during peak periods in peak direction only.)

Capital costs are assumed for the new buses needed in excess of the current buses including a 20 percent spares allowance. Costs are based on clean fuel vehicles. Vehicle requirements are based on today's schedule and the future schedules for each route. Table 3 summarizes the number of buses required. Additionally, the cost of an HOV connector at I-880 and State Route 237 could be considered for the express bus alternative. That cost would be approximately \$15 million. Ramps could also be provided at I-880 and Tasman Drive for HOV access at an estimated cost of \$5 million.

**Table 3**  
**Bus Fleet Required for Alternative 1: Express Bus**

Route	Today's Buses	Future Bus Needs	Difference (new buses needed)
140	2	6	4
520	3	6	3
180A	7	12	5
180B	--	<u>10</u>	<u>10</u>
Operating Fleet (sum of above)	12	34	22
Spare Buses	<u>3</u>	<u>7</u>	<u>4</u>
Total Fleet	15	41	26

Note: The 26 additional buses at \$250,000 each represent a capital cost of \$6,500,000.

## Alternative 2: BART - Fremont to Warm Springs

**BART Costs.** The capital cost for the BART extension to Warm Springs is derived from the capital cost estimates presented in the 1991 EIR for the Warm Springs Extension and is presented in Table 4. It should be noted that contingencies are included in each of the cost line items. Several adjustments to the values are noted in the table. The adjustments reflect increases in cost resulting from delays in project construction and the cost for parkland replacement due to the alignment through Central Park. Adjustments also reflect that project costs were based on anticipated time of expenditure (with a mid-point of FY 1995). A 5 percent inflation rate for one year is used to estimate project cost in 1994 dollars. Right-of-way for the Irvington and Warm Springs station has been purchased and is assumed to be a sunk cost that should be subtracted from the cost estimate to complete the project. Lastly, the 1991 EIR assumed two operational lines: Warm Springs to Richmond, and Warm Springs to Daly City. Subsequently, operational plans have been developed that have the Richmond Line terminate at Dublin. Consequently, Warm Springs service would be provided by the Warm Springs to Daly City line on 9-minute frequencies in peak periods and 15-minute frequencies in off-peak periods. This operating plan would require fewer vehicles than previously included in the cost estimate and a line item adjustment is included for this reduced cost. Based on the operating and maintenance analysis, 11 new vehicles are estimated as required for the Warm Springs extension.

**Express Bus Costs.** Express bus service starting at the Warm Springs Station was calculated for each route in the same way as for Alternative 1 and is shown in Table 5.

**Table 4**  
**Bus Fleet Required for Alternative 2: BART - Fremont to Warm Springs**

Route	Today's Buses	Future Bus Needs	Difference (new buses needed)
140	2	5	3
520	3	5	2
180A	7	11	4
180B	—	2	2
Operating Fleet (Sum of Above)	12	30	18
Spares	<u>3</u>	<u>6</u>	<u>3</u>
<b>Total Fleet</b>	<b>15</b>	<b>36</b>	<b>21</b>

Note: The 21 additional buses at \$250,000 each represent a capital cost of \$5,250,000.

**Table 5  
Capital Cost Estimate of BART Extension to Warm Springs  
(Cost to Complete Project in 1994 Dollars)**

	Amount (\$ in Millions)	
	Elevated Through Central Park	Subway Through Central Park
<b>EIR Cost Estimate</b> (Alt. 9 - One Station Extension to Warm Springs)		
Construction and Procurement	\$180	\$225
Engineering and Management	50	50
Start-Up and Agreement	10	10
Right of Way	80	80
Vehicle	55	55
Mitigations	<u>30</u>	<u>30</u>
<b>EIR Cost Estimate Subtotal</b>	405	450
<b>Add Estimated Incremental Costs for Delay, Mitigations, etc.</b>	80	55
<b>Subtract Adjustment to 1994 Dollars</b> (5% for one year)	(20)	(25)
<b>Subtract Right-of-Way, etc. Estimated Costs Expended Through 1993</b>	(15)	(15)
<b>Subtract Vehicle Cost Savings From Operational Change</b>	<u>(20)</u>	<u>(20)</u>
<b>Estimated Cost in 1994 Dollars</b>	\$430	\$445

Note: Eleven new BART vehicles are included in the cost estimate for the Warm Springs Extension.

## Alternative 3: Capitol Corridor

The cost of the improvements needed for the capitol corridor are derived from the ACR 132 study as shown in Table 6. These costs are over and above the funds already expended for the Capitol Corridor. These costs assume there is adequate space and equipment for vehicle maintenance in the new CalTrain Pullman yard. It is assumed that the state will pay costs for increasing Capitol Corridor service from three to six round trips a day. Equipment cost is for three train sets each comprised of a locomotive, three trailer cars and a cab car.

The Express bus cost is the same as Alternative 1.

	\$ Millions (1989 Dollars)	\$ Millions (1994 Dollars)
Stations (6)	\$13	\$17
Track/Signal Upgrade	35	45
Equipment (locomotives and cars)	<u>22</u>	<u>28</u>
<b>Total</b>	<b>\$70</b>	<b>\$90</b>

Note: Three new train sets are assumed.

## Alternative 4: LRT - Fremont BART to Tasman LRT

The capital cost estimate for Alternative 4 is derived from the 1988 Capital Cost Estimates prepared for the Fremont South Bay Corridor Study and escalated to 1994 dollars. Table 7 lists those costs.

The capital cost estimate for right-of-way and stations are based on large parking lots (comparable to BART). These cost estimates will be revised as soon as patronage forecasts are complete. It is expected that there will be substantial reductions in these cost elements. Additionally, the line profiles assumed in the 1988 study reflected a number of aerial sections to cross back and forth over the railroad. Many of these aerial segments are no longer needed due to revised station sites, and the line segment costs will be revised downward.

**Table 7**  
**Preliminary Capital Cost Estimate for**  
**LRT from Fremont to Tasman LRT**

	\$ Millions (1994 Dollars)
Right-of-Way	\$152
Utilities	8
Line Segments	138
Stations	59
System	24
Other	<u>1</u>
Subtotal	\$382
Engineering 25%	<u>95</u>
Subtotal	\$477
Contingency 25%	<u>119</u>
Total	\$596
Vehicles	<u>72</u>
Grand Total	\$668

Note: Thirty-six new LRT vehicles are assumed for service from Fremont to Sunnyvale.