

Final Report

# Around the Bay Rail Study

*Prepared for*

**Santa Cruz County Regional Transportation Commission  
Transportation Agency for Monterey County**

*By*

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## **1.0 EXECUTIVE SUMMARY**

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### **1.1 PURPOSE AND OBJECTIVES**

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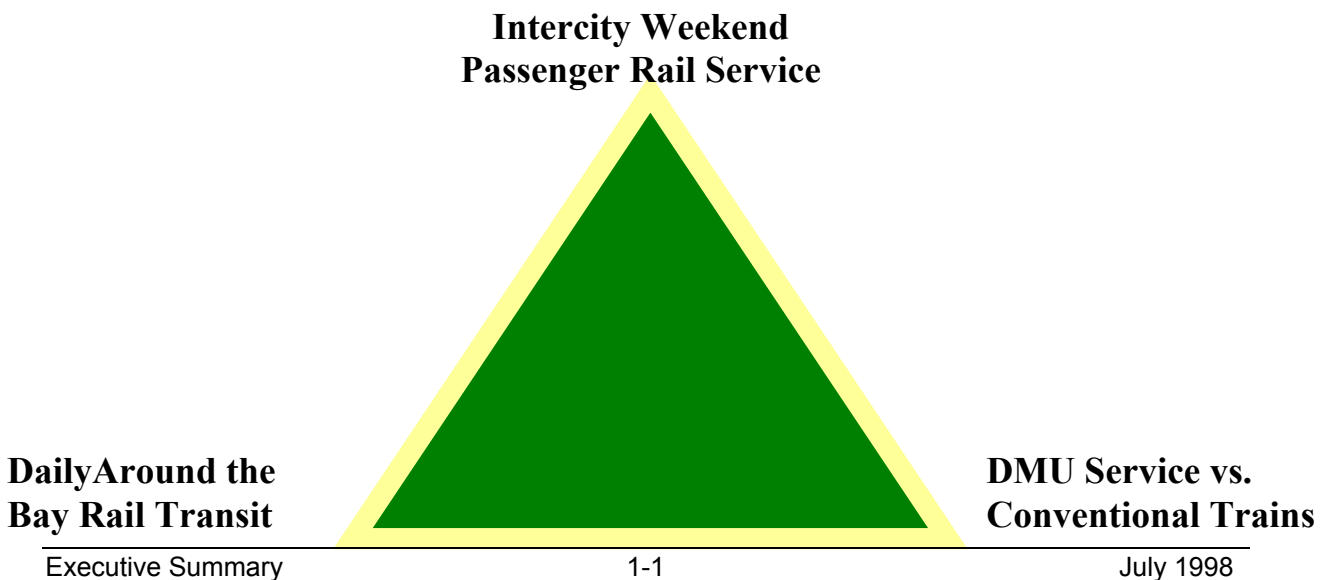
Santa Cruz County and Monterey County have independently pursued passenger rail programs to link with the San Francisco Bay area. Increasing congestion on roads and highways, the desire to maintain regional accessibility and attractiveness, and the growth of Northern California's passenger railroad system all contribute to the benefits of creating new passenger rail links from the San Francisco Bay area and between Monterey and Santa Cruz. The increasing need to shape transportation services which are consistent with environmentally sound development patterns also points to passenger railroad services on existing rights-of-way as a means of providing significant new transportation capacity for improved regional mobility and enhanced quality of life.

The Around the Bay Rail Study is based on current conditions in two counties. The analysis and conclusions of the Study go beyond transportation approaches published to date with a focus on the relationship of three opportunities for cooperation and coordination between the counties - cooperation that could provide a whole greater than the current parts. Figure 1.1 illustrates the three-part framework of the Study.

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**Figure 1.1 Three Around the Bay Coordination Opportunities**

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The Around the Bay Rail Study explores if the integration of two intercity passenger rail efforts could yield measurable financial and efficiency benefits; and, whether an additional service that joined the two main destinations (Santa Cruz and Monterey) could attract significant ridership to justify its costs and have an impact on regional mobility.

In addition, the analysis focuses on the possible use of Diesel Multiple Unit (self-propelled) passenger rail cars instead of traditional locomotive-hauled cars. DMUs appear to provide greater operating flexibility than conventional trains. The study develops operating plans, documents capital and operating costs, suggests a financing scheme and proposes institutional arrangements to carry out the proposed program.

The interplay of the three sides of the triangle is explored to find initial steps for the two counties to increasingly build a united front that would gradually yield united programs. This three-part framework raises two qualifications. First, in considering the benefits of coordination and integration, an assumption is made that there are literally two separate projects, which are being advanced at the same time to compare to an integrated program.

The real situation may well be that one of the counties may precede the other in carrying out its program. This report should not be interpreted to suggest that a single county program should not be advanced by itself, if the other county is not ready. To the extent that there are benefits of an integrated approach, there are far more benefits to the initiation of passenger rail service to either Monterey or Santa Cruz as the start-up of service to the Monterey Bay Peninsula region.

Second, it should be noted that the Around the Bay Rail Study is not intended to be an exhaustive discussion of the three subjects arrayed in Figure 1. Both counties have already developed excellent reports about portions of these three subjects. This Study is intended to help stakeholders and decision makers consider joint-county cooperation as an end with three technical and policy topics as the means.

As a starting point in Section 2, the separate, Monterey and Santa Cruz proposals and technical studies were used as the basis for much of the technical work including infrastructure requirements, operating statistics and institutional discussions that could help policy makers consider increased cooperation.

Each county has defined a separate Intercity weekend passenger rail start up project and has defined its characteristics differently. These separate county "base programs" define Alternative 1 as follows:

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- Santa Cruz County desires a seasonal weekend passenger rail service (two morning and two evening trips on each weekend day for about 26 weeks) linked to the San Francisco Bay Area through existing Caltrain and/or Capitol Corridor service and linked to the new Altamont Pass service (Altamont Commuter Express or ACE). These linkages would be accomplished by starting the service at San Jose using existing and available equipment from one of these passenger rail operations. The service would be recognized as an Intercity Service under the State's Intercity Rail Program.
- Monterey County desires a year-round extended weekend service (one morning and one evening trip on four days including all of the weekends year-round) linked to the San Francisco Bay Area by direct service from Caltrain's San Francisco station. Monterey desires to use rolling stock, which provides more amenities than the equipment now used by Caltrain. The service would be recognized as an intercity service under the State's Intercity Rail program.

The programs both involve complex and overlapping discussions and arrangements with the:

- California Department of Transportation (Caltrans),
- California Transportation Commission (CTC),
- Peninsula Corridor Joint Powers Board (PCJPB-Caltrain),
- Union Pacific Railroad (UP), and
- Federal Transit Administration of the U.S. Department of Transportation.

In addition, both programs have important common features such as:

- access to Union Pacific Railroad right-of-way,
- tapping the potential travel market from the greater San Jose and San Francisco Bay area, and visitors attracted to the Bay Area,
- selecting a service provider,
- making equipment decisions,
- marketing and customer service,
- station design,
- equipment acquisition and installation,
- construction of stations and improvements to the right-of-way, and
- securing state and federal funds.

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The Around the Bay Rail Study has outlined a common program with the substantial financial benefits of a single project. These common features are the basis for suggestions to combine and integrate the programs in Section 7. The recommended strategy rests on the proposal that a single Monterey/Santa Cruz project could be established and maintained with greater credibility and taxpayer utility than two.

Two separate efforts could jeopardize funding and require so many parallel relationships that they very well could be perceived as competing if not conflicting. Given the enormous number of joint issues and interests, passenger rail precedents throughout California support the promise for the Counties to pursue mutual interest and to secure the funding and recognition required to initiate service. In order to carry out this joint strategy, the counties would be required to negotiate and compromise with respect to their differences in approach so that they could define a coordinated operating and management plan.

This strategy, of course, presumes that both counties are prepared to advance their programs at the same time. If they are not, it would be in their mutual interest to advance one of the programs to demonstrate the benefits and success of passenger rail to their mutual region and to help encourage the other county's full participation to follow.

Nevertheless, the recommendation remains whether service to one destination or two destinations begins first: The two counties should advance as one, participating in all negotiations and approvals related to either county's progress as a united front, preferably under a formal agreement such as a Joint Powers Authority.

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## **1.2 ROLLING STOCK**

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Section 3.0, Diesel Multiple Unit Assessment presents the feasibility and cost-effectiveness of new DMU technology compared with conventional locomotive-hauled equipment. The sources consulted for this frame work are described in the Appendix. Traditional passenger rail equipment was compared to the new self-propelled DMUs to determine if a significant advantage could be identified for Santa Cruz and Monterey to consider this emerging alternative technology. The following issues were considered in comparing DMU's and conventional train equipment.

- Train Operating and Maintenance costs
- Federal safety regulations
- Operating characteristics: average speed, noise, scale

The greatest advantages of DMU equipment to Monterey and Santa Cruz are operating flexibility and the unique marketing. DMUs are more efficient to operate and maintain than locomotive hauled equipment for trains (consists) which typically carry a range of 500 to 600 passengers or less. For daily service with larger passenger loads, traditional equipment is likely to be more cost-effective. Exceptions to this cost-effectiveness axiom (based on passenger capacity) are DMU trains which can be split and joined at different destinations and which provide service designed to take advantage of this unique flexibility.

DMU trains can be efficiently operated as single car units during periods of low demand and quickly expanded to handle larger demand. In Section 4 a good illustration of flexibility is presented in a scenario of a four-car DMU train that brings weekend visitors from San Jose to Santa Cruz and Monterey. At Pajaro the four-car train would split, with two cars each proceeding to the respective "wharf" terminals. (In the other direction, a similar process would join two separate DMU trains in a timed meet at Pajaro for the final leg of the trip to either San Jose or San Francisco.) When these passengers have deboarded at the terminal destinations, a single DMU could again be split from the long-distance train and begin providing local rail transit service between Monterey and Santa Cruz.

The right-of-way to be used for Monterey and Santa Cruz intercity and Around the Bay services requires shared use with freight railroad traffic and in some cases, passenger railroad Traffic. Constraints on the expansion of the track now available make it difficult to divide passenger from freight traffic. New DMUs which meet all of the safety and crashworthiness requirements of the U.S. Federal Railroad Administration for such shared use of railroad track are under development in the



U.S. market. Several manufacturers are modifying European DMUs to meet U.S. requirements and their equipment is expected to be available when procurements take place that can attract bids from these manufacturers.

DMU's also provide an important potential marketing advantage. The DMU vehicles that will soon be on the market have a modern, attractive design using stainless steel and color detailing on the exteriors. In comparison to conventional trains DMUs are smaller in scale, lower in noise and higher in average speed. All of these features fit characteristics attractive to new Monterey and Santa Cruz passenger rail service.

In summary, the rolling stock analysis found a small cost advantage to the DMU rolling stock if DMUs are employed in place of conventional passenger train equipment and both counties operate separate programs. The analysis found more significant operational advantage if the services are integrated and DMU's are employed. This savings is the increment of costs from operating one DMU train instead of two trains with two locomotives. The cost difference compared to Alternative 1 (two separate county services) is significantly increased if Alternative 3 is implemented with new equipment and an integrated program of administrative oversight, marketing and service management.

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### **1.3 SERVICE PLANS**

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In Section 4 Alternative 2 integrates the two separate county service plans by alternating service to each destination every other weekend year-round from San Jose. The proposed start-up date for this service is 2002. There is the potential to provide bus service as a bridge each weekend to the destination not served by the train. However, incremental costs for this service enhancement were not included as part of this Study. Marketing and communications to potential riders in the San Francisco Bay Area would need to be explicit about the every-other weekend pattern.

This integrated service assumption is one way to initially, for the short-term, serve both areas with the same standard equipment. More importantly, Alternative 2 provides the basis for the Counties to begin to integrate their approach and negotiations with the external agencies that will be involved to provide and approve financial and operating assistance. By integrating the Intercity weekend services, Monterey and Santa Cruz will help "sell" their initial service program as extremely cost efficient. This short-term bridge strategy also sets the stage for incremental

improvements providing weekend service to both destinations with DMU equipment in the following 2-3 years. It the process of finding bridges toward incremental cooperation that is at stake here. Only with a joint program already underway for intercity weekend service is subsequent daily Around the Bay service (by 2005 or beyond) possible.

The integrated approach would be developed through contractual arrangements involving recognition by the State of the incremental costs of the new "intercity" service and could be based on existing services and equipment on the Caltrain corridor. In every case, if Amtrak is the operator and the service is recognized as "intercity", the service would benefit from Amtrak's right to access Union Pacific Railroad right-of-way without fees and at costs for services incremental to costs already borne by the railroad for its freight trains. A range of costs for such an integrated service could be defined from the least expensive, extending existing Caltrain schedules using existing Caltrain equipment; to a middle ground, using leased Intercity-type equipment on existing Caltrain schedules extended to Santa Cruz and Monterey; to the most expensive, using leased equipment solely for this purpose as a new train is added to the current flow of trains from San Francisco to Gilroy. The Alternative 2 proposed initial operating plan could begin in San Jose as an extension of Caltrain, Capitol Corridor or the new Altamont Commuter Express service without incurring new rolling stock expenses.

As resources for rolling stock and additional improvements are available, Alternative 3 is recommended for implementation in 2005. Alternative 3 would use DMU vehicles to provide weekend service to both destinations with trains that can split and be joined at Pajaro. This service would link to other passenger rail services at San Jose (Altamont service to Stockton, Capitols to Oakland and Sacramento, and Caltrain to Palo Alto and San Francisco).

A Summary of the Intercity Alternatives is provided in Table 1.1.

Future daily Around The Bay service could be initiated next using DMUs and taking into account the rolling stock and maintenance facility already being used for Weekend Intercity service. Additional DMUs would provide another level of operational flexibility permitting the trains used for intercity service to also be used, in part, to provide service between Monterey and Santa Cruz. An initial service level of four (4) daily round trips could grow eventually to twelve (12) daily round trips.

**Table 1.1 Summary of Intercity Alternatives O&M Costs, Capital Costs and Ridership for 2005**

	<b>Alternative 1</b> "Base Programs" Service start up: 2002		<b>Alternative 2</b> Alternate Weekends to Both Service start up: 2002		<b>Alternative 3</b> DMU Service to Both Service start up: 2005	
	<b>Santa Cruz</b>	<b>Monterey</b>	<b>Santa Cruz</b>	<b>Monterey</b>	<b>Santa Cruz</b>	<b>Monterey</b>
<b><u>SERVICE PARAMETERS</u></b>						
<b>Weekends Served Annually</b>	<b>24</b>	<b>52</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>52</b>
<b>Number of Round trips/Day</b>	<b>2 Trips</b> San Jose Santa Cruz	<b>1 Trip</b> SF/San Jose Monterey	<b>1 Trip</b> San Jose Santa Cruz	<b>1 Trip</b> San Jose Monterey	<b>2 Trips</b> San Jose Santa Cruz	<b>1 Trip</b> San Jose Monterey
<b><u>2005 O&amp;M TRAIN COSTS</u></b> (dollars in millions)	<b>\$ .909</b>	<b>\$1.735</b>	<b>\$ .591</b>	<b>\$ .650</b>	<b>\$ .598</b>	<b>\$ .867</b>
<b><u>INCREMENTAL CAPITAL COSTS</u></b>	<b>\$ 26.9</b> (Base costs)		<b>\$ 21.8</b>		<b>\$ 32.6</b>	
<b><u>2005 DAILY RIDERSHIP</u></b> (rounded)	<b>1,075</b>	<b>725</b>	<b>750</b>	<b>520</b>	<b>1,075</b>	<b>725</b>
<b><u>COSTS/RIDER</u></b> (Operating/rounded)	<b>\$14.14</b>	<b>\$17.20</b>	<b>\$13.52</b>	<b>\$14.74</b>	<b>\$7.67</b>	<b>\$8.59</b>

## 1.4 RIDERSHIP

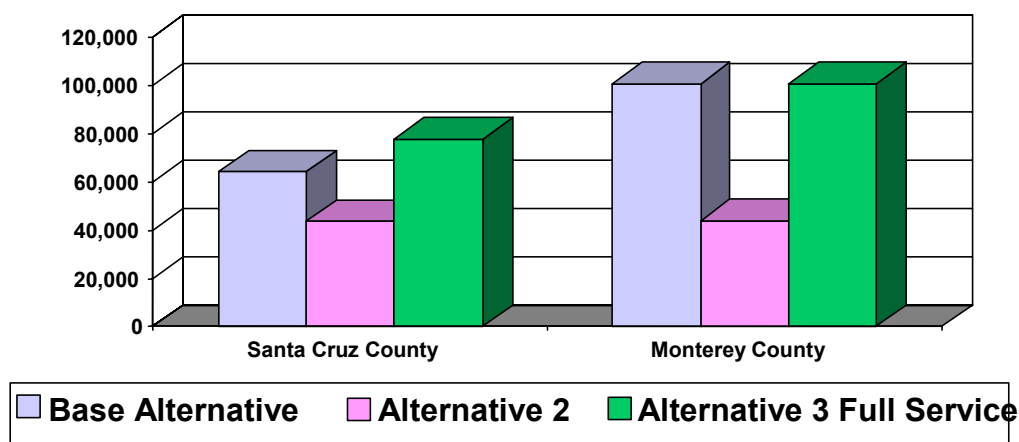
Ridership estimates for these services are presented in Section 5 using advanced sketch planning techniques and an array of available information from Monterey and Santa Cruz County transportation planning sources. This methodology was focused on a realistic set of numbers and only used transport demand models that had already been applied with results that were credible. The analysis was based on the size of each travel market and the potential market penetration for the railroad service.

The assessment of weekend intercity ridership produced the following conclusions:

- The end point destinations of Santa Cruz, Monterey/Seaside will generate 70 percent of the demand
- 700-1100 boardings will result in 2005 on a typical weekend peak day
- 900 to 1200 boardings will result in 2015 on a typical weekend peak day for each destination
- In 2015 a combined total for both destinations of 213,000 annual boardings will result from Alternative 3 full service.
- The low mode share that is expected (3 to 6 percent) suggest that small changes in market share will create large shifts in ridership totals. An increase in Santa Clara County gas prices would significantly increase ridership.
- Ridership potential is **very** sensitive to fares and fare promotions

Figure 1.2 compares the annual ridership results of the three weekend intercity

**Figure 1.2 2005 Annual Riders Weekend Service for Each Destination**



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alternatives that were carried through the study process. When Alternative 3 is implemented in 2005 with full service to both destinations, ridership reaches 1,800 trips per weekend day or an annual total of 178,900 trips. Projecting this level of service to 2015 yields an estimated daily ridership of 2,125 trips per weekend day or an annual total of 213,700 trips.

Daily Around the Bay rail service is proposed to be phased in over several years. Phase 1 was defined with approximately six round trips per day in 2005. The assessment of daily rail transit ridership produced the following conclusions:

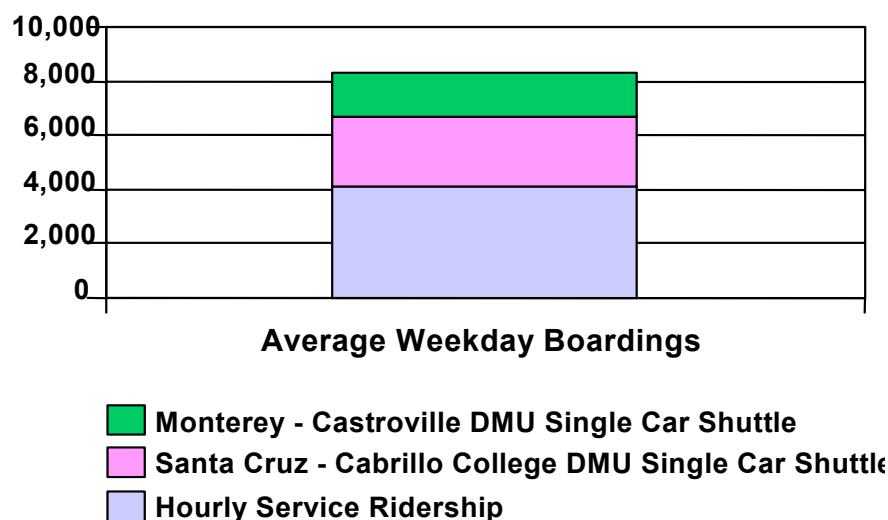
- Phase 1 service with 2-3 hour headways would initially have low ridership
  - forecasts between 900 to 1,300 trips per day in 2005
- Phase 3, hourly service, and strategic systems planning would produce solid daily ridership with forecasts around 4,100 trips per day in 2015
- DMU single car shuttle trains could double overall ridership
  - around 2,600 boardings per day for Santa Cruz
  - around 1,600 boardings per day for Monterey

The last conclusion listed above, concerning extra train shuttles from the end points, raises an interesting issue. The assessment of ridership for Around the Bay daily rail service shows that it is strongly driven by frequency. The challenge of this Study was to project a reasonable length of time for Monterey and Santa Cruz Counties to fund, purchase and deploy enough DMUs to achieve hourly service. For this Study a conservative time period of ten years between 2005 and 2015 was chosen although a more aggressive, shorter time period of 5-6 years is also possible. As a result, 2015 is used to anchor the future year range of ridership estimates.

In 2015, hourly departures from Santa Cruz and Monterey would result in ridership of approximately 4,000 trips per day. This is more than double the ridership of the most successful express bus service operating today along the Around the Bay travel corridor. The question was then asked, what would be the impact if in between the hourly departures at each end, single car DMU shuttle train service departed Santa Cruz and Monterey and traveled only to Cabrillo College and Castroville, respectively. The return trip of these DMU shuttles would be timed to give half-hour service in both directions.

DMU shuttles that would provide service every half hour in the more densely populated corridors near the terminals would offer a real alternative to bus or auto use and significantly expand the potential market. The result was ridership is estimated to nearly double to 8,340 daily trips. Figure 1.3 illustrates the daily

**Figure 1.3 2015 Average Daily Ridership for Around the Bay Rail Service**



ridership with hourly service departing each end point and the results from adding single car DMU shuttles to increase the frequency in the Around the Bay corridor segments with high travel demand.

The Around the Bay Rail Study time frame is primarily the five year period between 2005 and 2010. A full analysis of the costs and benefit impacts of adding DMU shuttle trains to supplement the hourly service in Phase 3 in 2015 is beyond the scope of the Final Report. However, the ridership benefits that were revealed in the course of testing service plan options recommends the concept.

## 1.5 FUNDING AND FINANCIAL PLANNING

Public transport and highway transportation funding requirements are significant in Monterey and Santa Cruz counties. If the passenger rail program is given a priority for future funding, some transportation revenues that will be available to the counties can be allocated for needed passenger rail investments and operations. Section 6 presents a financial plan for a coordinated service program. The conclusions resulting from the Financial Plan development are as follows:

- The two counties should present a united front to obtain commitments from traditional funding programs
- The united front should be used to leverage federal and state funds
- The counties should secure private sector contributions, and
- Pursue potential new local revenues

Capital investments are recommended to first start the initial service described under Alternative 2 service. Concurrently, additional investment to create the Alternative 3 DMU service to Monterey and Santa Cruz should be put in motion. Subsequent capital investments to create daily Around the Bay service should follow as soon as resources permit. In addition, funds to cover operating costs, *which will not be covered by fare-box revenues*, will also be required. The estimated financial requirements of the recommended plans are shown in Table 1.2.

<b>Table 1.2 Estimated Financial Requirements</b> (millions of dollars)					
	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 3 + Around the Bay</b>	<b>Alternative 3 + Around the Bay</b>	<b>Total</b>
<b>Year of Operations</b>	2002	2005	2005	2010	
<b>Capital Investment</b>	48.7	32.5	26.6	--	107.9
<b>Annual Operating Funds</b>	1.62	1.01	2.95	4.4	n.a.

There are existing capital investment funding sources that have been identified and could be available in both counties. If decisions are made to finance the passenger rail projects and the counties are successful in securing discretionary state and federal funding (including Federal Transit Administration New Start Funding) capital funding sources can be directed towards the projects. These available resources are summarized below:

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### **Capital Funds Identified**

Monterey	\$27.5 million
<u>Santa Cruz</u>	<u>\$31.7 million</u>
Total	\$59.2 million

There is a significant funding gap between the identified financial requirements and these identified capital funding resources:

### **Capital Funds Gap**

Monterey	\$28.1 million
<u>Santa Cruz</u>	<u>\$20.6 million</u>
Total	\$48.7 million

In 2005, the operating subsidy requirement for Alternative 3 with daily Around the Bay service is estimated to be \$2.95 million. Monterey County has identified a start-up resource in a \$400,000 CMAQ grant (Congestion Management and Air Quality funds available from the Federal Transportation program). Additional operating funds will need to be identified:

### **Operating Funds Gap**

Monterey	\$1.1 million
<u>Santa Cruz</u>	<u>\$1.4 million</u>
Total	\$2.5 million

In order to secure all of the required resources and fill the identified gaps in financing the projects, additional financial resources will be required. In Monterey County a one-half percent sales tax for transportation purposes could become a source for these required funds. In Santa Cruz County, which is already collecting a sales tax for existing transportation programs, options include private sector contributions and an increase in the gas tax. These new resources, if put in place will provide adequate funding to fill these identified gaps to implement the passenger rail programs.

Allocation of expenses to each of the Counties is recommended to be based on a joint or pooled costs identified as having a benefit for service to both counties and pools of costs identified solely as benefiting one county service. It is recommended that allocation of operating costs and subsidy requirements be based on passenger boarding/de-boarding by County.



### **1.6 IMPLEMENTATION**

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When the counties are both ready to coordinate their programs and implement Intercity weekend and daily Around the Bay passenger rail services, the consultant recommends an Action Plan to begin service as soon as possible. The Action Plan includes the following next steps.

- Conclude the current study phase and finalize the analysis in progress regarding service feasibility.
- Establish a new Joint Powers Authority
- Reach agreement on an integrated funding plan
- Advance a single project if one county is ready, but with a united front and schedule for both services to be implemented.
- Begin to negotiate intercity weekend service jointly as soon as the JPA is established. (Caltrans, UP, CTC, Amtrak, etc.)
- Develop local and federal financing based on the coordinated program
- Carry out design including service coordination
- Acquire rolling stock

The first and most important step to be taken is the creation of a Joint Powers Board of the two Counties and the integration of their rail planning into a new regional and coordinated program. (A sub-option is to form a JPB that includes Santa Clara County.) In making this decision, the counties will need to adopt a single passenger rail vision to initiate intercity service in a reasonable time. This will serve as the foundation for the additional expansion to an Around the Bay service that could build on the availability of DMU equipment during the weekdays.

A new JPA will require some compromises in the specific definition of service currently adopted by the counties. The benefits, however, can be considerable as the counties work together on a single program with the various external agencies that must approve and finance their plans.

The Joint Powers Board would undertake its work through a small three-person core staff, which would reside in a “managing agency”. The Managing Agency would also provide all the administrative support required to implement and operate the program. Candidates for the managing agency include the Transportation Agency for Monterey County (TAMC), the Santa Cruz County Regional Transportation Commission (SCCRTC), Monterey Salinas Transit (MST) and Santa Cruz Metropolitan Transit District (SCMTD).

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## **2.0 INTRODUCTION**

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Passenger rail service has continually expanded in California for the past twenty-years. The State's growing network of commuter, intercity and inter-state trains now forms the second largest passenger rail network in North America.

During this period, no one county has established new intercity service as a stand alone market or sponsor. Common markets, economies of scale and funding sources that prefer cooperative service plans have resulted in joint-county passenger rail programs. How the adjacent counties of Monterey or Santa Cruz, which have estimated costs and benefits of two separate, new rail programs, should address these precedents for starting new service is the starting point for this study.

In considering the benefits of integration, an assumption is made that there are literally two separate projects, which are being advanced at the same time to compare to an integrated program. The real situation, however, may well be that one of the counties may precede the other in carrying out its program. This report should not be interpreted to suggest that a single county program should not be advanced by itself, if the other county is not ready. To the extent that there are benefits of an integrated approach, there are also benefits to the initiation of passenger rail service to either Monterey or Santa Cruz as an initial passenger rail service to the Monterey Bay Peninsula with the concept of an integrated service to be pursued subsequently as the other county is also ready to advance its program.

The precedents for new passenger rail programs in California can be divided into two groups – intercity trains funded by the State Rail Program with regional Joint Powers Boards or Steering Committees; and, regional trains funded and operated by Joint Powers Board programs and sponsored by a coalition of counties.

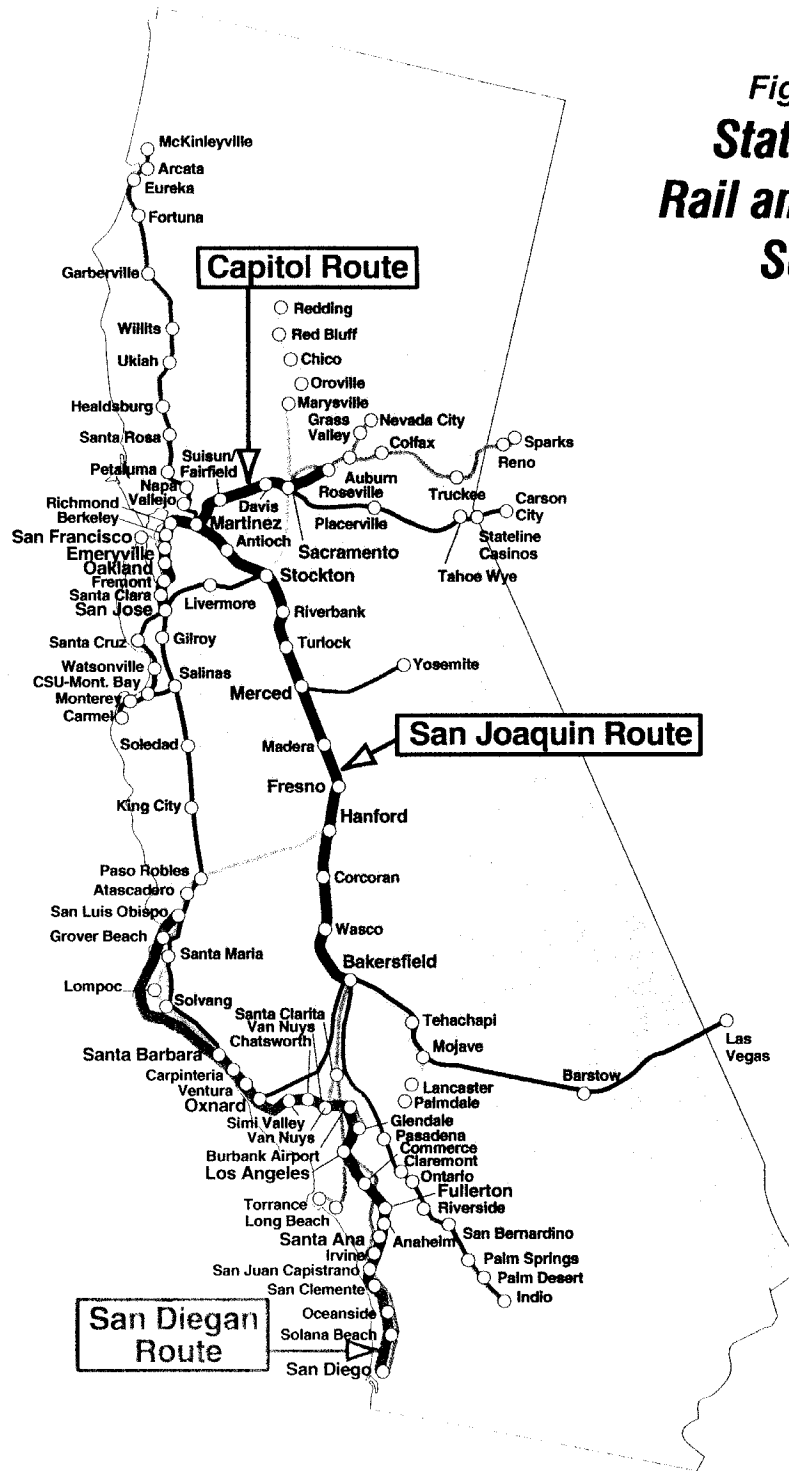
For longer distance intercity trains, the Caltrans Rail Program has served as the “managing agency” that contracts with Amtrak for State-sponsored extensions of the Amtrak national route system. The State Rail Program currently funds three intercity corridors shown in Figure 2.1 and described in Table 2.1.

In 1996 SB 457 was enacted by the California legislature and signed by the Governor. It permits the transfer of responsibilities for managing the state sponsored intercity rail corridors to regional Joint Powers Boards while the state continues to fund operating and capital costs. In 1997, the eight counties served by the Capitol Corridor formed a Joint Powers Board to provide local oversight and management to the State funded service.

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**Figure 2.1  
Statewide  
Rail and Bus  
Service**



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**Table 2.1 State and JPB Sponsored Passenger Rail Corridors and Extension Route Lengths**

Corridors & Extensions	Weekday Round-trips	Base Route Miles	Extension Route Miles	Total Miles	Percent Change
<b>State Sponsored</b>					
<b>San Diegan Corridor</b>					
Los Angeles - San Diego (base service)	10	128			
1988 New Extension Los Angeles - Santa Barbara	4		103	231	80%
1995 SB Service Extended to San Luis Obispo	1	335	118	468	35%
<b>San Joaquin Corridor</b>					
Oakland - Bakersfield (base service)	4	315			
Approved Extension Stockton-Sacramento (a)	1		75	390	32%
<b>Capitol Corridor</b>					
Sacramento - San Jose (base service) (b)	3	152			
1998 Extension from Roseville to Colfax	1		35	187	23%
<i>Average for State Sponsored Corridors (miles):</i>	-	267	83	319	44%
<b>Joint Powers Board Sponsored Service</b>					
<b>Caltrain - Peninsula Corridor</b>					
San Francisco - San Jose (base service)	66	47			
1994 Extension from San Jose to Gilroy (c)	4		30	77	64%
<b>Altamont Commuter Express</b>					
Stockton - San Jose	2	83	-	83	-
<i>Average JPA Sponsored Corridors (miles):</i>	-	65	30	80	-

**Notes:**

Sources: Amtrak National Timetable for existing service; "California Rails" 1995 map for San Joaquin extensions.

a) Stockton-Sacramento is a new line extension for one roundtrip that is scheduled to begin in late 1998.

The start of service is pending the Union Pacific Railroad agreement to a schedule to undertake the \$16 million in track and signal improvements required.

b) The Capitol Corridor includes four roundtrips between Sacramento and Oakland.

Of this service, only one roundtrip extends north to Roseville and only three roundtrips extend south to San Jose.

For purposes of this study, the base service is represented as 3 roundtrips, Sacramento-San Jose.

Additional trips between Oakland and San Jose are pending agreements required from the Union Pacific Railroad.

c) Negotiations began in 1991 to extend service to Gilroy. Planning and engineering began in 1992.

Additional trips between San Jose and Gilroy are pending agreements required from the Union Pacific Railroad.

The top half of Table 2.1 shows that the State funded corridors average 267 miles in length. The routes serve a wide range of travel markets. With the exception of a small number of trains in the San Diego-Los Angeles corridor, the state-sponsored trains are not structured to serve daily commuter markets. The Capitol Corridor, the newest line in the State sponsored passenger rail service, was implemented in 1991 and expanded to four round trips between Sacramento and Oakland in 1996. The second precedent of arrangements for initiating passenger rail service is a regional Joint Powers Board that oversees service largely funded by the participating county transportation agencies. Caltrain and the Altamont Commuter Express (ACE) are the two Northern California commuter systems that are operated and funded by Joint Powers Boards made up of local officials from counties served by the rail service. Both ACE and Caltrain Joint Powers Boards are comprised of three-counties with the Santa Clara Valley Transportation Authority sitting on both JPB's. The Section 7 Appendix lists the member agencies of the major passenger rail Joint Powers Boards. The lower half of Table 2.1 compares the route miles of Caltrain and the Altamont Commuter Express. The Caltrain and ACE routes average 80 miles in length and focus on serving commuter markets.

Both Santa Cruz and Monterey Counties have independently investigated passenger rail programs that would extend 1 to 2 round trips of either the Capitols or Caltrain service with a focus on weekend service. The current terminus of the Capitols is San Jose. The current terminus for Caltrain peak service is Gilroy. Table 2.2 shows that the additional route miles to extend new weekend service from San Jose to Santa Cruz/Monterey using Capitol Corridor trains (75 miles from San Jose) and from Gilroy using Caltrain service (45 miles from Gilroy).<sup>1</sup>

Note in Table 2.1 that all of the existing State sponsored corridors have been extended in recent years. Table 2.2 underscores that a 75-mile extension of the Capitols from San Jose represents a percentage increase of 40% in route miles, less than the average 44%) for previous extensions on all of the State sponsored corridors. And, it is the same length as the recently approved 75-mile extension of the San Joaquin intercity service between Stockton and Sacramento.

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<sup>1</sup> The Altamont Commuter Express service, with two round-trips per day between Stockton and San Jose to begin in 1998, has the potential to be a partner in a coordinated Santa Cruz and Monterey service plan. Like Caltrain, more than sufficient equipment from the weekday commuter service could be available for intercity weekend service between Stockton and Santa Cruz/Monterey. Incorporating a still future service in the analysis of Around the Bay Rail service, costs and institutional analysis would have required extensive involvement of the ACE operating and administrative organizations. Achieving this involvement from an organization under the pressure of starting a new service was beyond the scope of services.

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Indeed, even with an extension from San Jose to Monterey/Santa Cruz, the Capitol Corridor would remain the shortest route in the State Rail Program. However, the new Capitol Corridor JPB has expressed a goal to increase capitol service from 4 to 6 round trips. It is expected this goal will limit the availability of equipment for significant extensions of service for several years.

**Table 2.2 Comparison of Santa Cruz/Monterey Extension with Existing Corridor Miles**

Existing Passenger Rail Corridors	Route Miles	New Route Miles	Total Miles	Percent Change
<b>Capitol Corridor</b>				
Colfax - San Jose Current Service	187			
Extension from San Jose to Santa Cruz/Monterey (a)		75	262	40%
<b>Caltrain - Peninsula Corridor</b>				
San Francisco - Gilroy Current Service	77			
Extension from Gilroy to Santa Cruz/Monterey		45	122	59%

**Notes:**

a) The 75 mile route length from San Jose to Monterey/Santa Cruz is an average for the two extensions.

An extension of Caltrain service from Gilroy represents a smaller percentage (59%) increase of new route miles than the 1994 extension of service to Gilroy (64%). Unlike, the Capitols service, Caltrain has a surplus of passenger rail equipment available for expanded weekend service. In addition, the Santa Clara Valley Transportation Authority (SCVTA), which now solely funds the 4 round trips of weekday peak service from Gilroy, has proposed adding Gilroy weekend service. Preliminary discussions between the Santa Cruz County Regional Transportation Commission and the SCTVA have examined arrangements for service to Santa Cruz that would be partially funded by the SCVTA.

The history of new or expanded passenger rail service in California points to joint programs, agreements and boards to oversee and manage the service. This study examines arrangements for pursuing new passenger rail service to Monterey and Santa Cruz counties as part of a joint program of the two counties and as part of service extensions involving existing Joint Powers Board.

## **Study Goals and Report Organization**

The goal of the Around the Bay Rail study is to examine the feasibility of joint programs of Monterey and Santa Cruz counties to achieve intercity passenger rail service within the next five years. All joint programs grow from mutual interests, needs and opportunities. Three opportunities were examined to identify the grounds for such programs.

- First, the Study investigates the opportunity for operating a common service; that is, a service that uses a common train set, timetable and marketing program. Each program seeks to operate on the common 50-mile segment of the Union Pacific Railroad's Coast Line rail corridor between San Jose and Pajaro. The Santa Cruz program would branch off from Pajaro onto the Santa Cruz Line for 20 miles to the north serving stations within Santa Cruz county. The Monterey program would operate service initially to the town of Seaside then extend to Monterey continuing from Pajaro 26-miles to the south via 10 more miles on the Coast Line to Castroville and then 16-miles on the Monterey branch line. The previous, separate studies have considered using the same type of rolling stock and the same contract operators (Amtrak, et. al.). The first goal of the Around the Bay Rail Study was to compare the two separate programs and identify common operating and institutional opportunities to coordinate and achieve economies between the two programs as an integrated service.
- A second goal of the Around the Bay Rail study is to examine the opportunity to achieve lower operating costs and other mutual benefits from using new passenger rail vehicle technology. Nationwide, Diesel Multiple Unit (DMU) rail vehicles are an emerging opportunity to use self-propelled passenger train vehicles in corridors that extend from heavily used passenger lines to less densely populated regions. Recent success with DMU expansion in Europe has lower operating costs than conventional passenger rail trains in specific applications.

Examples of the conventional equipment that are used for this discussion are found on the 77-mile Caltrain system or the soon to be implemented 83 mile Altamont Commuter Express (ACE) service. Both of these high capacity systems, using diesel locomotives and bi-level passenger coaches, could be sources for new service from San Francisco/San Jose to Monterey and/or Santa Cruz counties. As part of the second goal, the operating characteristics and costs of Diesel Multiple Unit (DMU) vehicles are compared with conventional passenger railroad equipment for the intercity weekend service on the route from San Jose to Santa Cruz and Monterey. Opportunities are identified to achieve lower cost operations from the use of DMU vehicles. These systems issue,

outlined by comparing technology, are then linked to the institutional issue of joint programs.

- The third goal of the Around the Bay rail study is to examine the opportunity for daily rail transit service “Around the Bay” between Santa Cruz and Monterey. The first two goals address opportunities to reduce redundancies in weekend intercity programs. This third goal addresses the opportunity to expand mobility within the two-county region by daily operations of rail transit vehicles on the Santa Cruz branch line between downtown Santa Cruz and Pajaro, along the Union Pacific Railroad Coast Line from Pajaro to Castroville, and on the Monterey branch line between Castroville and downtown Monterey.

Operating plans, costs, funding and institutional arrangements to start daily rail transit service “Around the Bay” are outlined. Potential economies are explored as the result of joint program if an intercity weekend service were already in place. The examination points to the advantages of integrating the two service concepts so that intercity weekend service is a precedent to daily local service.

To achieve these goals, the balance of this report contains five sections. Each section begins with a list of Objectives, Key Issues and Recommendations. Section 3.0, Diesel Multiple Unit Assessment presents the feasibility and cost-effectiveness of new DMU technology compared with conventional locomotive-hauled equipment. The sources consulted for this frame work are described in the Appendix.

Operating Plans are presented in Section 4.0. Section 4 follows the sequence of the three Study goals. First, Alternative service plans are compared for intercity weekend travel to examine opportunities for coordinated service between the two counties. Criteria for coordinated service is reviewed. Potential stations not included in previous studies are discussed. Second, the costs and benefits of using DMU passenger rail equipment is evaluated. Third, daily rail transit service between Santa Cruz and Monterey is discussed. Capital costs and the operating and maintenance costs of the alternatives and the recommended service plans are presented.

Section 5.0 presents the methodology for estimating ridership and the ridership estimates for the respective service plans. The travel table spreadsheets used to develop the estimates are presented in the Appendix.

Section 6.0 address the funding plan to develop intercity weekend and daily Around the Bay rail service including cost sharing and new funding sources.

Finally, Section 7.0 presents an implementation strategy for intercity and daily passenger rail service. Long-term arrangements for the existing agencies as well as



the relationship between them and the new institution are outlined. It also describes the necessary steps to implement the financial plan, obtain the equipment, enter into contracts for operations and maintenance, and carry out the capital improvements to begin service. An Implementation Plan is included in Section 7.

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## **2.1 DEVELOPING A REGIONAL RAIL TRANSPORTATION PROGRAM**

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The Santa Cruz County Regional Transportation Commission (SCCRTC) is currently undertaking a Major Transportation Investments Study (MTIS).<sup>2</sup> The first part of the MTIS completed an examination of Intercity Rail Weekend Service in 1996. As part of this continuing MTIS, SCCRTC is now examining DMU passenger rail service between Santa Cruz and Watsonville. The MTIS study involves extensive review and discussion by decision-makers and technical advisory committee members.

The Transportation Agency for Monterey County (TAMC) continues to develop an extensive Rail Implementation Program that has been actively underway since 1995. TAMC is continuing direct discussions with PCJPB, Amtrak West management and the State of California, Department of Transportation Rail Division in order to progress the Monterey Program.

The Monterey Program has completed market research and ridership estimates that show service from San Francisco to Monterey over an extended four day weekend would generate the highest ridership.

As input to the Around the Bay Study, these recent passenger rail studies and their documentation were reviewed. Independent field inspections made of the 47-mile rail line between Santa Cruz and Monterey/Salinas and discussion with SCCRTC and TAMC staff resulted in confirming various aspects of the prior studies including ridership assumptions, capital costs and proposed station locations. In addition to numerous individual interviews with local transportation agencies and AMBAG staff, several Around the Bay Project Management meetings were held within the counties. The focus of the project management meetings was to resolve technical issues. Finally, the consultants who helped to prepare the prior studies were contacted to answer questions.

These studies revealed few major environmental or technical obstacles to intercity services to Monterey or Santa Cruz that would require costly mitigation or otherwise

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<sup>2</sup> This study approach applied and made the most of the technical tasks produced in the previous (and continuing) comprehensive rail program studies that have been developed by Santa Cruz and Monterey Counties.

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prohibit development of successful passenger rail programs. The goals, risks, estimated costs and benefits of the rail programs in both counties fall within the bounds found in other U.S. rail proposals that have been implemented successfully.

The Around the Bay rail study focuses on several other issues facing the region including defining new capital funding sources and defining how institutional cooperation between Monterey and Santa Cruz counties could benefit the respective rail programs in each county. As much as possible, technical data used in this report is based on prior studies. The current conditions in Section 2.2 are taken from prior studies and supplemental discussions.

Examples of parameters and data drawn from previous studies follow:

- A cost of \$13.02 per car mile for Caltrain operating costs was taken from the SCCRTC, 1996 Intercity Recreational Rail Study based on Caltrain's current O&M costs. In this previous study, the cost excludes vehicle lease costs. However, in Section 4 the \$13.02 is used as a marker to negotiate with Caltrain for weekend service to Santa Cruz and Monterey that would include vehicle costs.
- \$13.04 per car mile for the cost of leasing a 4-car rail consist was taken from the TAMC, 1997 San Francisco-Monterey Intercity Rail Service Implementation Summary. This additional costs was used in Section 4 as a cost marker in the event Caltrain would not supply vehicles at a cost of \$13.02 per car mile of service.
- An average of \$135,000 was used to estimate the capital cost of each new station/platform for Around the Bay daily service. This cost was derived from the SCCRTC, 1997 Project Study Report for Intercity Weekend Service. This assumes a "bare-bones" type of Station.
- An average cost of \$12,000 per mile per year for Santa Cruz and Monterey branch line maintenance was assumed for track maintenance taken from the TAMC Implementation Summary.
- The estimated capital costs of \$2.0 million each for Seaside and Pajaro Stations were Stations taken from the respective 1997 Project Study Reports.

Based on the prior work and this analysis, intercity weekend service would be the first service implemented followed by Around the Bay daily service. For new passenger rail service to begin in either county, new sources of capital and operating funds are required. The study has proceeded on the assumption that new local funding sources which would be put in place by the counties, would be programmed,

first for weekend intercity service in 2002, and then for Around the Bay daily service between Monterey and Santa Cruz in 2005.

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## **2.2 CURRENT INTERCITY SERVICE PLANS**

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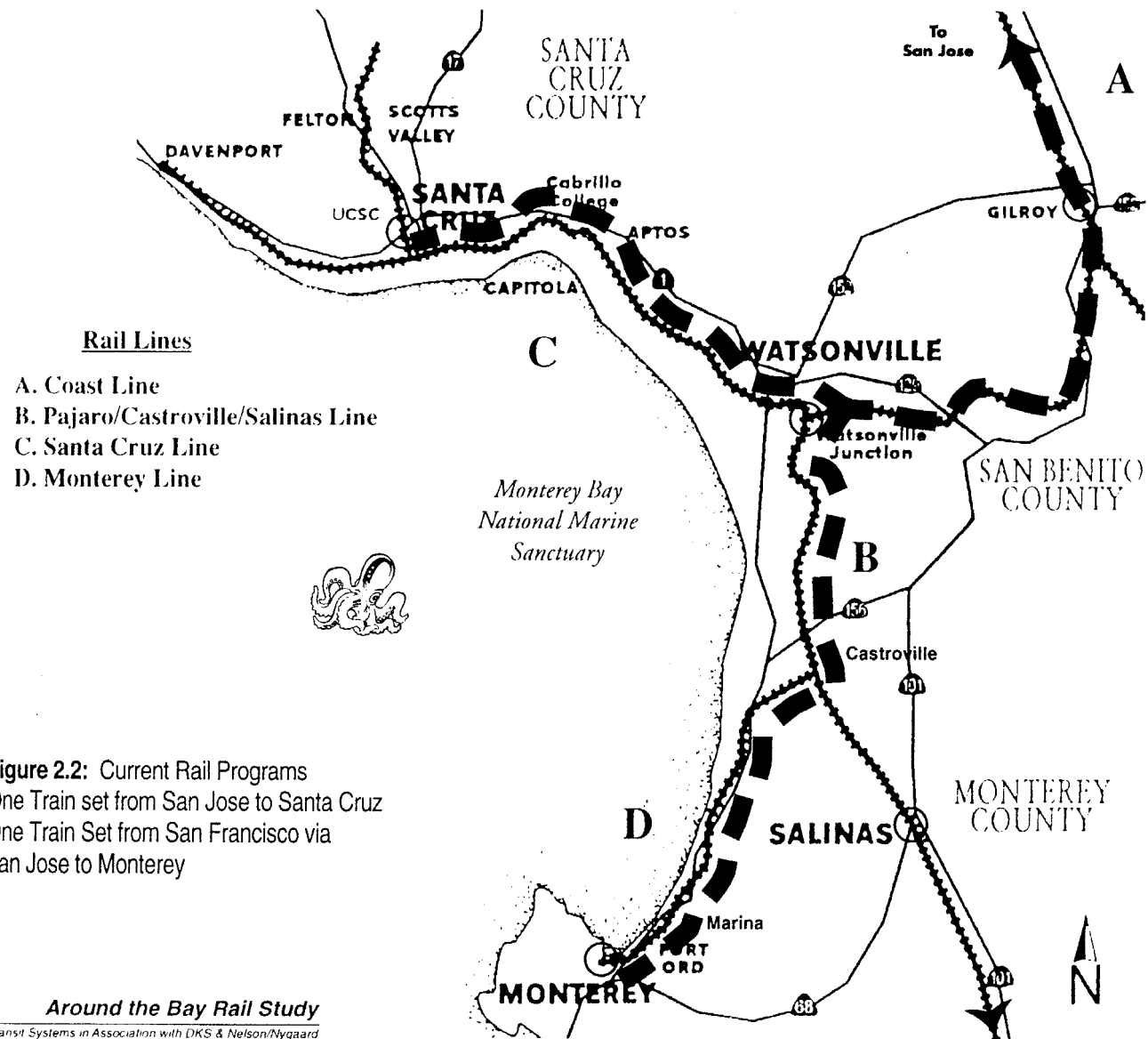
This section summarizes current conditions of the rail routes, service plans and stations as identified in previous studies and supplemental investigations. These conditions were used as background to examine coordination opportunities for intercity weekend service and then daily rail transit service between Monterey and Santa Cruz.

### **Routes, Line Segments and Freight Operations**

Figure 2.2 is a schematic map showing each segment of the rail network and the routes of the two current passenger rail program. Table 2.3 provides a broad summary status of the line conditions. Moving from north to south, the four line segments are described as follows:

The **Coast Line** (A) segment runs from San Jose to Salinas via Gilroy, Pajaro and Castroville. This segment of the Pacific Coast line which travels through Santa Clara, San Benito, Santa Cruz and Monterey Counties before proceeding south on the Pacific Coast to Los Angeles.

To further address issues on this line, this segment is divided into the 53-mile segment between San Jose and Pajaro and a second eighteen mile segment between **Pajaro, Castroville and Salinas** (B). For intercity weekend service, a new station is proposed at Pajaro that would be sponsored by both counties.



**Figure 2.2:** Current Rail Programs  
 One Train set from San Jose to Santa Cruz  
 One Train Set from San Francisco via  
 San Jose to Monterey

**Table 2.3 Summary of Conditions for Rail Line Segments**

Line and Proposed Service	Condition, Capacity Assessment and Maximum Speed	Current Level of Use - Ownership
<b>A. Coast Line - Intercity Weekend</b> 33 miles San Jose to Gilroy  20 miles Gilroy to Pajaro	FRA Class 3 & 4 single track with passing tracks  CTC Max speed 79 MPH. Five Caltrain stations; Amtrak service; Additional 2nd track improvements possible. Class 3 with 3 zones with speed restrictions of 35 mph. Some CTC New interlocking required at Pajaro to link main line, Santa Cruz lines	16-20 freight trains/week; majority are locals Two Amtrak trains per day; 4 Caltrain weekdays 1 track mile in San Jose owned by Caltrain 95% Union Pacific owned. Caltrain has limited daily access rights to Gilroy.
<b>B. Pajaro/Castroville/Salinas Line</b> <b>Intercity Wknd &amp; Daily DMU Service</b> 10 miles Pajaro to Castroville:  8 miles Castroville to Salinas:	Continuation of Coast line from SJ to LA.; Class 3 & 4 single track; 1 siding at Pajaro. Maximum speed 60-79 MPH. New Pajaro Station Needed; from Pajaro, 3 miles south (Mile post 103) space exists for new Passing tracks. For middle 4 miles (MP 107) the line runs through center of state/federal wildlife reserve and major wetlands on single track. For the next 3 miles, space exists for new passing tracks to Castroville.* Class 4 CTC with space for new passing tracks; open space territory.	10-14 freight trains/week; majority are locals Most short locals. Two Amtrak trains /day Includes active Salinas freight yard Union Pacific owned Under negotiations to achieve intercity rail access to San Jose via Coast Main Line Same access status as above.
<b>C. Santa Cruz Line Intercity</b> <b>Intercity Wknd &amp; Daily DMU Service</b> 21 miles Pajaro to Santa Cruz	Class 1 single track; large areas "excepted" track below FRA standards. Maximum speed 10 MPH. Needs upgrade for passenger use. Grade crossing upgrades needed. New stations & platforms needed at all station sites. In Santa Cruz, 1-2 tracks are planned for 1 <sup>st</sup> 1.2 miles from Union Street to end of Brdwlk; from Boardwalk the ROW is narrow and Restricted by development for 6.2 miles to New Brighton/Cabrillo College Station site where the ROW space exists for approximately one mile for passing track and siding for possible short turn DMU service back to SC.	2-3 freight trains per week; 2-3 Santa Cruz trains/day operated by Big Trees Railroad with short overlap in front of Wharf and Boardwalk. Union Pacific owns from Boardwalk to Pajaro. Under negotiations to exchange access for local capital improvements and to achieve access to Coast Line.
<b>D. Monterey Line</b> <b>Intercity Wknd &amp; Daily DMU Service</b> 16 miles Castroville –Monterey	Needs upgrade for passenger use; abandoned by UP. Incremental Upgrades are proposed by TAMC using used rail and selected tie Replacement. For first 6 miles, from Castroville south, large Segments run in open space with ample ROW for new passing Track. For next 6 miles, ROW is wide enough for 2 <sup>nd</sup> track in most Locations. \$3 million single-track bridge replacement needed.	No freight traffic. Union Pacific owned. Under negotiations for purchase and to achieve access to Coast Line for intercity weekend service to S. Francisco.

Source for Track Miles, CTC and speed zone status is 1994 Altamont Press publication that is based on SP Timetable. In addition, discussions with Project Staff, field inspections and previous SCCRTC and TAMC passenger rail reports were used to development broach gauge assessment.

\*See Section 4 discussion of adding a second track for DMU operations between the Monterey Line at Castroville and Santa Cruz Line at Pajaro.

- The **Santa Cruz Line** (C) runs 21 miles along the coast in a north south alignment between Pajaro and the Santa Cruz Wharf in Santa Cruz County. The line begins in agricultural areas near Watsonville and enters increasingly developed areas as it approaches Santa Cruz. Nearing Santa Cruz, the line travels over a number of bridges and at-grade road crossings. The branch line continues to Davenport, but this segment was not included in the scope of this study. For the initial phase of intercity weekend service, five stations were identified in previous studies.
- The **Monterey Line** (D) runs 16 miles through agricultural areas between Castroville and the town of Marina before proceeding south along Hwy. 1 to the proposed terminus near Monterey's central business district. An interim terminal is proposed for Seaside. Between Seaside and Monterey, the railroad right-of-way is currently being used as a recreational trail that is also a regional bicycle route. For intercity weekend service, only the new station at Seaside is proposed in the initial phase of service. It should be noted that the Monterey Program is expected to extend the passenger rail service to the Fisherman's Wharf area of Monterey as resources permit. For this study, future cost and ridership estimates are based on through service directly to Monterey.

The volume of freight traffic between San Jose and the respective branch lines is less than 10-12 trains per week. This level of freight should not pose a risk or constraint to the level of intercity weekend passenger service proposed.

For daily rail transit service, however, the presence of freight and Amtrak intercity trains for the segment between Pajaro and Castroville is expected to prevent use of Diesel Light Rail Vehicles such as the Siemens Regio Sprinter that was tested on the Santa Cruz line in 1996. Lightweight DMU vehicles that are not compliant with FRA safety and crashworthiness requirements cannot operate on the same railroad right-of-way as freight or Amtrak trains. Such mixed traffic would occur on the Coast Line between Pajaro, Castroville and Salinas. This conclusion is based on Federal Railroad Administration regulations that prevent such light-weight rail passenger cars (non-compliant DMUs) from operating in the mixed traffic of conventional passenger and freight trains that operate between Pajaro and Salinas. These regulations require structural strength in passenger railroad rolling stock operating with freight trains that is far greater than the strength of some light-weight DMU cars.

### **Markets, Service Plans and Operating Arrangements**

The markets, service plans and operating arrangements for the passenger rail programs that have been developed by Monterey and Santa Cruz Counties are summarized in Table 2.5. Projected travel time for intercity weekend service ranges from more than 2.5 hours from San Francisco to Monterey to about one hour from central San Jose to the first stations in Santa Cruz county (Pajaro/Watsonville).

In general, Monterey intercity service parameters will result in a higher cost than the Santa Cruz program identified to date due to three elements. To attract the highest level of annual ridership, the Monterey service is proposed to begin from San Francisco while Santa Cruz has considered options for beginning service from San Jose. A San Francisco origin increases the complexity of the service and the train miles by nearly 100 miles per day over service from San Jose. Second, to target the extended weekend and overnight market, the Monterey program calls for service four days per week for all 52 weeks.

Finally, not addressed in this comparative discussion of alternatives, the Monterey program is investigating express service from San Francisco and special amenities such as Dome and café cars. While the Around the Bay Rail study assumes a San Jose based service and does not include the incremental costs of a special rolling stock or San Francisco based operations, it is recommended that these goals continue to be pursued.

### **Stations**

The stations for the passenger rail programs that have been developed by Monterey and Santa Cruz Counties to date are shown in Table 2.6. Six potential stations have been identified in the Santa Cruz studies and one new terminus at Seaside in the Monterey Studies for the initial phase of service.

# ***Around the Bay Rail Study***

*LS Transit Systems, Inc. in association with DKS & Nelson\Nygaard*

**Table 2.5 Santa Cruz and Monterey County Base Intercity Weekend Service Plans**

	<b>Santa Cruz</b>	<b>Monterey</b>
<b><u>MARKETS</u></b>		
<b>Primary Seasonal Markets</b>	<b>Peak Season Weekend &amp; Holidays</b>	<b>All Year Extended Weekend</b>
<b>Directional Travel Markets</b>	<b>Two Way Santa Cruz-San Jose</b>	<b>To Monterey From San Francisco</b>
<b>Terminus in Bay Area</b>	<b>San Jose</b>	<b>San Francisco</b>
<b><u>SERVICE LEVELS</u></b>		
<b>Weekends Served Annually</b>	<b>24</b>	<b>52</b>
<b>Number of Round trips/Day</b>	<b>2</b>	<b>1</b>
<b>Days per Weekend</b>	<b>2</b>	<b>4</b>
<b>Additional Holidays &amp; Fridays</b>	<b>12</b>	<b>Included in Days Base Service</b>
<b>Annual One Way Trips</b>	<b>240</b>	<b>416</b>
<b><u>OPERATING ARRANGEMENTS</u></b>		
<b>Primary Operating Funds</b>	<b>Local &amp; State &amp; private</b>	<b>State</b>
<b>Potential Operational Partnerships</b>	<b>Amtrak/Caltrain/SCVTA Weekend Service To Gilroy or Amtrak</b>	<b>Amtrak Caltrain</b>
<b>Operator/Managing Agency</b>	<b>TBD</b>	<b>TBD</b>



# Around the Bay Rail Study

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**Table 2.6 Intercity Weekend Stations 2002-2005**

	Ridership Attractions, Tourist Destinations, Parks & Institutions	Summary of Station Area, Parking and Adjacent Track Conditions
<b><i>Santa Cruz Line</i></b>		
1 <b>Santa Cruz Wharf/Boardwalk</b>	Near UCSC, central bus. district Local transit transfers. Wharf, hotels, Boardwalk, beaches.	Single track; needs upgrade Station site, ADA access to be developed; parking lot available but already in use.
2 <b>Capitola</b>	Tourist center, beach	Single track; needs upgrade Station site, ADA access to be developed; parking lot available but already in use.
3 <b>Aptos Village</b>	Tourist center, Forest of Nisene Marks State Park	Single track; needs upgrade Station site, ADA access to be developed; parking lot available but already in use.
4 <b>Seascape</b>	Beach, residential resort	Single track; needs upgrade Station site, ADA access to be developed; parking lot available but already in use.
5 <b>Watsonville</b>	Near Business District First Stop in Santa Cruz County	Historical Station and site to be redeveloped. Single track; needs upgrade New parking lot to be developed
<b><i>Pajaro/Castroville/Salinas Line</i></b>		
6 <b>Pajaro/Watsonville Junction</b>	Future transfer point with daily rail transit service Proposed Redevelopment	Double Track; needs interlockings & sidings to serve branching to Santa Cruz Line Station & parking to be developed.
7 <b>Salinas</b>	Amtrak Intercity Station Local bus transit transfer point Steinbeck Center, shuttle to central business dist. Transit to San Benito County	Coast Main Line, single main track at station. Working freight yard. Station purchased by City of Salinas, 1997; large parking area Potential connection with an ex- tension of Capitols or San Diegans.
<b><i>Monterey Line</i></b>		
8 <b>Seaside</b> Serving Monterey, Pacific Grove and Carmel	Hotels, bus connectns Tourist & Conference Center Aquarium, Monterey Bay Hotels, local transit transfer center, Amtrak feeder bus. Longer term, 3-mile extension to "Wharf" will be considered.	Original track has been removed. Station site, ADA access to be parking lot available but in use. Additional parking needed. Station site may include storage track area for intercity trains.

## Schedules

The conceptual schedules developed by each county programs are shown in Table 2.7. However, the original Monterey schedule shows one weekend round trip each day from San Francisco to Monterey via San Jose. The Santa Cruz original schedule shows two weekend round trips each day with transfer connections in San Jose with Caltrain or the Capitols in San Jose. To illustrate the service included in this study, Table 2.7 shows the respective original schedules but with both starting from San Jose.

**Table 2.7 Conceptual Train Schedule for Monterey/Santa Cruz Programs**

	Southbound (Read Down)		Northbound (Read Up)	
Monterey Service				
Thurs-Sun				
San Jose	9:05 AM		7:55 PM	
Seaside	11:00 AM		6:00 PM	
Santa Cruz Service				
Saturdays, Sundays & Holidays				
San Jose	8:00 AM	1:00 PM	12:55 PM	7:45 PM
Santa Cruz	9:55 AM	2:50 PM	10:45 AM	6:00 PM

Monterey's original goal was to achieve express service for an all day stay or overnight stay at Monterey. The original Santa Cruz goal was to achieve travel time speeds and schedules that provide enough time for a day trip to either the Bay Area or Santa Cruz County.

## Capital and Operating Costs

The capital costs identified to date by each County total \$26.90 million for track, signal and station improvements for initial service as described by the service parameters in Table 2.5. Sources were the SCCRTC Project Study Report, 1997 and the TAMC Rail Service Implementation Plan Summary 1997.

	<b>Capital</b>	<b>Operating (annual)</b>
Monterey	\$16.3 million	\$3.4 million
Santa Cruz	\$10.6 million	\$1.2 million
Total	\$26.9 million	4.6 million

### **Institutional Arrangements**

Similar options for managing and service providers have been identified by both counties and are still under discussion. Using the state Rail Program to fund and manage the services with Amtrak the operator is the primary option. Amtrak offers substantial benefits as an operator and manager of intercity service. These include an established contractual right of access to private freight railroads' track routes, capital funding and equipment and significant experience and capability for operating attractive passenger rail service.

### **Ridership**

Estimated ridership identified to date by the respective previous studies are about 300 passengers per weekend day for Monterey within one round trip year around, and 900 passengers per weekend day for Santa Cruz with 2 round-trips during the peak season.

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## **2.3 ALTERNATIVE 1**

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### **Two Programs**

To investigate the use of common equipment, timetables, administration and marketing programs, the two current separate rail programs were examined. The studies developed to date consider a similar route, similar rolling stock and train size and the same contract operator. The projected operating data of the two separate programs were reviewed individually and then in terms of various combinations of coordinated service to identify where coordination and economies could be achieved. To identify common ground between separate service plans and cost assumptions, four steps were taken.

1. First, a common service route was defined. Both programs have considered San Francisco as a starting point. However, a number of issues concerning service that would start in San Francisco remain unanswered by previous studies and are beyond the scope of the Final Report. To focus the Around the Bay Rail Study, San Jose is used as the starting point of the cost analysis. The extension of Caltrain service is used as focal point of the cost analysis. Caltrain controls both the San Francisco and San Jose Stations and operates all trains from San Francisco.

Caltrain service that begins in San Jose for the purpose of this Study is likely to begin in San Francisco in actual practice. Advantages of a shared program that can be identified for the common route segments south of San Jose to Pajaro would be present north of San Jose to San Francisco.

Defining the Diridon San Jose intermodal station as a common anchor for the cost analysis is supported by its importance as a major passenger rail station. The Diridon San Jose station generates one of the highest levels of intermodal transit activity in Northern California. The San Jose location significantly exceeds the San Francisco station site in several areas, including:

- A larger number of daily passenger rail trains connecting at the station (78 including Amtrak, Caltrain and future ACE service in San Jose vs 66 trains for Caltrain service only in SF)
- Station staffing, crew base capacity and facilities for intercity train service (none at San Francisco)
- Station facility size to accommodate large group departures, luggage, etc. (no luggage service exists now at the San Francisco station)
- Frequency of local and regional express transit bus connections including free shuttles (no free shuttles or regional bus service connects to San Francisco station)
- Hourly dedicated Amtrak Thruway feeder buses serving State Rail Program intercity trains throughout Northern California (no intercity feeder bus service at the San Francisco station)
- Extensive adjacent dedicated parking (no parking exists at San Francisco), and
- A surrounding regional population that is twice as large as San Francisco.

An additional future benefit of the San Jose Diridon station as the common anchor is possible due to the high frequency of its intercity feeder bus service. The current Monterey and Santa Cruz passenger rail service plans have focused on extended weekend service operating 3-4 days per week. Weekend service has the draw back of appearing focused on the recreational travel market only and, thereby raising questions about its justifications at the state and federal levels.

However, the Santa Cruz/Monterey – San Jose Amtrak Thruway Bus Service operates seven days a week at the highest frequency bus service in the Caltrans Rail Program and generates high levels of ridership and financial

performance. This feeder bus service is closely coordinated with both Caltrain and Capitols rail service as well as their marketing and public information.

A coordinated marketing program for Santa Cruz/Monterey passenger rail service could combine the weekday feeder bus element with weekend rail service into a single, enhanced travel product. The result would be a seven-day a week regional connection between Santa Cruz/Monterey and San Jose/San Francisco.

Both programs would operate on the common 50-mile segment of the Coast Line rail corridor between San Jose and Pajaro. From Pajaro, service to stations within Santa Cruz county would branch off onto the Santa Cruz Line for 20 miles to the north. Service to Monterey county would continue 26-miles to the south via 10 more miles on the Coast Line to Castroville and then 16-miles on the Monterey branch line. These common route segments, from San Jose to Monterey and Santa Cruz, were used to identify the operating and capital costs analysis as well as the ridership potential of joint programs.

2. Second, to provide a common operating costs analysis, the operating and maintenance costs from Caltrain were used to develop comparisons of operating and maintenance costs. Caltrain Operations and Maintenance (O&M) costs were also used to compare conventional passenger rail operating costs with DMU costs. Caltrain operating costs were used for the following reasons.
  - Caltrain train mile costs were documented in the 1996 SCCRTC Recreational Rail Study. These same costs have been used in other Northern California rail studies in recent years.
  - Caltrain operations and maintenance cost data is readily available in order to compare data with potential Diesel Multiple Unit operations.
  - Caltrain service has rolling stock and locomotives available on weekends and has explored extending Caltrain service to Gilroy on weekends.
  - Amtrak is the contract operator of the Caltrain Service
3. Third, to explore the opportunities for reducing operating costs with a two-county, joint intercity rail program, the O&M costs analysis was carried out in two steps. First, to identify the basic service costs of passenger train operations, the cost of each program was determined using Caltrain O&M costs as though they were an extension of the current Caltrain system. External costs that could be expected to be constant for both services were excluded from the initial analysis such as track access fees or the costs of leasing rolling stock.

4. The current program from each county (see Table 2.5 above) was defined as the base alternative, or Alternative 1. Caltrain O&M costs were applied to this alternative. Additional alternatives were then developed that had the potential to begin and operate over time at lower annual costs than the combined costs of Alternative 1.

Section 3 of the Report provides an introductory review of the comparison of Caltrain and DMU operating costs and characteristics. Section 4 then discusses the two Alternatives that show the most promise for cost savings through a coordinated service, jointly managed by the two counties.

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### **3.0 DIESEL MULTIPLE UNIT ASSESSMENT**

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#### **3.1 SUMMARY**

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The second goal of the Around the Bay Rail Study is to examine the opportunity to achieve mutual benefits from using new passenger rail vehicle technology. Nationwide, Diesel Multiple Unit (DMU) rail vehicles are an emerging opportunity to use self-propelled passenger train vehicles in corridors that extend from heavily used passenger lines to less densely populated regions.

The third goal of the Around the Bay Rail Study is to examine the opportunity to use DMU vehicles in daily rail transit service on the 47-mile route between Santa Cruz and Monterey.

This section provides background to the emerging use of Diesel Multiple Units to provide passenger rail service at lower costs and at a smaller scale than conventional passenger rail trains. DMUs are single level, self propelled passenger rail vehicles. The passenger cars can operate as single vehicles or in trains (or, in “multiple units”) without a separate locomotive for power. Electric Multiple Vehicles or EMUs, using overhead or third rail contact for power, operate as single units or in multiple unit trains in many parts of the midwest and eastern United States. Diesel Multiple Units began to see increasing use throughout North America until the concurrent decline of U.S. rail car manufactures and U.S. public investment prior to the 1970’s. A small number of original DMUs remain in use today. However, all DMUs in use today (Dallas beginning in 1997, Vermont beginning in 1999) have been extensively rebuilt and approved for use by the Federal Railroad Administration for safety performance and crashworthiness.

A resurgence of DMU design and production in Europe and Japan over several years has raised the prospect for the expansion of modern DMU use once again in the US. A wide range of design, performance and costs exist in the new vehicles. Several European vehicles have capacities and features that equal or exceed the highest quality commuter and intercity trains found in the U.S.

The IC 3 *Flexliner*, which toured Northern California in 1997, is an example of train amenities equal to commercial airline business class service. The IC 3s seating capacity is approximately 140 passengers and has a top speed of more than 80

mph. Like many high-end DMUs, the IC 3 vehicle is made of 2-3 units (hence the name Intercity City car with 3 connected units) that are permanently joined as “married pairs or triplets.” Passengers may walk between the married pair units without having to open or pass through doors. These vehicles are in service in Scandinavia and Israel and a purchase is currently being negotiated in Pennsylvania.

To date, all European or Japanese DMUs have not yet achieved FRA approval for operating on the U.S. freight and public railroad track network. One category of these vehicles in particular is referred to as Diesel Light Rail Vehicles (DLRVs) because their size and weight resemble a light rail vehicle more than a commuter or intercity rail car. The Siemens Regio Sprinter, which also toured the local branch lines with special permission from the UPRR and State Public Utilities Commission, is a good example of a DLRV. It has a top speed of approximately 65 mph and can carry 75 passengers.

In short, all new DMUs, like other forms of new technology, pose institutional and operating issues that must be addressed to achieve acceptance. These issues are now the subject of national interest within the public transit industry in order to introduce the vehicles in “new start” passenger rail programs.

The purpose of Section 3 is to collect and analyze general data about the institutional/regulatory issues, operational issues, relative capacities, operating and maintenance (O&M) costs and capital costs of Diesel Multiple Unit (DMU) and Diesel Light Rail Vehicle (DLRV) equipment, so that the feasibility of such equipment for proposed passenger service in the Santa Cruz/Monterey-San Jose corridors can be assessed. Institutional issues that will require federal regulatory approval and private freight railroad acceptance are outlined.

### **Key Findings – Regulatory/Institutional Issues**

Regulatory and institutional barriers to the operation of DMU and DLRV equipment in the United States is reviewed below. As a result of this review, the following issues were identified. These issues are discussed in greater detail in the balance of Sections.

#### ***DMUs:***

- No new DMU equipment compliant with Federal Railroad Administration regulations (crashworthiness, etc.) is yet available for sale in North America.



- The FRA's proposed passenger rail safety standards which are expected to take effect in 1998, will make the requirements for new DMU equipment more stringent in the North American market.
- There are two potential strategies for developing new FRA-compliant DMU equipment; the conversion of European DMU equipment or the redesign of North American Electrical Multiple Unit (EMU) equipment to diesel operation.
- Some of the operating advantages suggested for DMU equipment are unproven in the North American market and may not be permitted under existing FRA rules.

### ***DLRVs:***

- DLRV equipment does not comply with FRA regulations and, therefore, can operate only on dedicated rights-of-way and on freight tracks with freight windows, where there is complete time separation between railroad and DLRV activities. This restriction makes it virtually impossible to use DLRVs for service from Monterey or Santa Cruz to San Jose.
- Even if the Union Pacific Rail Road were to agree to a strict time separation of freight traffic and DLRVs for Around the Bay daily service on the track between Pajaro and Castroville, the presence of Amtrak and Santa Cruz-Monterey intercity service on this same track would prohibit mixing DLRV and conventional passenger rail service.
- Acceptance of DMU or DLRV operation by the UPRR will be a function of the railroad's corporate attitude about risk and willingness to accept new practices as much as public regulatory approval.
- California Public Utility Commission regulations for LRV equipment may restrict the use of existing European DLRV models in California.

### **Key Findings – O&M Costs**

After analyzing available O&M cost data for both DMU and locomotive-hauled equipment, the following general premises were found:

- In short consists, DMUs are more efficient to operate and maintain than locomotive-hauled equipment of similar capacity.
- The O&M cost advantage of DMU equipment is highest for train consists with a capacity of less than 400-500 passengers such as a four car *IC 3 Flexliner* consist.

- A major cost advantage of DMU train equipment in the Around the Bay Rail study is that a single train set can be used in a service plan where a train travels on a common trunk line and then splits to serve two destinations.

Comparisons of DMU and Caltrain equipment are further explored in the Service Plans, Section 4, in the context of operating plans developed for the different rail services envisioned for the Santa Cruz/Monterey to San Jose corridor.

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### **3.2 INTRODUCTION**

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The purpose of this section is to collect and analyze general data about the institutional/regulatory issues, operational issues, relative capacities, operating and maintenance (O&M) costs and capital costs of Diesel Multiple Unit (DMU) and Diesel Light Rail (DLRV) equipment, so that the feasibility of such equipment for proposed passenger service in the Santa Cruz/Monterey-San Jose corridors can be assessed. Obtaining applicable O&M costs for such equipment presents some special challenges. Total O&M costs for rail vehicles include the following factors:

- Crew Costs
- Fuel Consumption/Costs
- Vehicle Maintenance Costs

**Crew costs** are generally driven by agency practices and are not directly driven by the type of equipment operated. Crew costs for Caltrain rail operations were used because the labor market is close to the Santa Cruz/Monterey study and Caltrain costs are benchmarks for this study. Amtrak operates Caltrain services under contract to the JPB, so these crew costs also represent Amtrak crew costs. A future option to explore is the use of local transit system labor forces to maintain DMU passenger rail equipment.

**Fuel consumption** is driven by the type of vehicle operated. Standard rates of fuel consumption for different DMU vehicles were obtained from manufacturers. **Fuel costs** may vary by agency contracts and regional differences. However, fuel costs were determined by combining rates of fuel consumption with standardized fuel costs.

While crew and fuel costs can be easily quantified and compared across different vehicle types, **maintenance costs** for vehicles vary by operating agency, region, country, labor rates, regulatory practice and accounting methods. Different U.S.

commuter rail agencies with similar equipment assign different maintenance costs to the operation of their equipment.

Although historically DMUs have operated in North America, two of the most common, Budd RDCs and SPV 2000s, have been retired from most passenger services. No new Budd RDCs have been built since the mid-1950s and surplus RDC fleets available for rebuilding are becoming increasingly scarce. For this reason rehabilitated Budd RDCs were not considered for this project. Moreover, the Budd vehicles are vastly different from the modern DMU equipment which is widely available in Europe and Asia today and is presently being promoted in the North American market. However, none of these modern DMU vehicles have been operated in the United States or Canada for anything other than brief demonstration services.

For the comparison between DMU and locomotive powered equipment required for this framework, four general classes of rolling stock will be analyzed. These four classes are listed as follows:

- Locomotive-hauled
- Conceptual European Diesel Multiple Units (DMUs built FRA approved)
- Conceptual U.S. Diesel Multiple Units (DMUs proposed, not built)
- European Diesel Light Rail Vehicles (DLRV)

The statistics and information for each class will be based on the performance, capabilities and experience of actual vehicles obtained from various sources. In the case of the locomotive-hauled class, Caltrain operations and costs for their diesel locomotive-hauled gallery car fleet will be used to establish a baseline against which the other classes will be compared. The comparison of more general “classifications” of equipment, instead of actual manufacturers, will be done for two reasons:

- DMU equipment is highly customizable with a wide variety of engine, transmission, coupler systems, and car lengths which affect O&M costs, so different configurations of a specific model can have different performance.
- Equipment manufacturers are often reluctant to share performance data, if they feel as if they are being assessed in “consumer reports” style environment.

The purpose of this analysis is to determine what general class of equipment is best suited to passenger service in the different study scenarios, not to determine which specific *manufacturer’s* equipment should be used for the Around the Bay rail services.

Amtrak has operated a number of demonstration services with DMU equipment, including the ADtranz IC 3 Flexliner and the Siemens Regio-Sprinter. At present, no O&M cost estimates have been derived from demonstration services conducted in the United States, however, Amtrak is hoping to develop such estimates if it can arrange a long-term demonstration for the equipment.

Another difficulty in comparing O&M costs for locomotive-hauled and DMU equipment results from the unique and very different capabilities of the different types of equipment. The expense of locomotive operations can be spread to the costs of operating a “consist” of the locomotive and the coaches it pulls (or pushes). A single DMU is less expensive to operate than a single locomotive because the engine and mechanical parts are more simple, but the longer the DMU train, the more expensive the mechanical equipment contained since each DMU is self-powered. A “typical” locomotive-hauled train cannot be fairly compared to a “typical” DMU train. There is no such thing as a typical consist. The problem is multivariate and therefore trains of DMUs and locomotive-hauled trains with *equivalent* passenger capacities must be compared to one another in order for there to be a fair comparison. A special framework has been developed for better comparing multiple operating and maintenance cost variables and this framework is presented in this report.

### **Peer Review of Issues**

In an effort to collect the greatest amount of information about DMU operations, several specialists were contacted in the railroad and transit industries regarding the use of DMU technology to build on the knowledge of the consulting team. The names of contacts and issues discussed are summarized at the end of this section.

There are at present no available estimates of O&M costs for DMU equipment in operation in the United States. The Calgary Commuter Rail Task Force has developed O&M costs for the Regio-Sprinter based on Calgary Transit’s demonstration service early in 1996, but those estimates are based on limited Canadian experience. Of the two other areas considering DMU equipment, neither North County Transit District (NCTD) nor Triangle Transit Authority (TTA) used actual DMU O&M cost estimates as part of their preliminary planning for service. The TTA, for instance, averaged O&M costs for light rail and commuter rail in order to create an “order-of-magnitude” estimate for planning purposes. However, European O&M cost estimates are available for both DMU and Diesel Light Rail Vehicles and these can be used for comparison to the JPB Caltrain’s existing locomotive-hauled services.

### **3.3 INSTITUTIONAL/REGULATORY ISSUES**

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There are a number of issues that affect the feasibility of using DMUs and DLRVs in passenger rail service in the United States. These issues will need to be monitored and resolved before DMU or DLRV equipment can be placed in regular revenue service.

The most important of these issues concerns the FRA's buff strength requirements for multiple-unit equipment and cab cars. Buff strength governs the force applied to the end of the vehicle which could be withstood by its structure. FRA regulations<sup>1</sup> (footnotes are at the end of the section) require a 400,000 lb. buff strength for multiple unit passenger equipment operating in trains with a gross weight under 600,000 lbs. and an 800,000 lb. buff strength for multiple unit passenger equipment operating in trains with a gross weight over 600,000 lb. No European or Japanese rail vehicle manufacturer presently produces a compliant DMU for the American market. No DMU equipment sold overseas presently meets these requirements. Any rail equipment that will operate in mixed traffic over the same tracks used by passenger or freight trains is governed by these FRA standards.

Only transit operations that operate either on an isolated rail network (like BART) or operate on tracks that are segregated from railroad traffic by time of day (like San Diego Trolley) are exempt from FRA regulation. This last strategy involves the provision of "freight windows" in which freight trains have complete control of tracks that are otherwise used by non-compliant passenger equipment, like light rail vehicles. The FRA has not actually ruled about the legality of using freight windows with non-compliant equipment, but it has taken no formal position in regards to light rail operations using such a strategy. San Diego Trolley and Maryland MTA Light Rail presently use freight windows and Salt Lake City and Oceanside, California are developing light rail systems that rely on them.

Another issue of concern to any passenger rail operator is side-impact strength. Buff strength is not the only measure of protection in the event of a collision. Rail vehicles operating on lines with roadway grade crossings can also collide with roadway vehicles which ignore the grade crossing protection. For this reason, compliance with existing FRA buff-strength requirements is not enough to assure passenger safety on lines with frequent grade crossings, since rail vehicles can also receive side and corner impacts from motor vehicles. New FRA regulations currently under review may set strength requirements for side and corner impacts.

### **3.4 COMPARISON OF DMU VEHICLE TYPES**

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#### **Conceptual European Diesel Multiple Units**

Manufacturers such as Siemens, GEC Alsthom and ADtranz have DMU equipment operating in passenger service on European railroads. There are several reasons why such vehicles may soon operate in the United States. All three manufacturers claim that the equipment can be upgraded to meet U.S. FRA standards. The manufacturers claim that FRA-compliant equipment can be delivered within twenty-four months of the first order. The ADtranz DMU has operated in demonstration service in the United States without meeting the FRA standards under a special arrangement with the FRA. Pennsylvania DOT is negotiating with ADtranz for several DMUs for their Harrisburg service. It is believed that both GEC Alsthom (in association with Bombardier) and ADtranz responded to the RFP with proposals for FRA-compliant versions of their European equipment. Pennsylvania DOT has yet to select a winning bidder (April 1998), but it may be possible to “add-on” to the Pennsylvania DOT order once a contract is awarded.

The DMU capital and operating cost estimates in Section 4.0 are based on an average of data from two European DMU vehicle manufacturers, a Siemens VT628 and the ADtranz IC 3 Flexliner. Both vehicles have similar seating capacity. The Siemens vehicle has been in production for over four years, and the IC 3 has been in production for less time. The use of this average approach results in the designation of *Conceptual* European DMU.

### **Conceptual U.S. Diesel Multiple Units**

Nippon-Sharyo and Bombardier have both been marketing DMU model designs for the North American market. Bombardier has since withdrawn their DMU model in favor of an Americanized version of a DMU produced by GEC Alsthom in France. Figure 3.1 is from a promotional brochure for the GEC Alsthom DMU. These conceptual carbody designs are based on electric multiple unit (EMU) models produced by these companies for other North American transit properties. The Bombardier design was based on an EMU produced for the Deaux Montagnes Line in Montreal. The Nippon-Sharyo design is based on an EMU produced for South Shore Line in Northern Indiana. Nippon-Sharyo claims that its DMU is FRA compliant and could be assembled in the United States with an eighteen (18) month lead time, but they are not clear whether their vehicles meet the 400,000 lbs. or 800,000 lbs. standard. Neither of these DMU models has ever been in production overseas, nor have any domestic orders been received, so there is no assurance that these models meet the claimed design standards or can pass FRA requirements.

Each car Nippon-Sharyo car has an 87-person seating capacity. This is a shorter vehicle than the European married-pair models and therefore could be expected to cost less per unit. However, to carry the maximum number of passengers estimated for peak season Santa Cruz and Monterey intercity service the total capital cost of total vehicles required would be nearly the same. Figure 3.2 is a conceptual layout from promotional brochure for the Nippon-Sharyo vehicle.

### **European Diesel Light Rail Vehicles (DLRVs)**

The Siemens-Duewag "Regio-Sprinter" has recently been demonstrated in various North American cities including Santa Cruz and Monterey counties. Other similar vehicles are being offered by ADtranz (Regio Shuttle) and Bombardier (Talent). Unlike the other European DMUs, which resemble standard railroad passenger coaches, the Regio-Sprinter is best characterized as a diesel powered light rail vehicle (DLRV) in terms of its construction and operating performance. Its buff strength is even lower than the European DMUs (between 125,000 and 135,000 lbs.) discussed above, and hence is even further from compliance with FRA regulations.

# Around the Bay Rail Study

LS Transit Systems, Inc. in association with DKS & Nelson\Nygaard

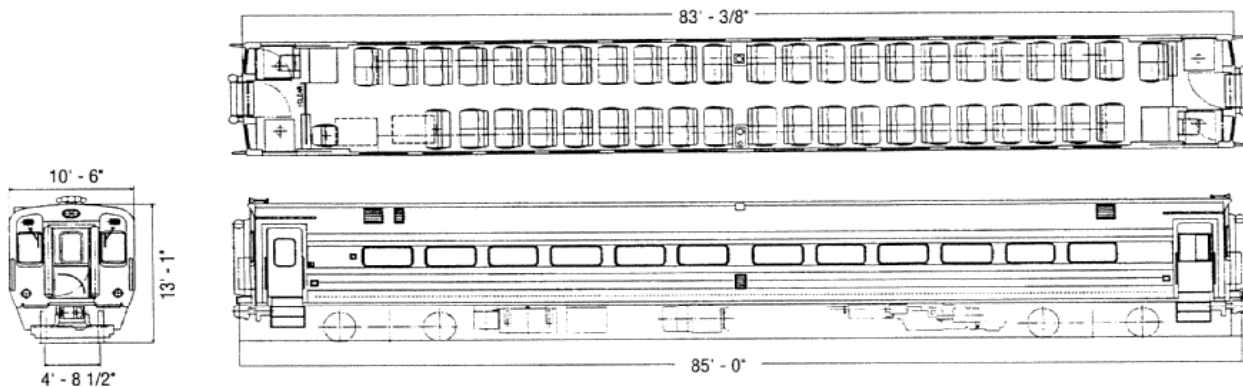
Figure 3.1

D E S I G N  
V A R I A T I O N  
— O F —  
N I P P O N  
S H A R Y O  
D I E S E L  
R A I L  
C A R S

- Offers compliance with all existing FRA and ADA requirements. Provides complete flexibility and versatility in all Commuter operations.
- May be operated in single car or multiple car (up to 10) consists allowing efficient peak and off-peak services.
- Can be supplied in various configuration, seating arrangements, cab configurations, with ADA compliant Toilet facilities.



Base Car layout (2x2 Seating, 87 passengers)



Alternative Seat Configuration (3x2 Seating, 105 passengers)



Alternative Seat Configuration (3x2 Seating with ADA Compliant Toilet Facility, 98 passengers)



Nippon Sharyo U.S.A., Inc. 375 Park Avenue, Suite 2806, New York, NY 10152 Tel : 212-755-2150 / Fax : 212-755-2257



Figure 3.2

## ALICE Diesel Multiple Unit



### ALICE 405

PERFORMANCE	Metric	Imperial
Maximum operating speed on level tangent track	160 kph	100 mph
Minimum horizontal curve radius	80 m	3149'
Minimum vertical curve radius	500 m	19685'

DIMENSIONS	Metric	Imperial
Length (over coupler)	105528 mm	4154'
Width (over side sheets)	3119 mm	122'1/32"
Width (over threshold)	3024 mm	119"
Height (rail to roof)	4001 mm	157'1/2"
Doorway width (center side door)	1350 mm	53'1/64"
Doorway width (end side door)	750 mm	29'1/64"
Coupler height above rail	876 mm	34'1/64"
Wheel diameter (new)	920 mm	36'1/64"
Number of Axle motors	5	
Truck wheel base	2600 mm	8'6'1/2"
Truck centers	18135 mm	713'1/32"
Track gauge	1435 mm	56'1/64"
Floor height above rail	1300 mm	51'1/64"
Minimum height - floor to ceiling	2200 mm	86'1/32"

WEIGHT AND CAPACITY	Metric	Imperial
Car weight trailer car	46000 kg	101 000 lb
Car weight power car	59000 kg	130 000 lb
Seat Capacity		260 to 340 seats

### ALICE 406

PERFORMANCE	Metric	Imperial
Maximum operating speed on level tangent track	200 kph	125 mph
Minimum horizontal curve radius	80 m	3149'
Minimum vertical curve radius	500 m	19685'

DIMENSIONS	Metric	Imperial
Length (over coupler)	105528 mm	4154'
Width (over side sheets)	3119 mm	122'1/32"
Width (over threshold)	3024 mm	119"
Height (rail to roof)	4001 mm	157'1/2"
Doorway width (center side door)	1350 mm	53'1/64"
Doorway width (end side door)	750 mm	29'1/64"
Coupler height above rail	876 mm	34'1/64"
Wheel diameter (new)	920 mm	36'1/64"
Number of Axle motors	6	
Truck wheel base	2600 mm	8'6'1/2"
Truck centers	18135 mm	713'1/32"
Track gauge	1435 mm	56'1/64"
Floor height above rail	1300 mm	51'1/64"
Minimum height - floor to ceiling	2200 mm	86'1/32"

WEIGHT AND CAPACITY	Metric	Imperial
Car weight (trailer car)	46000 kg	101 000 lb
Car weight (power car)	59000 kg	130 000 lb
Seat Capacity		260 to 340 seats

\* The technical data are given for information purposes only and may be modified without previous notice.

#### GENERAL DATA

Type of trainset: Diesel Multiple Unit (DMU)

Train composition: power car + motorized-trailer + trailer + power car

#### SYSTEM DESCRIPTION

Propulsion system: one or two diesel engines per power car or motorized-trailer 400 hp (300 kW) per engine

Transmission: hydraulic - two stage driving inboard axles

Cooling system: roof-mounted coolant radiators with hydraulic fan motor

Fuel tank capacity: 670 US gal. / 2500 approx. litres per car

Truck type: outboard bearing, fabricated frame

Primary suspension: helicoil springs

Secondary suspension: air springs

Brakes: friction tread brakes on all wheels, two disc brakes on each unpowered axle and dynamic retarder within transmission.

Heating: floor

Air conditioning: two 6,5 ton roof-mounted self-contained units

Carbody: stainless Steel (ferritic and austenitic)

#### ELECTRICAL SYSTEM

Auxiliary power: one diesel engine powered APU per power car or motorized-trailer

Auxiliary voltage:

480 Vac /3 ph /60 Hz

120 Vac /1 ph /60 Hz

Low voltage: 24 Vdc or 72 Vdc

Lighting (passenger area): fluorescent



ALICE 405 - 406

GEALSTHOM

Under existing FRA regulations, DLRV equipment cannot operate on active railroad tracks. This includes tracks used by freight trains, locomotive-hauled passenger trains, and even FRA-compliant DMU trains. The previously mentioned demonstrations have all taken place on trackage which is segregated in time from regular rail freight operations. The freight trains can only operate during the time periods when the Regio-Sprinter does not operate, similar to the San Diego Trolley. For these reasons, DLRVs are generally not appropriate for operation on mainline railroad tracks, where it is not possible to create “freight windows”.

The Public Utilities Commission (PUC) of the State of California regulates the buff-strength of light rail equipment, but not railroad equipment which is under the jurisdiction of the FRA. The PUC would probably claim jurisdiction over DLRV equipment operating in light rail service. PUC General Order 143A. Section 6.03 stipulates the LRV compression loads (buff strength) should be “equal to twice the unladen car body weight applied longitudinally at the end car sills.” Much of the European DLRV equipment being offered in this country falls short of meeting this standard. A Regio-Sprinter weighs approximately 31 metric tons (68,343 lbs.) and has a buff strength of only 125-135,000 lbs. For this reason, some changes in the DLRV models may be necessary to allow operation in California.

There are a number of other institutional and regulatory issues regarding the use of DMU or DLRV equipment for passenger service in the United States. These issues include:

- Recent FRA Notice of Proposed Rule Making (NPRM) on Passenger Railroad Standards,
- FRA Regulations Regarding Locomotive Inspections,
- Maintenance Crew Familiarity, and
- Signal Shunting Capabilities.

### Recent FRA Notice of Proposed Rule Making (NPRM)

The Federal Railroad Administration has recently issued (September 23, 1997) proposed passenger equipment safety standards and regulations for passenger railroad equipment operating in the United States. These proposed standards and regulations tighten the regulatory requirements for DMU equipment. For instance, under the proposed Rule 238.203 all passenger equipment will have to meet an 800,000-lbs. buff strength requirement. In addition, the proposed rules introduce an array of requirements for collision posts, corner posts, rollover strength and side impact strength which are not mentioned in the existing FRA requirements for MU

equipment. It is unclear whether the DMU equipment proposed for the North American market by equipment manufacturers can meet the proposed standards.

### FRA Regulations Regarding Locomotive Inspections, Coupling

The Federal Railroad Administration has historically defined DMUs and cab cars as locomotives (because they have cab controls), which means that they require inspection every 93 days, raising operating and maintenance costs. This requirement will be maintained under the new FRA NPRM.

Some DMUs, like the IC 3 Flexliner, can couple and uncouple automatically. This can allow a single train to serve two branches, with the train splitting up at the junction of the two lines. The automatic coupling can also allow a service provider to easily tailor train length to the passenger demand at different times of day, reducing unnecessary car miles. Finally automatic coupling can make yard sorting and consist make-up much easier than with locomotive-hauled equipment. However, it should be noted that the use of automatic coupling has not been approved by the FRA and the use of automatic coupling does not eliminate the existing FRA requirements for air brake tests<sup>2</sup>, etc. Indeed the new proposed FRA rules require that a Class II brake test be conducted “whenever previously tested units are added to or removed from the train . . .”<sup>3</sup> These restrictions on the use of automatic coupling will need to be resolved to achieve the operational flexibility that has been suggested for IC 3 DMU equipment.

### Maintenance Crew Familiarity

Maintenance crews will require training in order to properly maintain DMU equipment because it is significantly different than the equipment presently operated by Amtrak for the JPB or operated anywhere else in the United States. For these reasons, maintenance staff will need to receive special training in order to conduct regular inspections and maintenance and cannot be hired from other commuter railroad properties.

### Signal Shunting Capabilities

DMUs operating singly have had inconsistent signal shunting capabilities which means that normal railroad signal systems have trouble “detecting” the presence of the vehicle. This is due to the fact that individual DMUs operating alone are light in weight and have only two trucks in contact with the rails. European DMU equipment usually consists of a married pair or triplet, which places at least three trucks in contact with the rails. This signal shunting problem can be rectified by

operating two-car trains. Other technological solutions, however, are also available, and this problem is now considered solved.

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### **3.5 O&M COST DATA**

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#### **O&M Cost Data Structure**

In developing the O&M cost comparison for locomotive-hauled and DMU equipment, this section of the report addresses three goals:

- The expense classes and sub-classes used to create DMU and Diesel Light Rail O&M cost estimates should be similar in structure to those used for JPB Caltrain locomotive-hauled services.
- The O&M cost estimates should only include expense classes and sub-classes that pertain to *vehicle* operations and not the maintenance of track and structures or administration.
- All expense classes and sub-classes should be defined so that they can be compared across vehicle types (that is, cost/train hours, cost/train miles, gallons/mile, etc.)

In order to accomplish these goals, a cost comparison effort was put in place which included analyzing the O&M cost estimates for locomotive-hauled equipment produced for analysis of extensions for the Caltrain system.<sup>4</sup> Those estimates had several expense classes. Only two of these expense classes were determined to directly relate to the operation and maintenance of trains:

- Train Operations
- Maintenance of Equipment

These expense classes were taken from an O&M cost model for JPB commuter rail operations. In this analysis, the costs for the Maintenance of Equipment were taken directly from the cost model and should directly mirror actual JPB costs. The train operations expense class in the JPB model included the cost for overtime wages, which was outside this analysis. For this reason, Caltrain wages and a wage-benefit ratio were obtained directly from Caltrain.<sup>5</sup> Fuel was an important expense subclass and the cost of fuel was also obtained directly from Caltrain.<sup>6</sup>

Of the classes, Train Operations was the most important, consuming around 21% of the combined Amtrak/JPB O&M costs. Maintenance of Equipment was the next

most important, consuming around 14% of the combined Amtrak/JPB O&M costs. Maintenance of Way and Fuel were much smaller, consuming around 8% and 5%, respectively.

The Maintenance of Way, General Administrative and other Contract Management expense classes were not included in this analysis because those expense classes do not directly impact *vehicle* operations. Moreover, those expense classes should not differ much based on the relative efficiencies of operating DMU and locomotive-hauled equipment. It has been suggested that DMU equipment is lighter than the F40's presently used by Caltrain and might therefore result in fewer broken rails and less track maintenance. However, capturing the differential in maintenance of way costs that would result from using lighter vehicles would be difficult and is beyond the scope of this analysis.

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### **3.6 O&M COST DATA SOURCES**

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#### **Operator Wages and Fringes**

All O&M cost estimates in this report assume the same labor costs for all types of vehicle consists, based on Caltrain crewing rules. Caltrain labor costs per train are based on the size of the consist used, as longer trains require more assistant conductors. Of course, real trains may require more staff in order to insure complete fare collection on a full train. For comparison purposes, only the minimal staff customarily required on Caltrain trains were included in this analysis. Any additional fare collection staff required would be equivalent for locomotive-hauled and DMU consists.

Labor costs were based on revenue train hours. Of course, every revenue train hour has additional non-revenue hours associated with it that cover yard and deadhead moves. The cost of these non-revenue hours was assumed to be directly related to the cost of revenue hours regardless of the type of equipment used. For this reason, non-revenue operating labor costs for all of the equipment types were not included in this analysis. The cost of non-revenue hours will be included in the operating plans developed in Section 4. The cost of labor benefits were assumed for this analysis to be a percentage of the wages listed below and were estimated to cost .55 times<sup>7</sup> (including 8% for FELA) the cost of the actual wages. FELA refers to the Federal Employees Liability Act of 1908, which established a national workman's compensation system for all railroad employees that is funded by railroads, both public and private.

Every train, regardless of size was assumed to require an engineer. According to Caltrain rules, a train operating with up to four revenue passenger cars can be operated with only a conductor.<sup>8</sup> Trains operating with four to six revenue passenger cars can be operated with a conductor and an assistant conductor. Trains operating with seven or more revenue passenger cars can be operated with a conductor, an assistant conductor, and a conductor's helper. For the purposes of this report, a DMU vehicle was assumed to be defined as the same as a bi-level passenger coach, so a DMU train with four to six vehicles was assumed to require a conductor and an assistant conductor, just like a locomotive-hauled train.

Some DMU equipment manufacturers have indicated that their equipment is especially labor efficient, allowing one operator to both operate the train and the doors or allowing a train to be broken up into pieces to serve two lines, etc. Labor "savings" such as these were not included in these estimates because they have not been substantiated in the North American market. For this reason, it was decided that any O&M efficiencies revealed by operation of DMUs would have to result from the equipment itself and not related labor efficiencies. The following approximate direct labor rates were provided by Caltrain:

### **Data Summary - Labor (Operator Wages and Fringes)**

- Engineer \$24.00 per hour
- Conductor - \$20.00 per hour
- Ass't Conductor - \$18.50 per hour
- Conductor Helper - \$17.00 per hour
- Crew costs assigned based on the minimum required under Caltrain rules

## **Fuel and Lube**

The Fuel and Lube expenses for rail vehicles generally include three main cost areas:

- fuel consumption for revenue operations
- fuel costs
- cost of equipment lubrication

### **Fuel Consumption for Revenue Operations**

Fuel consumption was calculated for revenue operations based on the number of train miles traveled. For the locomotive-hauled equipment, a fuel consumption rate of 2.23 gallons of fuel per revenue train mile for F-40 locomotive-hauled was assumed. The JPB O&M cost model assumed that fuel costs increased by car-

miles traveled. In fact, the fuel consumption of locomotive-hauled consists should increase slightly as consist size rises, but not as steeply as would be implied by a per car-mile cost basis. For this reason, a method was adopted for estimating fuel costs different than those used in the JPB model.

Fuel consumption rates were obtained from Siemens, ADtranz and Nippon-Sharyo for their DMU and DLRV equipment. These fuel consumption rates were averaged to produce fuel consumption rates for each class of equipment:

- Production European Diesel Multiple Units -0.33 gallons per vehicle mile
- Conceptual U.S. Diesel Multiple Units - 0.42 gallons per vehicle mile<sup>9</sup>
- Conceptual European Diesel LRVs - 0.28 gallons per vehicle mile<sup>10</sup>

It should be noted that for the DMU equipment, these fuel consumption rates are listed for an individual self-contained unit or married-unit. If a train contains three DMU units, then the fuel consumption rate for that train would be three times the rates listed above. It should also be noted that DMU manufacturers offer a wide range of performance levels for their DMU equipment. Some high-performance levels are equipped with more engines or more powerful engines and in such cases fuel consumption would increase accordingly. In each case, the most standard version of the rail equipment was selected as a basis for comparison.

### Cost Of Fuel

All of the equipment analyzed in this study is diesel powered. The cost of diesel fuel can vary widely over time and by region of the country. As already seen, DMU and DLRV equipment, when operated in small consists, is much more efficient in terms of fuel consumption than an equivalent diesel-hauled train. The cost impact of this relative fuel efficiency is based on the cost of diesel fuel. The cost of diesel fuel for Caltrain has varied over the past year between \$0.68 and \$0.80 per gallon and was at the time of his report \$0.75.<sup>11</sup> This price is well within range for past experience with other commuter rail carriers throughout the country and is used for this study.

### Cost Of Equipment Lubrication

One cost factor not directly addressed in the JPB O&M cost model is the cost of lubrication. Many proponents of DMU and DLRV equipment suggest that one of the primary advantages of such equipment is the reduced lubrication requirements. While this advantage is true, lubrication is not a significant cost factor. Vehicles and Equipment Department suggested that diesel locomotives consume more lubrication than DMUs do because in large locomotive engines the lubrication ends up in the combustion chamber. This is much less of a problem for the much smaller bus or truck-type diesel engines found on DMUs. Previous experience indicates that an F-40-locomotive engine consumes 5-10 gallons of lubrication a day.<sup>12</sup> The locomotive's entire 243 gallons are changed out once a year. Most modern locomotives provide Head-End Power (or HEP) which provides electric power for the train's lights, heating and air-conditioning. This HEP is often supplied via a small diesel engine or auxiliary power unit (APU). The APU has its 25 gallons changed every 45 days. Diesel engine lubricant, when purchased in bulk, costs around \$2.50 a gallon. Even if DMUs consumed ZERO lubrication, the total daily cost differential between the two kinds of equipment would total only \$20 (eight gallons @ \$2.50 per gallon). In fact, a Vehicles and Equipment Department estimated that the types of engines used on DMUs would consume around two quarts of oil for every 1000 miles. Because actual lubrication consumption figures for the DMU equipment were not easily available and because the total possible cost differential is so small, lubrication costs were not included in this analysis.

### **Data Summary - Fuel Consumption**

- Locomotive-hauled – 4 car consist 2.23 gallons per train mile
- Conceptual European Diesel Multiple Units - .33 gallons per vehicle mile
- Conceptual U.S. Diesel Multiple Units - .42 gallons per vehicle mile
- Production European Diesel LRVs- .28 gallons per vehicle mile
- Lubrication costs were not included in this analysis

### **Inspection, Maintenance and Repairs of Revenue Vehicles**

The final expense class in the JPB O&M cost model used for this report was the Maintenance of Equipment. In the JPB O&M cost model for locomotive-hauled equipment, this expense class is made up of a large number of labor, supervisory and material costs which vary in terms of train miles, car miles, and number of employees. Costs which were derived from train miles were attributed to locomotive maintenance and those which were derived from car miles were attributed to coach maintenance. Those costs which could not be attributed to



either train or car miles, were converted into a percentage “tax” on those costs which could be attributed. The derived cost elements for this expense class worked out to \$2.01 per train mile and \$0.63 per car mile, which is slightly high for our experience for such costs with other commuter rail providers.

Siemens, ADtranz, Bombardier and Nippon-Sharyo were consulted with to obtain per vehicle mile maintenance costs for their DMU and DLRV equipment. Also analyzed was the results of a 1993 Deutsche Bahn (German National Railways) study of the maintenance costs for the 628/928 train set that was cited in Economics of Diesel Multiple Unit Operations. It should be noted that the maintenance costs for the European equipment is based on actual European railroad experience, while the maintenance costs for the conceptual U.S. equipment are derived from manufacturer estimates. These per-vehicle mile maintenance costs were averaged to produce fuel consumption rates for each class of equipment:

- Conceptual European Diesel Multiple Units - \$1.18 per vehicle mile
- Conceptual U.S. Diesel Multiple Units - Not available at this time
- Production European Diesel LRVs- \$0.84 per vehicle mile<sup>13</sup>

Since a train can be composed of several units or married-units, each with its own motive power, maintenance costs rises with the lengthening of the train, so a train of three European DMUs would cost \$3.54 per train mile to maintain.

### Data Summary - Vehicle Maintenance

- Locomotive-hauled – 4 car consist \$2.01 per train mile  
\$0.63 per car mile
- Conceptual European Diesel Multiple Units - \$1.18 per vehicle mile
- Conceptual U.S. Diesel Multiple Units - Not available at this time
- Production European Diesel LRVs- \$0.84 per vehicle mile

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## 3.7 PASSENGER CAPACITY

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The information provided by European manufacturers about their DMU equipment was usually about intercity configurations of equipment. Intercity equipment in Europe has amenities such as first class seating sections, telephones and bathrooms, all of which take up usable passenger space. For longer commuter trip like the trip to the San Francisco Bay area, some of these amenities may be very attractive. However, first class seating is very uncommon in the U.S. European

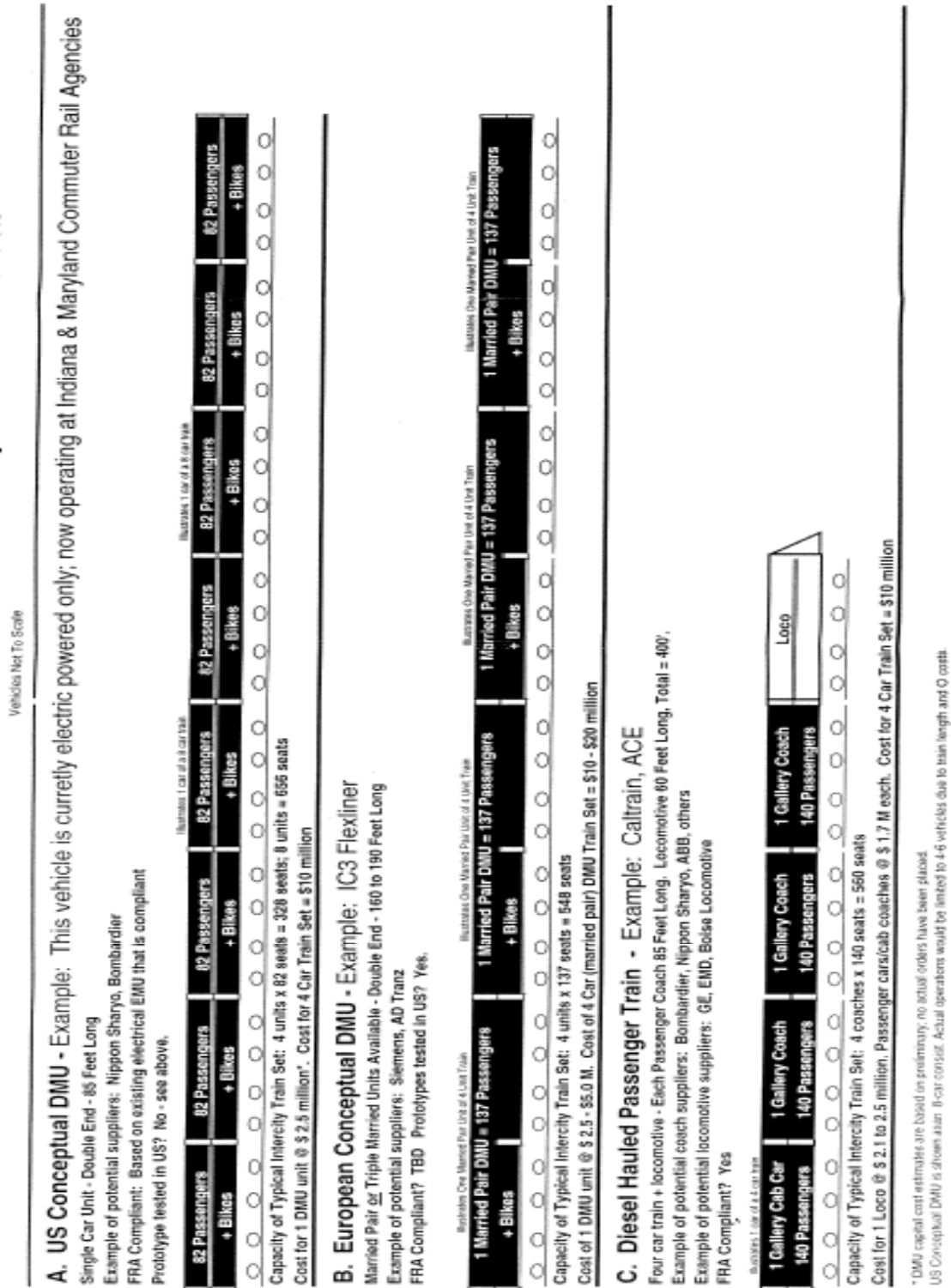
equipment generally consists of married-pairs or married triplets which are semi-permanently coupled and operate as a single unit. For this reason, the seating capacities of the European DMU equipment were increased slightly to assume that space used for first class seating was converted to standard passenger seating. Every first class seat was assumed to be replaced by two standard seats. It is always possible to alter the passenger capacity of railroad equipment by altering the pitch and density of the seating, but the manufacturers representatives did not feel that the estimates used were unreasonable. It should be noted that all of the passenger capacities listed for each class represent averages and that these averages represent vehicles of very different sizes.

### **Data Summary - Passenger Capacity, By Vehicle Class (Average)**

- Locomotive-hauled - Gallery Coach -140 passengers
- Conceptual European Diesel Multiple Units -144 passengers per unit
- Conceptual U.S. Diesel Multiple Units - - 82 passengers with bikes
- Production European Diesel LRVs- - 74 seated passengers per unit

Figure 3.3 compares the capacity and costs of two categories of DMUs with a conventional passenger train such as Caltrain. The DMU costs range from \$2.5 million to \$3.7 million for each unit. Capital costs are further discussed in Section 3.9.

Figure 3.3 Comparison of Capacity and Costs For Conventional Intercity Train and DMU Consists



### **3.8 MAINTENANCE FACILITY**

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The expense class of Maintenance of Equipment includes the cost of both labor and materials for maintaining the locomotive-hauled and DMU equipment. Existing Caltrain equipment is serviced and maintained at facilities in San Francisco, San Jose and Gilroy. Because Caltrain is already considering an expansion of its maintenance and servicing facilities based on its present and expected future requirements, it is quite likely that the addition of extra cars and locomotives to serve the Santa Cruz/Monterey area would also require expansions of the existing facilities or entirely new facilities. Therefore no cost is included in the discussion of capital costs in Section 4.

DMUs would require a completely different kind of maintenance facility than the facility used to maintain Caltrain locomotive-hauled equipment today and would therefore require a completely new dedicated DMU maintenance facility. It would be possible, however, to design any new Caltrain maintenance facility so that it could accommodate both locomotive-hauled and DMU equipment. The different facility requirements result from the fact that DMU engines are very often truck or bus engines and every vehicle is equipped with at least one engine. For this reason, it is assumed that the SCCRTC/TAMC would require a new maintenance facility dedicated to the servicing of its DMU fleet, if DMU equipment were utilized. The capital cost of building such a facility is included in the capital costs (see next section) for the different kinds of equipment.

In late 1996, Dallas Area Rapid Transit Authority (DART) began commuter rail service with refurbished Budd RDCs. DART has constructed a 125,000 square foot maintenance facility with two bays and room for two cars in each bay. It is the only DMU maintenance facility recently constructed in the United States. This facility had a total capital cost of \$7.5 million dollars<sup>14</sup> and this figure was used to produce a conservative estimate of the future cost of a new DMU maintenance facility to be \$10 million.

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### **3.9 CAPITAL COSTS**

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Because the capital cost of DMU equipment is often substantially more than that of unpowered coaches and because DMU equipment would very likely require a new specialized maintenance facility, it is important to detail the capital costs of

the different kinds of equipment in this analysis. The capital costs for the locomotive-hauled equipment was taken from a discussion with Walter Stringer, Manager of Operations at Caltrain based on recent bids for new Gallery Cars (non-powered passenger coaches).<sup>15</sup>

The capital costs for the DMU equipment represents only manufacturer estimates or previous bids and may not represent the actual cost of purchase for a fleet of vehicles the size of a fleet required for a typical SCCRTC/TAMC passenger rail service. Capital costs for Conceptual U.S. DMUs are not available at this time as no orders for such equipment has been placed up to this time. An overall sense of the cost of Conceptual U.S. DMU equipment may soon become available as a result of the Pennsylvania DOT procurement of DMUs for their Harrisburg service. At this time, Pennsylvania DOT has yet to award a contract in that procurement process. Initial costs for such equipment can be expected to be high, as the first production vehicles would have to bear the cost of re-designing and re-engineering the equipment for diesel operation. A preliminary estimate of the cost based on discussions with vehicle manufacturers indicate that Conceptual U.S. DMU equipment would cost between \$2.5 and \$3.0 million per unit. The per vehicle additional maintenance facility capital cost was derived from the DART experience as described in the previous section.

#### **Data Summary - Vehicle Capital Costs**

- Locomotive - \$2.1 million per F-40 locomotive (HEP power)
- Gallery Coach - \$1.6 million per Coach
- Gallery Cab Car - \$1.75 million per Cab Car
- Conceptual European DMUs - \$3.7 million per married-unit<sup>16</sup>
- Conceptual U.S. DMUs - \$2.5-\$3.0 million per unit (estimate)
- Production European DLRVs- \$1.8 million per vehicle<sup>17</sup>
- DMU Maintenance Facility - \$576,923 per DMU vehicle

# Around the Bay Rail Study

*LS Transit Systems, Inc. in association with DKS & Nelson\Nygaard*

**Table 3.1 Summary of DMU Equipment Data**

	Caltrain Conventional Passenger Train	Conceptual European DMUs	Conceptual U.S. DMUs	European DLRV's
<b>Labor (Train Operations)</b>	Engineer \$24.00/hour Conductor \$20.00/hour Assn't Conductor \$18.50/hour Conductor Helper \$17.00/hour	Same Same Same Same	Same Same Same Same	Same Same
<b>Benefits Multiplier</b>	55%	Same	Same	Same
<b>Operating Fuel Consumption</b>	2.23 gallons/train mile	0.33 gallons/vehicle mile	0.42 gallons/train mile	0.28 gallons/train mile
<b>Cost of Fuel</b>	\$0.75 per gallon	\$0.75 per gallon	\$0.75 per gallon	\$0.75 per gallon
<b>Vehicle Maintenance</b>	\$2.01 per train mile \$0.63 per car mile	\$1.18 per vehicle mile	NA	\$0.84 per vehicle mile
<b>Passenger Capacity (seated)</b>	140 per gallery car	174 per multiple unit	82 per multiple unit	74 per car (unit)
<b>Capital Cost</b>	\$2.1 million per locomotive \$1.6 million per gallery coach \$1.75 million per gallery cab	\$3.7 million per multiple unit	\$25.-\$3.0 million per unit (Estimate)	\$1.8 million per DLRV

Figure 3.1 summarizes DMU and diesel-hauled equipment costs. Table 3.1 presents a summary of DMU equipment data so that such equipment can be compared to the diesel-hauled equipment common in the North American market for proposed passenger service in the Santa Cruz/Monterey to San Jose corridors.

This data collected has included:

- Institutional/regulatory issues,
- Operating and maintenance (O&M) costs, and
- Capital costs.

The data included in this section was used as background information for the evaluation of equipment appropriate to the intercity and daily service under consideration for Santa Cruz and Monterey counties. The decision as to which equipment is a “best fit” between the equipment types available, the different types of service proposed and the different corridors is based on the analysis of operating plans presented in Section 4.

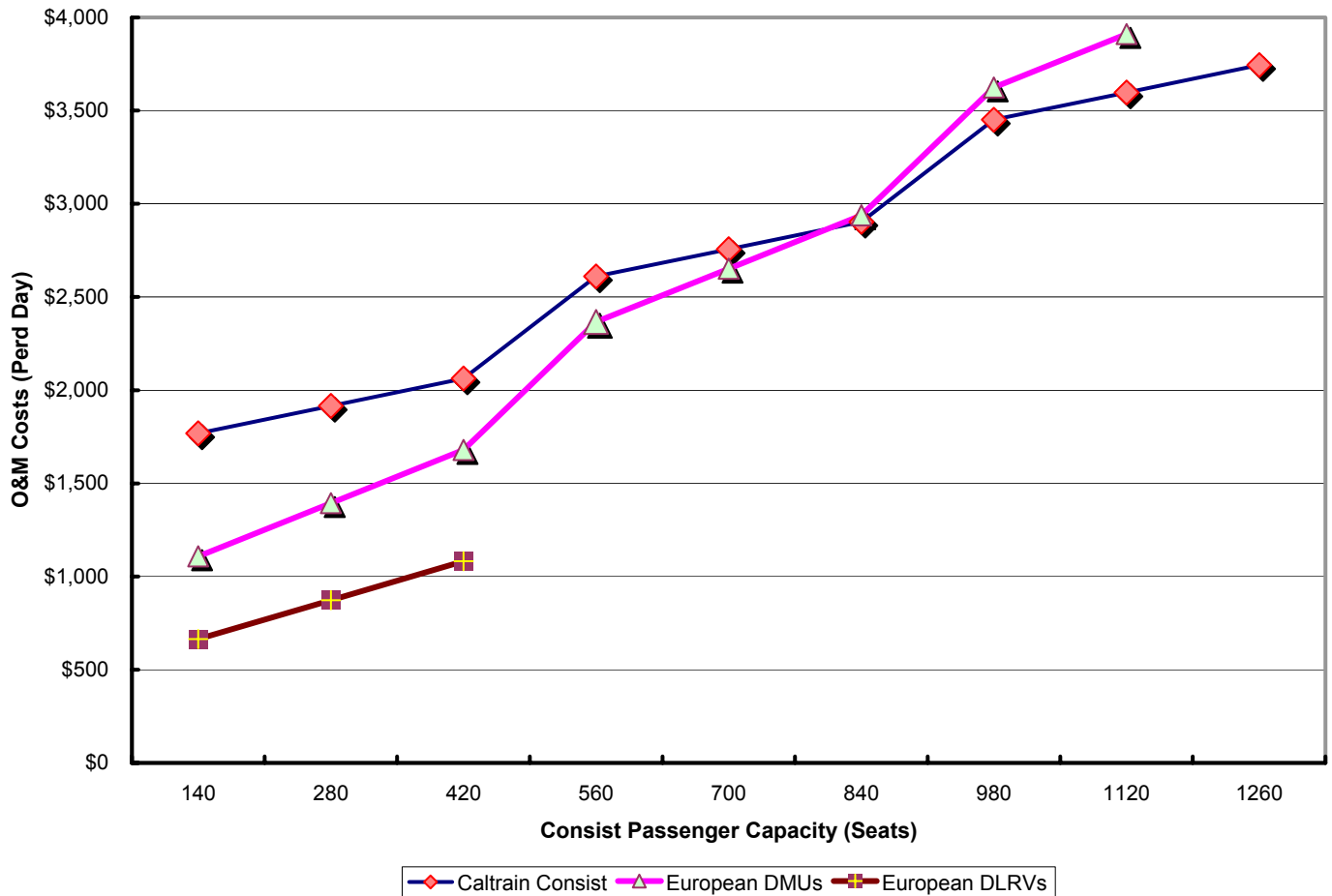
This information is useful when it is possible to compare the different types of equipment against one another based on their passenger capacities. Figure 3.4 compares the operating and maintenance costs of different types of equipment operating over 500 miles for 5 train hours. Please note that Conceptual U.S. DMU equipment is not included because it lacks any operating history.

From a glance, it is clear that the DLRV equipment is not appropriate for anything more than short haul or light density services, because of its low seating capacity (standing room is more extensive). It is also clear that DMU equipment is less expensive to operate than locomotive equipment, when the trains are operating with short consists: less than 700-800 passenger capacity.

## Around the Bay Rail Study

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**Figure 3.4 Vehicle Operating and Maintenance Costs For Different Types of Rail Equipment by Capacity**





### **3.10 INFORMATIONAL CONTACTS AND RESEARCH**

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In an effort to collect the greatest amount of information about DMU operations, several specialists in the railroad and transit industries were contacted regarding the use of DMU technology in addition to our own expertise. Many of these specialists were originally contacted as part of a study of DMU equipment conducted for the Massachusetts Bay Transportation Authority (MBTA) which was updated as part of this analysis for SCCRTC/TAMC. These specialists fall into three basic categories:

- Industry Watchers/Consultants,
- Agency planners considering DMU technology, and
- DMU manufacturer representatives.

The Appendix contains a list of the informational contacts regarding DMU Operating and Maintenance (O&M) costs.

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<sup>1</sup> Code of Federal Regulations, Title 49, Section 229.141 (a) and (b)

<sup>2</sup> Existing FRA regulations regarding brake tests can be found in 49 CFR 232.12. There are several different types of brake tests, but a test conducted when a train is combined or broken up takes approximately 2-3 minutes. The train must be stopped and the engineer must apply and release the brake air pressure. At the same time, the conductor or assistant conductor must get off the train and watch to see that the brakes physically being applied and released.

<sup>3</sup> USDOT, "Passenger Equipment Safety Standards; Proposed Rule", Federal Register, September 23, 1997, p. 49811 proposed rule 238.317.

<sup>4</sup> Manuel Padron & Associates, San Francisco Downtown Station Relocation EIS/EIR, Operations and Maintenance Cost Methodology Report, JPB, August 30, 1995. The \$13.02 costs per car mile used in this study were also used in the SCCRTC Intercity Recreational Rail Study, 1996.

<sup>5</sup> Caltrain staff interviewed over the phone on 10/27/97.

<sup>6</sup> Caltrain staff interview, 10/27/97.

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<sup>7</sup> The labor benefits ratio applies to “straight” time only. Overtime benefits are assessed at a different rate, but overtime hours are excluded from this analysis.

<sup>8</sup> Interview with Caltrain staff, 10/27/97.

<sup>9</sup> Nippon-Sharyo only.

<sup>10</sup> ADtranz only.

<sup>11</sup> Caltrain staff interview, 10/27/97.

<sup>12</sup><sup>12</sup> MBTA Railroad Operations interviewed by Daniel Jacobs on February 3, 1997

<sup>13</sup> Based solely on the RegioShuttle

<sup>14</sup> Facsimile received from Carole Foster of DART Railroad Operations, dated February 20, 1997.

<sup>15</sup> Caltrain staff interview, 10/27/97.

<sup>16</sup> Production European DMUs are produced in a variety of models and configurations. Both married-pairs (two semi-permanently linked units) and married-triplets (three semi-permanently linked units) are common. The ADtranz Flexliner is available as a married-triplet, but the Spanish National Railways have purchased a married-pair version of the same equipment.

<sup>17</sup> Based on RegioSprinter Only.

Figure 3.3 Comparison of Capacity and Costs For Conventional Intercity Train and DMU Consists

Vehicles Not To Scale

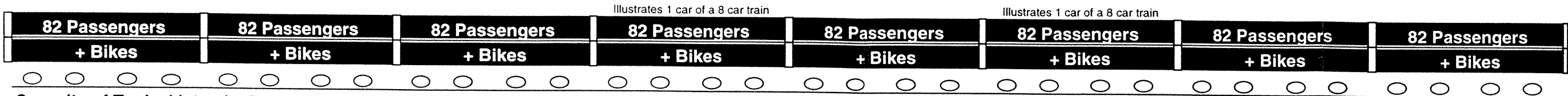
A. US Conceptual DMU - Example: This vehicle is currently electric powered only; now operating at Indiana & Maryland Commuter Rail Agencies

Single Car Unit - Double End - 85 Feet Long

Example of potential suppliers: Nippon Sharyo, Bombardier

FRA Compliant: Based on existing electrical EMU that is compliant

Prototype tested in US? No - see above.



Capacity of Typical Intercity Train Set: 4 units x 82 seats = 328 seats; 8 units = 656 seats

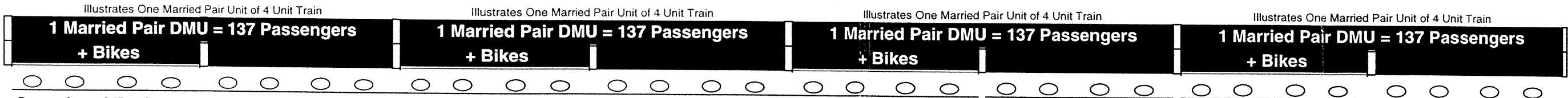
Cost for 1 DMU unit @ \$ 2.5 million\*. Cost for 4 Car Train Set = \$10 million

B. European Conceptual DMU - Example: IC3 Flexliner

Married Pair or Triple Married Units Available - Double End - 160 to 190 Feet Long

Example of potential suppliers: Siemens, AD Tranz

FRA Compliant? TBD Prototypes tested in US? Yes.



Capacity of Typical Intercity Train Set: 4 units x 137 seats = 548 seats

Cost of 1 DMU unit @ \$ 2.5 - \$5.0 M. Cost of 4 Car (married pair) DMU Train Set = \$10 - \$20 million

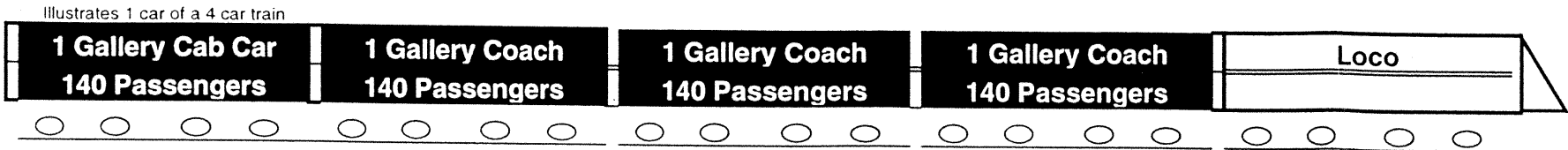
C. Diesel Hauled Passenger Train - Example: Caltrain, ACE

Four car train + locomotive - Each Passenger Coach 85 Feet Long. Locomotive 60 Feet Long, Total = 400'.

Example of potential coach suppliers: Bombardier, Nippon Sharyo, ABB, others

Example of potential locomotive suppliers: GE, EMD, Boise Locomotive

FRA Compliant? Yes



Capacity of Typical Intercity Train Set: 4 coaches x 140 seats = 560 seats

Cost for 1 Loco @ \$ 2.1 to 2.5 million. Passenger cars/cab coaches @ \$ 1.7 M each. Cost for 4 Car Train Set = \$10 million

\* DMU capital cost estimates are based on preliminary; no actual orders have been placed.

US Conceptual DMU is shown as an 8-car consist. Actual operations would be limited to 4-6 vehicles due to train length and O costs.

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## **SERVICE PLANS**

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### **4.1 SUMMARY**

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The purpose of Section 4 is to:

- Identify criteria for developing coordinated service plans for intercity weekend service that links the travel markets of the San Francisco Bay Area with Monterey and Santa Cruz Counties and supports the passenger rail programs in each county.
- Compare and assess the costs and benefits of three alternative service scenarios for coordinated intercity weekend passenger rail service serving Monterey and Santa Cruz.
- Compare the costs of each alternative using a common service plan to highlight costs and service options.
- Revisit the operational differences between traditional locomotive hauled rail coaches and DMU services, as discussed in Section 3, regarding the operating and maintenance cost factors (fuel consumption, maintenance costs, crew costs) under different types of service scenarios.
- Develop Santa Cruz - Monterey Daily Around the Bay DMU service scenarios with capital and operating costs.

### **Key Issues**

- Alternative operating scenarios were developed and evaluated to investigate the potential for service benefits and economies greater than those in Alternative 1.
- The “base programs” identified in previous studies have examined two separate passenger rail programs. Both programs face major challenges in achieving funding at the local, state and federal level. The potential for a coordinated program to achieve funding approvals as the result of demonstrating a more cost-effective service was explored.
- To build a common service plan cost comparison, this study begins the service for all Alternatives in San Jose. However, it is assumed that actual weekend service from San Jose will be linked to markets represented by San Francisco and

Oakland to Santa Cruz and Monterey through convenient, timed transfers or through express service from San Francisco.

- Caltrain operating costs were used to develop a new common base between the two County programs. A conservative operating cost scenario was then developed to examine a worse case cost scenario that used Caltrain as a contract operator based on a negotiated price agreement.
- Service coordination, that integrates transportation funding resources, service development and administration and marketing, was found to be at the heart of achieving economies of scale. As a result, integration of facilities and operations is the focus of this section and the recommendations listed below. With this focus, two new alternatives were identified with the potential for lower annual operating costs than Alternative 1.
- Operational differences and costs between traditional locomotive hauled rail coaches and Diesel Multiple Unit operating equipment were evaluated.
- Daily Around the Bay rail transit service scenarios were reviewed to investigate use of DMU vehicles to provide new regional mobility between the cities of Santa Cruz and Monterey. The high capital costs of starting a new passenger rail service led to a phasing approach of incremental improvements.

### **Recommendations**

The three intercity weekend service alternatives have produced three recommendations. The first recommendation restates Alternative 2 and Alternative 3 as complementary phases instead of mutually exclusive options.

- For Intercity Weekend Service, implementation of Alternative 2 is recommended in the short term from 2002 to 2005 as a low-cost start up strategy. Alternative 2 would provide service from San Jose to Monterey and Santa Cruz on alternate weekends using a common train set and schedule.

Alternative 2 is the lowest cost start-up service due to the use of only one train set for a joint program sponsored by both counties. Most important, Alternative 2 could only be realized from joint advocacy. It would begin the shared service arrangements for both rail programs to transition to share costs and benefits over the longer term. Alternative 2 service to each destination on alternate weekends for 1-3 years is a fall back compromise to achieve near-term success. Figure 4.1 illustrates the service route for Alternative 2, Alternate Weekend service to both Monterey and Santa Cruz.

- Alternative 3, Intercity Weekend Service using a single train set of DMU vehicles, is recommended to follow as resources permit, with a target start up in 2005.

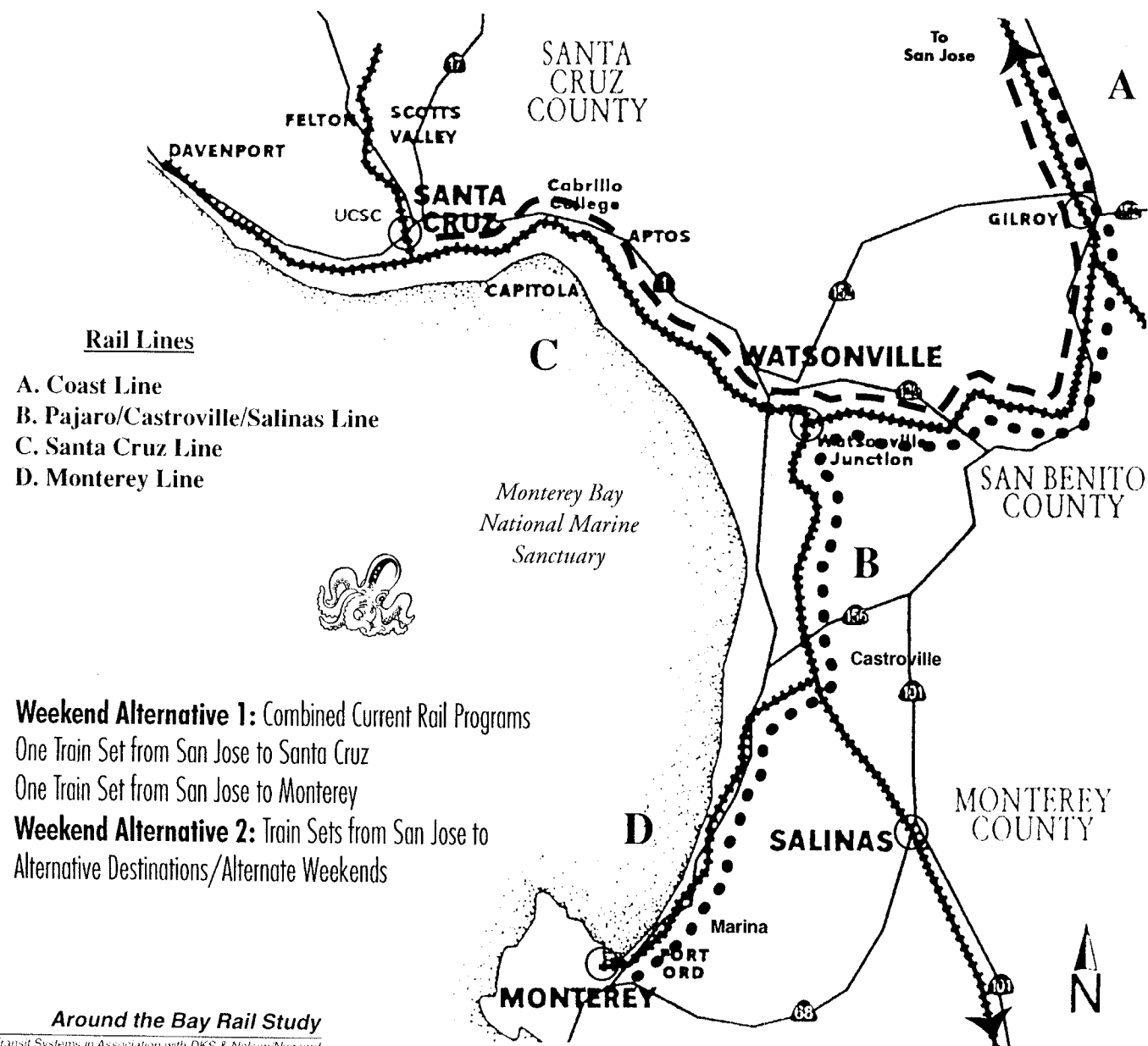
Alternative 3 would provide service between San Jose and Monterey-Santa Cruz with a 4-car DMU train that would operate as a single train until Pajaro. At Pajaro, it would split into two 2 car trains. Each train would operate from Pajaro to the respective branch lines and end points. As Alternative 3 is phased in, initial service could be combined with Alternative 2 to give both counties “every weekend service”.

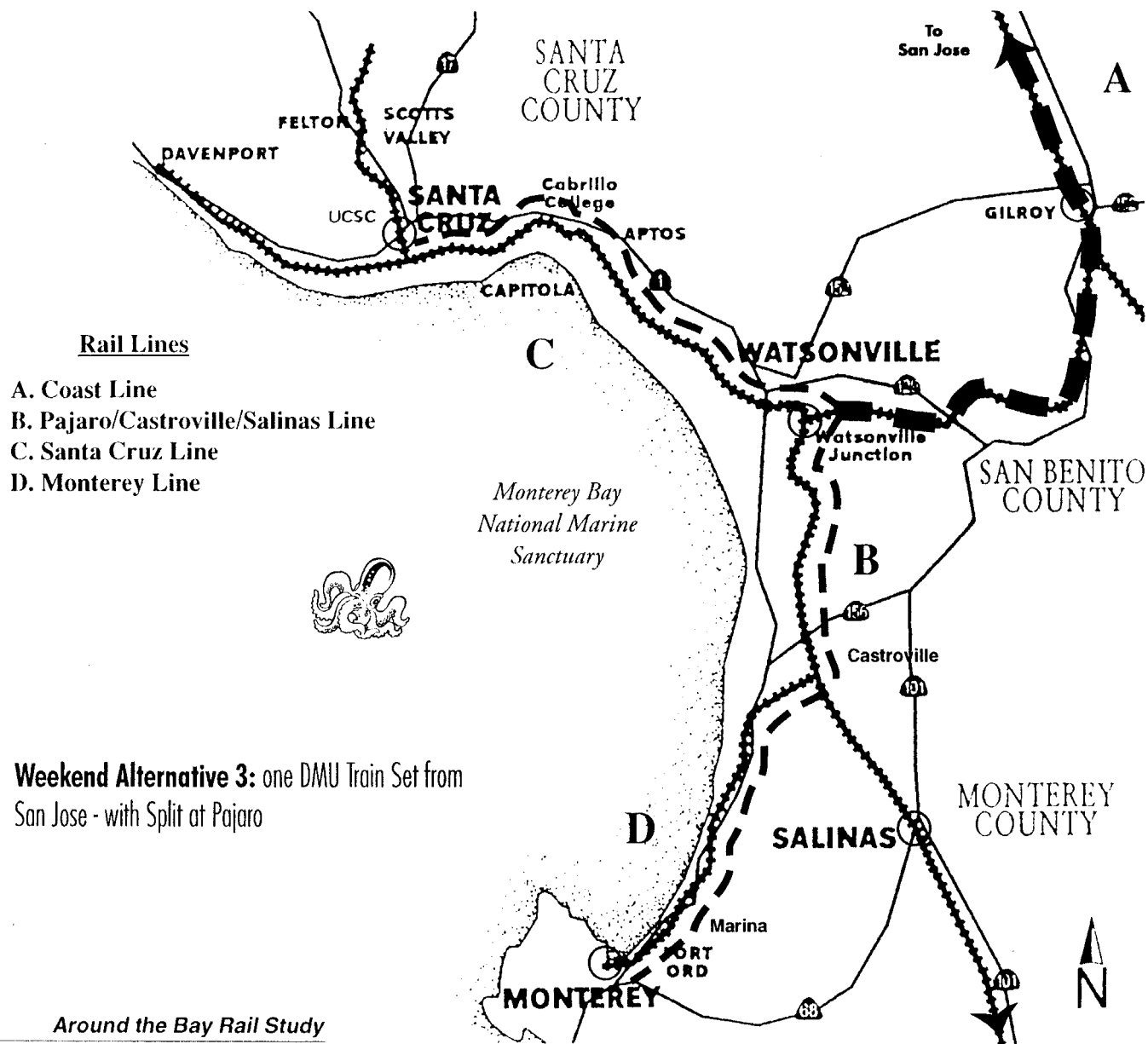
The Alternative 3 service plans (number of days per year, number of days per week and number of trips per day) would reflect the current goals of each county.

- The basis for this recommendation is that Alternative 3, provides a train service that combines travel to two destinations for the major trunk line portion of the journey in single train. By splitting at Pajaro, each transportation agency is required to fund only the last increment of the trip as the sole contributor. This Alternative is projected to save approximately \$1.0 million annually in train operating and maintenance costs over Alternative 1. Figure 4.2 illustrates the service route for Alternative 3, Weekend Intercity service to Monterey and Santa Cruz using DMU equipment.
- A third recommendation is a sub-option of Alternative 2. It is recommended that the two regional transportation agencies meet with representatives of Caltrain and the State Rail Program to discuss a contract by the State for Caltrain to provide intercity service on weekends as described under Alternative 2. Under an agreement among the State, Caltrain, Amtrak and the two planning agencies, a Caltrain consist would operate from San Francisco to Monterey and Santa Cruz.

Amtrak would operate the service under its contract with Caltrain to Gilroy but assert its right of access as an intercity operator under the State Rail Program beyond Gilroy. An incremental amount of Caltrain operating costs would be funded as part of the State Rail Program between San Francisco and Gilroy with the balance paid by Caltrain, Santa Clara Valley Transit Authority, Monterey and Santa Cruz. Beyond Gilroy, the service would be funded by the State with the balance funded by the two counties. A State Rail Program contribution of 50% of the operating costs is suggested as part of this intercity concept.

While this sub-option to Alternative 2 is suggested for investigation, it is not included in the operating and cost analysis at this point. To achieve the goals of this study, the service analysis focuses on operations between San Jose and the Monterey Bay destinations. An investigation of the institutional and costs to operate service on the 47-mile PCJPB route between San Francisco and San Jose is beyond the scope of services.







- For Around the Bay daily service, a phased DMU-based rail transit service is recommended between Santa Cruz and Monterey. The DMU vehicles would be the same as those the vehicles for Alternative 3 Weekend Intercity Service. Initial daily service would start in 2005 with the purchase of two (2) additional DMU vehicles to operate 4 daily round-trips between Santa Cruz and Monterey for the first 1-2 years. It is recommended that the frequency of the daily rail transit service increase to hourly, or approximately 12 round-trips, between 2005 and 2015 as resources permit. The level of service would increase as incremental capital improvements are made to the right of way and acquisition of vehicles.

Daily rail transit service when fully implemented and using the same vehicles as intercity service, provides cost-efficient regional mobility to the Monterey Bay counties due to the economies of scale resulting from the DMU investments established for Alternative 3. In 2005 as the first daily service is phased in with 4-6 round trips between Santa Cruz and Monterey, the farebox is projected to be 39%. By 2010, the farebox recovery increases to 50% when 10-round trips are operating between Monterey and Santa Cruz.

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## 4.2 INTERCITY WEEKEND SERVICE COORDINATION

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### Introduction

This section begins with a discussion of Service Coordination.

Service coordination begins with institutional agreements and cooperation between transportation agencies with interdependent risks and opportunities for transit system development. Based on these cooperative agreements to share responsibilities and benefits, service coordination becomes a public investment strategy to achieve project funding and approvals. Finally, coordinated service that is implemented is a means to achieve ridership growth, public acceptance and customer satisfaction through an integrated product offering to the travel market. Implementing service coordination covers six areas of activity.

1. **Fare Policy Integration** and coordination that allows inter-regional travel between systems without penalty of multiple fare transactions and conflicting fare policy. The Watsonville Transit Center agreement is a precedent for such coordination.
2. **Service Integration** and timed transfers between two or more complimentary systems. The Salinas, Monterey, Watsonville, and Santa Cruz Transit Centers achieve this function for local transit and connections to the Amtrak feeder bus system.

3. **Service Information and Marketing** includes schedules, maps, telephone information and other customer information systems. The transit system maps and schedules distributed by the Santa Cruz (Metro) and Monterey-Salinas (MST) agencies each include transfer and connecting schedule information about the other. This represents a step toward coordinating service information.
4. **Planning and Funding Coordination** pools system improvement goals and financing. Section 6 addresses shared costs and funding.
5. **Facilities Integration** achieves passenger convenience through train routings, platform locations and local transit centers and train station.
6. **Schedule Coordination** to increase the service offering through schedule and equipment cooperation with potentially competing systems on the same track.

This section outlines service coordination issues related to the last two items, facilities integration and the operations of intercity weekend passenger rail service over the nearly 100 miles of track that connect San Jose, Santa Cruz and Monterey.

Section 7 addresses the institutional agreements and cooperation that precede and produce new passenger rail service. Once service begins, coordination also involves on going relationships with external institutions. The four external institutions most important to Santa Cruz/Monterey passenger rail service are summarized as follows:

- The State of California funds and oversees intercity rail programs including proposals to extend the Capitol Corridor to Salinas via Watsonville Junction (referred to as Pajaro in this report). The State is a potential manager of intercity service to Monterey and Santa Cruz.
- Amtrak West that operates one round trip of the Coast Starlight via Pajaro and Salinas on its route through California. Amtrak West also manages operating contracts with private operators of feeder bus routes that currently serve Santa Cruz, Watsonville, Salinas and CSU Monterey and Monterey. Amtrak is a potential operator of the service to Monterey and Santa Cruz Counties.
- Union Pacific Railroad owns the railroad right of way from San Jose to Salinas and the Monterey and Santa Cruz branch lines. The UPRR controls track access and approves capacity improvements and new service plans. The UPRR is the most likely source of the engineering and construction of track and signal improvements for service to Santa Cruz and Monterey.
- Caltrain and the Santa Clara Valley Transit Authority operate weekday commuter trains on UPRR right of way from Gilroy for 30 out of the 50 miles between San Jose and Pajaro. Caltrain is potential manager and operator of the service to Monterey and Santa Cruz. SCVTA is a potential funding partner for weekend service between San Jose and Gilroy.

These external institutions are discussed or noted in the discussion of rail operations in this section and Section 7.

### **Criteria for Coordinated Service**

All proposed rail services face competition at the local, state and federal level to secure capital and operating funding. A two-county program must show that it can serve a variety of diverse goals and interests. Based on a review of the service goals now being pursued independently by TAMC and SCCRTC, the following outlines a best case set of criteria that could be used to carry out a joint-program. Such a program should:

- Qualify for State Intercity operating funds as the State's 4th Intercity passenger rail route or an extension of a current route (Capitols).
- Require a minimal level of costs and improvements to start service with potential to add improvements over time.
- Have flexible operating capability to serve multiple destinations and markets.
- Be possible to implement by 2002.
- Attract an operator who will supply rolling stock.
- Provide weekend Caltrain service south of San Jose.
- Have the potential to serve Salinas on weekdays in the longer term.

These criteria were used to develop potential intercity weekend service alternatives to Alternative 1. A review of these alternatives identified two with the greatest promise for implementation, expansion and on-going cost economies for both counties.

### **4.3 INTERCITY WEEKEND SERVICE PLANS**

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Following the sequence of Current Conditions outlined in Section 2, including Stations, Schedules and Costs, Section 4.3 describes the costs and benefits of Alternatives 2 and 3 in comparison to Alternative 1.

Table 4.1 compares Alternatives 2 and 3 with Alternative 1 service parameters in the base programs. The original Santa Cruz base service in Alternative 1 is designed to attract the highest number of one day and overnight visitors to travel by train from the San Francisco Bay Area to several Santa Cruz destinations on weekends during a 26-week peak season. The second weekend day round trip in the Santa Cruz base program would also provide utility to Santa Cruz County residents traveling out of the County.

The Monterey base service is designed to promote overnight visitors to travel by train from San Francisco and the South Bay to Monterey over extended (4 day) weekends throughout the year.

The history of successful new passenger rail starts has been made by those whose overriding mission was to put a train into service on day-one and then add improvements from that day forward. Alternative 2 is a short-term bridge to get service started on the road to implementing Alternative 3 service in 2005. The greatest merit of Alternative 2 is its challenge to use a coordinated program to putting one train in operation from the San Francisco Bay Area to Santa Cruz and Monterey, with each destination served on alternate weekends. Caltrain is the proposed service operator.

Alternative 2 requires the lowest possible operating costs. Once in service, enhancements could be added as fast as resources permit. Alternative 2, as defined here with two days of weekend service, could be expanded by Monterey County to four days of service to meet their original goal of extended weekend service. Similarly, actual service could be extended to San Francisco that included express trains. Using Caltrain as the contract operator in Alternative 2 could facilitate these extension goals.

Should Monterey or Santa Cruz proceed to implement their original base service first, Alternative 2 could be implemented when the other county was ready.

Advantages of Alternative 2 are that it sets the precedent for developing and phasing a coordinated program over 2-3 years. Various administrative and management relationships could be developed between the Counties and with Caltrain and the UPRR. Year round service would be provided as far as Pajaro, giving some year-round utility to portions of residents and destinations in both counties. Service could start with one jointly funded single train set, reducing start up costs.

**Table 4.1 Comparison of Alternative 1 Service Parameters with Alternatives 2 and 3**

	<b>Alternative 1</b> "Base Programs" Service start up: 2002		<b>Alternative 2</b> Alternate Weekends to Both Service start up: 2002		<b>Alternative 3</b> DMU Service to Both Service start up: 2005	
	<b>Santa Cruz</b>	<b>Monterey</b>	<b>Santa Cruz</b>	<b>Monterey</b>	<b>Santa Cruz</b>	<b>Monterey</b>
<b>Potential Service Operators</b>	<b>Amtrak/Caltrain/Other</b>		<b>Caltrain</b>	<b>Santa Cruz/Monterey Agency</b>		
<b>Weekends Served Annually</b>	<b>24</b>	<b>52</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>52</b>
<b>Number of Round trips/Day</b>	<b>2 Trips</b> San Jose Santa Cruz	<b>1 Trips</b> San Francisco Monterey	<b>1 Trip</b> San Jose Santa Cruz	<b>1 Trip</b> San Jose Monterey	<b>2 Trips</b> San Jose Santa Cruz	<b>1 Trip</b> San Jose Monterey
<b>Number of Days Served per Weekend</b>	<b>2</b>	<b>4</b> (Extended weekend)	<b>1</b>	<b>1</b>	<b>2</b>	<b>4</b>
<b>Additional Holidays &amp; Fridays</b>	<b>12</b>	<b>Included in Base Service</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>Included in Base Service</b>
<b>Annual One Way Trips</b>	<b>240</b>	<b>416</b>	<b>156</b>	<b>156</b>	<b>312</b>	<b>416</b>
<b>Number of Cars Per Train</b>	<b>4</b>	<b>4</b> Dome and Café Cars	<b>4</b>	<b>4</b>	<b>2 out of 4</b> In a 4 car Train	<b>2 out of 4</b> In a 4 car Train
<b>Capacity of Each Train</b>	<b>560</b>	<b>560</b>	<b>560</b>	<b>560</b>	<b>277 for 2 cars</b>	<b>277 for 2 cars</b>

1) DMU capacity serves the one-way demand for Santa Cruz by the second round trip.

Alternative 3 is recommended after 2005 to achieve a large number of the original service plan goals shown in Alternative 1 base programs. Santa Cruz service would operate for the 26-week peak season with two round trips. Monterey service would operate year round with one round trip. DMU self-propelled trains would replace Caltrain equipment. The DMU capacity for self-propelled power within each car makes it possible for a single four-car train from San Jose to split into two, 2-car trains at Pajaro. From Pajaro, each 2-car DMU train set would proceed toward the respective destinations via Santa Cruz and Monterey branch lines. The 2-car train set would then return to San Jose for the second trip of the Santa Cruz program.

Based on the ridership estimates in Section 5, Monterey service would require a third vehicle added to the weekend train set for a (2+3) 5-car train. Looking ahead to daily service discussed below, the DMU train that serves Monterey would provide daily DMU service Around the Bay during its intercity layover.

It should be noted that an Alternative 3 “Start-up” option was developed to examine initial DMU service at a lower service level than full service as shown in Table 4.1. Alternative 3 “Start-up” was included in the Section 5 Ridership estimates but is not addressed in the balance of this report.

### **Stations**

Table 2.6 lists station stops developed to date in the SCCRTC MTIS and TAMC Rail Development Program study areas. These are proposed for all Alternatives in this Study. Five new or restored station sites are under consideration in Santa Cruz County. These stations will be phased pending an agreement with local communities to contribute toward the capital costs either directly or through in-kind resources:

- Watsonville – restoration of historical station site,
- Seascape – new station,
- Aptos Village – new station,
- Capitola – new station, and,
- Santa Cruz Wharf/Boardwalk – restoration of historical terminus.

Two new or restored station sites are under consideration in Monterey County with Seaside the first priority.

- Seaside – interim terminus and transfer station beginning in 2002,
- Monterey – to be restored as new terminus when line is extended.

Additional station sites identified for future consideration include:

- Castroville – would be a new station the Castroville area and provide transfers with buses serving Salinas, and,
- Pajaro - a stop at Pajaro has been identified as a rail transfer station that would have mutual benefit to the service plans of both counties.

Based on SCCRTC's preliminary discussions with the Santa Clara Valley Transportation Authority about potential new Caltrain weekend service to Gilroy, 1-2 station stops south of San Jose are assumed. These would be designated in consultation with SCVTA.

Parking estimates required to serve outbound Santa Cruz residents and tourist during peak seasons are discussed under Stations for Around the Bay service.

### **Schedules**

The proposed service run times of approximately 2.5 hours are the same for service between San Jose and Seaside and the Santa Cruz Wharf respectively. These travel times would require all of the (\$26.9 million) in capital improvements to the branch line rights of way identified in previous studies for Alternative 1. Pending future negotiations with the UPRR, a placeholder of \$7.5 million in additional track and signal improvement costs are also proposed (see Alternative 2 and 3 Capital Cost tables below) between Gilroy and Pajaro and at Pajaro. This would fund both the initial capital cost that is expected to achieve access to Union Pacific Railroad tracks and to achieve operating speeds sufficient for approximately 2 hour schedules. A travel time of 2.25 hours was used for the Around the Bay Rail Study.

To achieve maximum cost-effectiveness in the initial phase it is proposed that detailed schedules for Alternative 2 would be developed with Caltrain to combine service to the Monterey Bay region with current or new service to Gilroy. For example, the first train on Friday evening from San Francisco to Gilroy provides local service throughout San Mateo and Santa Clara County north of San Jose. It should be proposed to Caltrain that the Gilroy bound trains that would continue on would be express service from San Francisco with limited stops north of San Jose.

A major disadvantage is that an extensive coordinated service information program including promotions, timetables and telephone information would need to assure awareness of the schedule variation.

As the first DMU vehicles are commissioned for service in 2005 (phasing in Alternative 3), the alternate weekend service underway, using Caltrain equipment, could be supplemented with DMU service on the opposing alternate weekends to increasingly provide a schedule of every-weekend service to both destinations.

### **Adding Alternative 2 To the State Rail Program**

This section describes an Alternative 2 sub-option for achieving new service. Currently, Monterey and Santa Cruz are exploring options with the State of California to include service to Monterey or Santa Cruz in the State's Intercity Passenger Rail Program. Monterey has proposed a new intercity service from San Francisco to Monterey. Santa Cruz has examined an extension of a Capitol Corridor round trip and an extension of Caltrain weekend service.

Both face some barriers. Using the Capitol Corridor as a base may be a relatively simple method of applying for Intercity since Capitol Corridor trains are fully funded by the State's Intercity program. However, extending Capitol Corridor service would require an additional Capitol train set and no new State owned rolling stock is expected to be added in the next 2-3 years. A Capitol train does not directly serve the passenger rail market in San Francisco, which is vital to the Monterey concept.

A second, "hybrid" alternative more directly supports the criteria for achieving benefits from a Monterey/Santa Cruz coordinated service plan. In 1996 SB 457 was enacted by the California legislature and signed by the Governor. It permits the transfer of responsibilities for managing the state sponsored intercity rail corridors to regional Joint Powers Boards while the state continues to fund operating and capital costs.

SB 457 suggests another approach to adding Alternative 2 to the State Rail Program would combine Caltrain weekend service to Gilroy with a State role in providing intercity service beyond Gilroy. SB 457 allocates the oversight of existing intercity rail service to new Joint Powers Boards. This alternative would ask the State to allocate oversight of new intercity rail service to an existing Joint Powers Board that would be augmented with participation from Santa Cruz and Monterey.

Service would start in San Francisco on the Caltrain right-of-way and continues through San Jose and Gilroy to Monterey/Santa Santa Cruz. A proportion of the service (that could be determined by number of cars, passengers, etc) would be jointly funded by Caltrain as regional service and by the State as intercity service. A prorated allocation between the parties would fund 1-2 trains of weekend Caltrain service from San Francisco as regional service and as intercity service as far as Gilroy. A second negotiated allocation between the parties would fund intercity service beyond Gilroy.

To create this service, several decisions would need to be reached with respect to contractual arrangements, equipment and operations. The parties would need to carefully structure agreements involving Amtrak, the Santa Clara Valley Transportation Authority, Caltrain, the Union Pacific Railroad and Caltrans<sup>1</sup>. The key would be to

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<sup>1</sup> Under the current PCJPB Agreement for Gilroy service, SCVTA has all capital and operating cost responsibility for the Gilroy extension.



assure that Amtrak's access right to the UPRR track for intercity service is preserved. One possible approach is for the State to agree to arrange service with Caltrain as long as the service or a proportion of the cars on the service was differentiated from Caltrain's regular service and recognized as intercity.

Train service would start in San Francisco and make limited stops on the way to Monterey. If the train service is incremental to existing service, a contract with Caltrain would be developed to deal with payments for access to the San Francisco terminal station and the entire Caltrain right-of-way through San Jose. If an existing Caltrain scheduled trip could be the basis for the service, it could be done less expensively since Caltrain would not require reimbursement for the use of its right-of-way to Gilroy and potentially less reimbursement for the operating costs to Gilroy.

Using existing Caltrain commuter gallery car equipment would make this alternative relatively easy to arrange but would not provide the level of amenity that is desired in the Monterey program. An equipment alternative could be to operate a currently scheduled Caltrain trip that fits the proposed destination schedules between Friday and Sunday. Using a scheduled Caltrain trip, that would provide utility to the three Caltrain JPB member counties, would minimize the Caltrain contract and access costs. Santa Cruz and Monterey could then either lease a full set of special rolling stock from Amtrak or only 1-2 special cars for the service to add to a Caltrain consist. Various cost agreements would be established depending on whether the two counties added cars to an existing train or added a new train set that Caltrain would run (using Amtrak as its contract operator).

Once established, Alternative 3 could be operated and funded under the same arrangement but with credit given by the State and Caltrain to Santa Cruz and Monterey for the capital costs of the cars.

While this arrangement may go beyond convention, it should be noted that passenger rail expansion in California has continued consistently over the last eight years. Most expansions, such as the start up of commuter service between Stockton and San Jose, or the recent extension of Capitol service 50 miles north to Colfax, have begun out of what were unprecedented and complex arrangements at the time.

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## **4.4 CAPITAL AND OPERATING COSTS**

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This section outlines the capital and operating cost of each alternative for Intercity Weekend service. Service would start in 2002 with initial investments beginning in 2000-2001. To compare costs between alternatives, it is assumed that weekend service in both of the base programs in Alternative 1 as well as the service plan in Alternative 2 would employ a 4-car Caltrain consist. Alternative 3 would provide service with a 4-car DMU train that would operate as a single train until Pajaro. At

Pajaro, it would split into two, 2-car trains. Each train would operate from Pajaro to the respective branch lines and end points. Based on the ridership demand in 2010 identified in Section 5, the DMU train would be expanded to five cars with 3 cars allocated to the higher demand destination after the split. Beyond five vehicles, additional round-trips are recommended to respond to demand instead of larger DMU trains.

### **Improvements Required and Estimated Capital Costs**

To date, a total of \$26.9 million in capital improvements has been identified for the two base Intercity Weekend programs. These are designated as the capital costs for Alternative 1. The Alternative 1 capital costs are considered a base for Alternatives 2 and 3.

Tables 4.2 presents the Alternative 2 capital costs. Table 4.3 presents Alternative 3 capital costs. The base capital costs are shown in both Tables 4.2 and 4.3 as Alternative 1. The capital improvements for the base programs in Alternative 1 include track, signals and stations on the two branch lines sufficient enough to initiate intercity rail service by 2002. Alternative 2 capital improvements also include:

- Purchase of the Santa Cruz branch line from Pajaro to the Wharf
- Track and signal improvements and a new station at Pajaro
- Track and signals capital improvements to achieve access to the Union Pacific Railroad line between San Jose and Pajaro.

The incremental additional capital cost of Alternative 2 over Alternative 1 is \$21.8 million. The total cost of Alternative 2 is \$48.7 million.

Table 4.3 presents Alternative 3 capital costs. Alternative 3 would require all of the improvements in Alternative 1 and Alternative 2 as well as addition capital improvements to implement DMU intercity rail service beginning in 2005. Alternative 3 capital improvements also include:

- Track and signal upgrades to increase operating speeds on the branch lines
- A maintenance base for DMU vehicles
- Five Diesel Multiple Unit vehicles

Beginning in 2003 a maintenance facility for DMU vehicles would be developed and the track and signal improvements to increase operating speeds would begin. In 2004, the five DMUs (four-car train plus one spare) would be purchased for service to begin in 2005. Key Assumptions precede and notes follow each table.

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**Table 4.2 Alternative 2, Alternate Weekends Intercity Service Capital Costs**

**Key Assumptions**

- The Table presents 2000-2010 conceptual planning capital costs for Alternative 2, Alternate Weekend Service.
- The 2000-2002 cost estimates are for the Alternative 1 investments including design and procurement.
- Alt. 1 investments are assumed as a base for all additional Alternatives in the Around the Bay Study.
- Alt. 2 is a short term recommendation for service beginning in 2002. Alternative 3 is recommended for 2005.
- The costs to purchase the Monterey branch are to be determined subject to negotiations with UPRR.
- The costs of the Santa Cruz branch is based on an independent estimate of the net liquidation value.
- The actual costs may change subject to negotiations with the UPRR.
- Rolling Stock is leased as part of an operating contract with Caltrain or Amtrak.
- Jointly funded elements are shown with a bold type. All dollars are 1998\$.

Alternative 2 (1)	2000-2002	2002	2003	2004	2005-2009	10 Yr. Total	10 Yr. Total
Alternative Weekend	Alternative 1						With Alt. 1
Santa Cruz ROW Purchase			\$4,866,667	\$4,866,667	\$4,866,667	\$14,600,000	\$14,600,000
Stations/Platforms (2)	\$2,600,000	\$0	\$0	\$0	\$0	\$0	\$2,600,000
Pajaro Station (3)		\$2,250,000	\$0	\$0	\$0	\$2,250,000	\$2,250,000
Tracks/Signals	\$24,300,000	\$0	\$0	\$0	\$0	\$0	\$24,300,000
Tracks/Signals (Access) (4)		\$2,500,000	\$2,500,000	\$0	\$0	\$5,000,000	\$5,000,000
Vehicles - (leased)	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Total</b>	<b>\$26,900,000</b>	<b>\$4,750,000</b>	<b>\$2,500,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$21,850,000</b>	<b>\$48,750,000</b>

**Alternative 2 Notes:**

- 1) Alternative 2 is recommended to begin in 2002 instead of the two programs developed to date by each county.
- 2) Station costs include \$600,000 in Santa Cruz County (SCCRTC PSR, 1997); \$2,000,000 for Seaside (TAMC staff review of Seaside PSR, 2/98).
- 3) Source for cost estimates is Pajaro Valley Station (PSR) prepared by City of Watsonville, 1997. Station costs are shared by Counties equally.
- 4) Track and Signal items represent cost estimates for joint investments to be funded by contributions from both counties on a 50-50 share for joint track improvements between Gilroy and Pajaro. The Gilroy-Pajaro costs represent a low range place-holder dollar amounts projected to achieve access from the UPRR and improvements to reduce travel time.

**Table 4.3 Alternative 3 DMU Intercity Weekend Service Capital Costs**

**Key Assumptions**

- The Table is a summary of the combined capital costs for Alternatives 2 and 3 and assumes Alt. 2 is in place.
- The 2002-2001 cost estimates are for the Alternative 1 investments including design and procurement.
- Alt. 1 investments are assumed as a base for all additional Alternatives in the Around the Bay Study.
- Alternative 3 is DMU service strategy recommended to begin in 2005.
- DMU costs are based on European Concept DMU (IC 3 Flexliner, married pair) with capacity for 140 passengers each.
- Jointly funded elements are shown with a bold type. All dollars are 1998\$.

Alternative 3	2000-2002	2002	2003	2004	2005-2009	10 Yr. Total Without Alt. 1	10 Yr. Total With Alt. 1
<b>Intercity DMU Service (1)</b>	Alternative 1	5 DMUs purchased					
Santa Cruz ROW Purchase		\$0	\$4,866,667	\$4,866,667	\$4,866,667	\$14,600,000	\$14,600,000
Stations/Platforms	\$2,600,000	\$0	\$0	\$0	\$0	\$0	\$2,600,000
<b>Pajaro Station (2)</b>		\$2,250,000	\$0	\$0	\$0	\$2,250,000	\$2,250,000
Tracks/Signals	\$24,300,000	\$0	\$0	\$0	\$0	\$0	\$24,300,000
<b>Tracks/Signals (Access)</b>		\$2,500,000	\$2,500,000	\$0	\$0	\$5,000,000	\$5,000,000
<b>Tracks/Signal Upgrades (3)</b>		\$0	\$2,000,000	\$0	\$2,000,000	\$4,000,000	\$4,000,000
<b>Maintenance Base (4)</b>		\$0	\$5,000,000	\$5,000,000	\$0	\$10,000,000	\$10,000,000
<b>5 DMUs (5)</b>		\$0	\$0	\$9,250,000	\$9,250,000	\$18,500,000	\$18,500,000
<b>Total</b>	<b>\$26,900,000</b>	<b>\$4,750,000</b>	<b>\$14,366,667</b>	<b>\$19,116,667</b>	<b>\$16,116,667</b>	<b>\$54,350,000</b>	<b>\$81,250,000</b>

**Alternative 3 Notes:**

- 1) Alternative 3 is recommended to follow Alternative 2 in 2005. DMU service would require a number of additional investments from both counties. The costs include those required to begin Alternative 2 in 2002. The incremental additional costs to implement Alternative 3 after Alternative 2 has been established is \$32 million.
- 2) Pajaro Station costs are assumed to be shared by both Counties equally.
- 3) Track and Signal improvements under Alternative 3 are to enhance operations of DMU vehicles on the respective branch lines, including additional grade crossing improvements, track improvements and communications.
- 4) The Maintenance Base is for DMU service to begin in 2005. This base would also be used for Daily Service.
- 5) Five European Concept DMUs are required to start Intercity Weekend service. Four cars plus one spare. The estimated cost is \$3.7 million each. DMU capital (and O&M) cost estimates are based on an average of the operating data for two European DMU Vehicle types now in production, Siemens VT 628 and AD Tranz IC 3. Based on using an average, the term European Conceptual Vehicle is used in the analysis.

The incremental additional capital cost of Alternative 3 over Alternative 2 is \$32 million. The total cost of Alternative 3 is \$81.3 million.

### **Operations on Union Pacific Railroad Trackage**

Operating on the Union Pacific Coast Line presents two issues regarding access to freight lines. The first is the track owners desire to be compensated for the use of their infrastructure and maintenance costs. This issue is common to all three of the intercity service alternatives.

Throughout the United States, new passenger rail programs are being considered that project the increased use of freight railroad trackage to achieve cost-effective proposals. During the previous 20 years of increasing passenger rail development, private freight railroads have provided access to new public rail operators reluctantly. California leads the nation in negotiating with freight railroads to “buy” new access to freight railroad trackage for new passenger rail service. The Caltrans State Rail Program has aggressively achieved access for all three State-sponsored corridors through the funding of capital improvements (e.g., new track, signal and grade crossings). These improvements directly benefit the freight railroad’s operations and provide the capacity for expanded and higher quality passenger rail service. Tables 4.2 and 4.3 include \$7.5 million as a low-range place holder for improvements to the Union Pacific Railroad track and signals between Gilroy and San Jose. In addition, an access costs of \$5.00 per train mile has been added to the presentation of weekend intercity operating and maintenance costs below.

Joint Powers Boards have achieved access through the purchase of the freight trackage, (such as Caltrain between San Francisco and San Jose that gives priority to passenger service but allows freight windows in the late evening), and the funding of a capital improvements (such as the initial improvements on the Union Pacific trackage to start service between San Jose and Gilroy).

The second issue related to operating on freight operator tracks is the track owner’s corporate attitude about risk and new practices when a new standard of rail technology, such as a DMU passenger train, is introduced to operate within their infrastructure. European experience has coined the term of “mixed traffic” to describe the increasing practice of operating DMU vehicles on the same track and in close proximity to conventional passenger trains and freight trains

The Union Pacific Railroad’s attitude toward new DMU operations on their trackage service will need to be addressed through discussion and an education process that may be able to draw on precedents in other parts of the nation. DMU operations would take place between San Jose – Gilroy for weekend intercity service and between Pajaro and Castroville for daily rail transit service. Mixed traffic issues with respect to freight capacity or railroad safety as the result of the new passenger train

being proposed will be minimal since the level of existing passenger and freight traffic is small and expected to grow slowly. Additional passenger trains within the parameters of the Monterey/Santa Cruz passenger rail plans will be easily accommodated with incremental improvements to the track, signal and control system over several years.

Additional capital and O&M costs related to DMU access are included in the cost estimates for daily Around the Bay service below.

### **Estimated Train Operating and Maintenance Costs**

A number of arrangements are possible to implement Alternative 2 and Alternative 3. Alternative 2 is designed as an extension of Caltrain service. The DMU service in Alternative 3 could also be operated under a contract with Caltrain or by a Monterey/Santa Cruz agency that would be determined in the future. For the Around the Bay Rail study, the O&M cost analysis assumed that two engineers would be needed to operate the two DMU trains once they have split at Pajaro. However, it is possible that the second engineer could board at Pajaro for Santa Cruz portion and thereby reduce costs for the engineer's service hours that would operate the train on the second round trip Santa Cruz to Santa Cruz.

Caltrain is in the process of adopting the MTC Translink fare collection system using a stored value card as a pass. It is now accepted within the entire transit industry that the arrival of stored value fare media will result in adoption of a proof of payment fare collection system. This fare collection system is assumed for the weekend intercity service and is reflected in a minor reduction in Caltrain's standard costs for an Assistant Conductor when applied to O&M costs beyond 2005.

Caltrain O&M costs of \$13.02 per car mile were applied to the two programs in Alternative 1 to develop a common base. These costs were then applied to the service levels in Alternatives 2 and 3. This produced the cost difference between the Caltrain operating costs in Alternative 1 and the Caltrain operating costs in Alternatives 2. A set of European Conceptual DMU operating costs was then applied to each of the Alternatives. This produced the difference between the Caltrain operating costs in Alternatives 1 and 2 and the DMU operating costs for Alternative 3.

Table 4.4 is a summary of the estimated O&M costs for the three Alternatives and the potential savings from the use of DMU equipment. Annual O&M costs range from \$2.6 million for Alternative 1 to \$1.3 million for Alternative 3.

Note that in Table 4.4 the service plans in Alternative 1, with Caltrain-like equipment are virtually identical to the service plans in Alternative 3 with DMU equipment. Alternative 3 shows savings of \$140,000 annually from operating DMU service versus a Caltrain-like service operating the same service plan. This is due to the lower

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**Table 4.4 Estimated Operating and Maintenance Costs for Intercity Weekend Alternatives 1, 2 and 3**

	<b>Alternative 1</b> "Base Programs" Service start up: 2002		<b>Alternative 2</b> Alternate Weekends to Both Service start up: 2002		<b>Alternative 3</b> DMU Service to Both Service start up: 2005	
	<b>Santa Cruz</b>	<b>Monterey</b>	<b>Santa Cruz</b>	<b>Monterey</b>	<b>Santa Cruz</b>	<b>Monterey</b>
<b><u>SERVICE DESCRIPTION</u></b>						
<b>Weekends Served Annually</b>	<b>24</b>	<b>52</b>	<b>26</b>	<b>26</b>	<b>26</b>	<b>52</b>
<b>Number of Round trips/Day</b>	<b>2 Trips</b> San Jose Santa Cruz	<b>1 Trips</b> San Francisco Monterey	<b>1 Trip</b> San Jose Santa Cruz	<b>1 Trip</b> San Jose Monterey	<b>2 Trips</b> San Jose Santa Cruz	<b>1 Trip</b> San Jose Monterey
<b>Number of Cars Per Train</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>2 out of 4</b>	<b>2 out of 4</b>
<b>Number of Car Miles</b>	<b>69,878</b>	<b>133,286</b>	<b>11,355</b>	<b>12,436</b>	<b>45,983</b>	<b>66,694</b>
<b>Cost/Car Mile</b>	<b>\$13.02</b>	<b>\$13.02</b>	<b>\$13.02</b>	<b>\$13.02</b>	<b>\$11.77</b>	<b>\$11.77</b>
<b><u>ANNUAL O&amp;M COSTS</u></b>						
Caltrain 13.02/car mile for Alt. 1 & 2 (dollars in millions)	<b>\$ .909</b>	<b>\$1.73</b>	<b>\$ .591 K</b>	<b>\$ .650</b>	<b>\$ .541</b>	<b>\$ .784</b>
<b>Total Annual O&amp;M Costs</b> (Combined costs of two counties)	<b>\$2.645 M</b>		<b>\$1.242 M</b>		<b>\$ 1.325 M</b>	
<b>Total Annual DMU O&amp;M Costs Savings</b> Over Caltrain-like operations	<b>\$ .061</b>		<b>.290</b>		<b>\$ .140</b>	
<b>Total Annual Savings Over Alternative 1</b>	<b>-</b>		<b>\$1.14 M</b>		<b>1.17 M</b>	

**Notes:**

The presentation of intercity weekend O&M costs for San Jose to Monterey and Santa Cruz is based on the service parameters shown above. The analysis included a comparison between DMU and Caltrain-like operations. The DMU savings in this analysis assume 4-car DMU trains consisting of married-units. A DMU married-unit (which is semi-permanently coupled) is assumed to have the equivalent seating capacity to a single bi-level coach or approximately 140 seats.



**Table 4.5 Cost Comparison of Alternative 3 and Alternative 1**

## 1. Comparison of Train Operating and Maintenance Costs

### Alternative 1

- Two Passenger Rail Programs
- Two 4-car diesel-hauled train sets operating separately
- Two service plans and administrative agencies

### **Annual O&M Costs**

Dollars in Millions

\$2.6

### Alternative 3

- One Passenger Rail Program
- One DMU 4-car train set operating to both destinations
- Two coordinated service plans

\$1.3

### **Alternative 3 Train O&M Costs Savings**

**\$1.3 Million**

## 2. Sources of Alt. 3 Train O&M Cost Savings

### **Annual O&M Savings**

DMU train operating costs are lower because of three operating characteristics:

- **DMU Vs Conventional Train Vehicle Performance**

Approximately \$130,000 of the annual cost savings are due to DMU Vehicle Performance (fuel, maintenance, etc.)

\$ .130    10%

- **DMU Train Sets Splitting at Pajaro vs Two Trains**

Approximately \$325,000 of the annual cost savings are due to the splitting of a four car train at Pajaro. For the remaining distance, each county is operating a 2-car train.

\$ .325    25%

- **Single DMU Train Set vs Two Conventional Trains**

Approximately \$845,000 of the annual cost savings are due to operating a single four car train in stead of two trains for the 54 miles between San Jose and Pajaro.

\$ .845    65%

**\$ 1.300    100%**

## 3. DMU Consumer Product Advantages

- |                                   |   |
|-----------------------------------|---|
| • <b>Greater Flexibility</b>      | <b>Can be used for both daily and intercity service.</b>  |
| • <b>Smaller Scale</b>            | <b>Visually less intrusive en route and at terminus.</b>  |
| • <b>Less Noise</b>               | <b>Less vibration and lower noise level en route.</b>     |
| • <b>Greater Marketing Appeal</b> | <b>Unique promotional identity and travel experience.</b> |



operating costs of DMU operating equipment. More importantly, Alternatives 2 and 3 both show annual savings of \$1.1 million from a combined program over the two programs in Alternative 1.

Table 4.5 focuses the summary in Table 4.4 on specific costs savings and operating advantages of DMU based service plan in Alternative 3 over Alternative 1.

Table 4.5 shows that total operating cost savings derived from DMU trains over the conventional trains proposed for Alternative 1 are generated by DMU operation characteristics.

- 1) First, about 10 percent of the costs savings are because a four-car self-propelled DMU train generates lower fuel and maintenance cost than a four-car train with a locomotive.
- 2) About 25 percent of the savings are because the four car DMU train would split at Pajaro into two, two-car trains. On an annual basis, this would result in lower total costs per car mile for the shorter DMU trains for the total of 46 miles between Pajaro and the terminal destinations.
- 3) Finally, about 65% of the cost savings is because with a single DMU 4-car train, there are fewer cars and fuel costs than with the total of two, four car trains proposed for Alternative 1.

As a sensitivity analysis, a comparison was made between the O&M costs of Caltrain-like operations with a 4 car consist and a 6 car consist. The DMU O&M costs in a 6-car train equal Caltrain-like equipment in a 6-car train. That is, with 6 car trains, about 10% of the cost savings from DMU vehicles would no longer exist. About 90% of the cost savings would remain.

### **Estimated Operating and Maintenance Costs for Contracted Service**

The scenarios assumed in prior studies for operating arrangements that use Amtrak as a contract operator treated operating costs differently for administration or access costs to achieve "operating rights" to UPRR tracks. For the Around the Bay Rail study a common scenario was developed to examine using Caltrain as a contract operator based on a negotiated price agreement. These cost estimates create a range between some cost scenarios in previous studies and higher cost points. This expanded range of costs can be used to assess the feasibility of a coordinated program.

Table 4.5 presents the intercity weekend O&M costs for Alternative 2 beginning with the start of service in 2002. The current fully allocated cost of Caltrain operations of \$13.02 was also used as a surrogate for a Caltrain contracted cost per car mile. The assumption made is that this is a high-end cost that could result from a negotiation with Caltrain that would take into account its current costs for Amtrak services plus a fair allocation of Caltrain.

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**Table 4.5 Intercity Weekend O&M Costs for Alternative 2 and Alternative 3 2002-2010**

	2002	2003	2004	2005	2010
<b>Proposed Alternatives</b>	<b>Alternative 2, Alternate Weekends</b>			<b>Alternative 3, DMU Service</b>	
<b>Service Operator</b>	<b>Caltrain</b>			<b>Monterey/Santa Cruz</b>	
<b>Train Consist</b>	<b>4 Car Caltrain</b>			<b>4 Cars</b>	<b>5 Cars</b>
<b>Annual Train Miles</b>	<b>23,851</b>	<b>23,851</b>	<b>23,851</b>	<b>38,948</b>	<b>38,948</b>
<b>Base Intercity Train O&amp;M Costs (1)</b>	<b>\$1,242,152</b>	<b>\$1,242,152</b>	<b>\$1,242,152</b>	<b>\$1,400,000</b>	<b>\$1,800,000</b>
<b>Cost per train mile</b>	<b>\$52</b>	<b>\$52</b>	<b>\$52</b>	<b>\$36</b>	<b>\$46</b>
<b>Equipment Lease (2)</b>	<b>\$319,601</b>	<b>\$319,601</b>	<b>\$319,601</b>	<b>-</b>	<b>-</b>
<i>Subtotal:</i>	<i>\$1,561,805</i>	<i>\$1,561,805</i>	<i>\$1,561,805</i>	<i>\$1,400,036</i>	<i>\$1,800,046</i>
<b>Contract Contingency (8%) (3)</b>	<b>\$117,135</b>	<b>\$117,135</b>	<b>\$117,135</b>	<b>\$105,004</b>	<b>\$135,003</b>
<i>Subtotal:</i>	<i>\$1,678,940</i>	<i>\$1,678,940</i>	<i>\$1,678,940</i>	<i>\$1,505,040</i>	<i>\$1,935,050</i>
<b>Branch Line Maintenance (4)</b>					
<b>Monterey (4)</b>	<b>\$200,000</b>	<b>\$200,000</b>	<b>\$200,000</b>	<b>\$240,000</b>	<b>\$240,000</b>
<b>Santa Cruz</b>	<b>\$200,000</b>	<b>\$200,000</b>	<b>\$200,000</b>	<b>\$240,000</b>	<b>\$240,000</b>
<i>Subtotal:</i>	<i>\$2,078,940</i>	<i>\$2,078,940</i>	<i>\$2,078,940</i>	<i>\$1,985,040</i>	<i>\$2,415,050</i>
<b>Track Access (5)</b>	<b>\$99,000</b>	<b>\$99,000</b>	<b>\$99,000</b>	<b>\$215,540</b>	<b>\$215,540</b>
<b>Total Annual O&amp;M Costs</b>	<b>\$2,178,028</b>	<b>\$2,177,940</b>	<b>\$2,177,940</b>	<b>\$2,200,580</b>	<b>\$2,630,590</b>

**Notes:**

- 1) Base intercity train costs are for contracted train operations. The costs per train mile are calculated by dividing the Base intercity Train O&M costs by the Annual Train Miles consumed by the respective Alternatives.
- 2) The source for equipment lease costs for 4-car consist is the TAMC Intercity Rail Implementation Plan Summary, 1997. Equipment leases costs stop in 2005 with purchase of DMU equipment to implement Alternative 3.  
Note that negotiations with the contract operator would determine equipment lease costs and favorable negotiations could lower the conservative, "worse case" costs projected here.
- 3) Source: TAMC Intercity Rail Implementation Plan Summary, 1997
- 4) Same as above. However, costs do not include fare collection or maintenance. Maintenance costs were increased 20% in 2005 to achieve higher operating speeds.
- 5) Based on an average of \$6.00/train mile for ACE access to UP and Caltrain \$4.00/train mile from 1992 agreement with UP.

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management services plus a fee. In negotiations, the full allocation of Caltrain costs would not be accepted as a basis for contracting since they are now fully recovered by Caltrain's operating budget and would not be increased by Caltrain providing contracted services. Using an incremental approach a lower starting point would reasonably result in a contracted cost no higher than \$13.02 per train mile.

The costs in Table 4.5 are compared to DMU intercity service beginning in 2005. All costs are in 1998 dollars. The base train costs are for train operations only. The cost table presents additional costs for leasing equipment, branch line maintenance and a contingency. It is this scenario that is presented in the Financial Plan and analysis in Section 6 for Alternatives 2 and 3.

### **4.5 AROUND THE BAY DAILY SERVICE PLANS**

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This Around the Bay Rail study presents the feasibility of implementing two types of service within a time frame of approximately five years. Daily Around the Bay service on the 47 mile route between Santa Cruz and Monterey was evaluated as a major component the Around the Bay Rail study. Implementation is proposed over a ten-year period between 2005 and 2015. For this study, three phases of service expansion were used beginning with four round trips in 2005. A DMU would depart each end point every 3-4 hours. The travel time would be approximately 1 hour and 47 minutes which is comparable to Caltrain local service over the same distance between San Jose and San Francisco.

This initial service could be achieved with two European Conception DMU vehicles in operation and one spare. Each vehicle would provide seats for 137 passengers and operate separately to provide the initial four round trips. As resources permitted, additional round trips would be introduced. For operating and financial analysis, 4 round trips in 2005 and 8 round trips in 2010 are examined. By 2015, hourly service is proposed with approximately 12 round trips daily. As a future enhancement, train shuttle service for approximately 10 miles between the end points and higher density adjacent localities is proposed. A shuttle between Salinas and Castroville was examined. For 2015, ridership estimates point to a near doubling of daily patronage resulting from the train shuttle expansion.

To provide a picture of this full service the Appendix includes sample timetables for 12 round trips in 2015 with hourly service from each end point. A single AM Northbound sample timetable shows morning departures from Monterey. A set of AM and PM, Northbound and Southbound timetables illustrate potential service with shuttles operating between Santa Cruz and Cabrillo College, and Monterey and Castroville with half hour frequencies. Fully implemented, daily Around the Bay service would provide significantly increased mobility to the region.

Table 4.6 presents the daily service parameters. Its important to note that the DMU trains would be treated on each segment of the route in exactly the same way as locomotive-hauled trains. That is, they would be governed by operating rules and traffic control systems used to dispatch and monitor vehicles as they move from terminal point to terminal point in accordance with railroad operating procedures and Federal Railroad Administration regulations. Control points at the entrance and exits to the UPRR owned segment (on the Coast Line between Pajaro and Castroville) would be operated by UPRR to provide through movements on this ten (10) mile segment for all trains. Priority for daily passenger operations would be part of the negotiated arrangements with the UPRR to use this segment.

**Table 4.6 Around the Bay Daily Rail Service Plan Parameters**

		116%											
Planning Phases (1)		Phase I	Phase I	Phase I	Phase I	Phase I	Phase I	Phase II	Phase II	Phase II	Phase II	Phase III	Phase III
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
I. Daily DMU Ridership over 10 years (2)		922	1071	1243	1444	1677	1947	2261	2625	3049	3540	4111	
A. Peak Ridership Demand Calculations													
Maximum Load Point (3)		70	70	70	70	90	90	130	140	190	210	220	240
Vehicle seating capacity - total seats (wbikes) (4)		137	137	137	137	137	137	137	137	274	274	274	274
Maximum number of vehicles per one-way trip (5)		1	1	1	1	1	1	1	1	2	2	2	2
Percent Capacity > Peak Demand		96%	96%	96%	96%	52%	52%	5%	-2%	44%	30%	25%	14%
Number of Round Trips		4	4	4	4	6	6	8	8	10	10	12	12
Total vehicles to be purchased this year		0	0	0	1	0	1	0	2	1	1	0	0
Total vehicle costs year to date		\$11.1	-	-	\$14.8	-	\$18.5	-	\$25.9	-	\$29.6	-	-
Total trainsets in service (excluding 1 spare) (5)		2	2	2	2	3	3	4	4	5	5	5	5
Miles per one-way trip		47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4	47.4
Travel time per one-way trip (25 mph avg. speed)		116	116	116	116	116	116	116	116	116	116	116	116
Annual Train Miles (trips x 47.4)		138,437	138,437	138,437	138,437	207,656	207,656	276,874	276,874	346,093	346,093	415,312	415,312
Annual Revenue Car Miles (2xs for married pair units)		276,874	276,874	276,874	276,874	415,312	415,312	553,749	553,749	692,186	692,186	830,623	830,623
Annual Train Hours		6,492	6,492	6,492	6,492	9,738	9,738	12,984	12,984	16,230	16,230	19,476	19,476
Base Annual O&M Costs		\$1,186,259	\$1,186,259	\$1,186,259	\$1,186,259	\$1,729,389	\$1,729,389	\$2,272,518	\$2,272,518	\$3,462,665	\$3,462,665	\$4,054,213	\$4,054,213
Peak Period Service Annual O&M Costs (5)													
Total O&M Costs		\$1,186,259	\$1,186,259	\$1,186,259	\$1,186,259	\$1,729,389	\$1,729,389	\$2,272,518	\$2,272,518	\$4,218,999	\$4,218,999	\$4,962,839	\$4,962,839
Total O&M Costs		\$1,086,259	\$1,086,259	\$1,086,259	\$1,086,259	\$1,629,389	\$1,629,389	\$2,172,518	\$2,172,518	\$3,362,665	\$3,362,665	\$3,954,213	\$3,954,213

**Notes**

- 1) Phase 1 begins with procurement in 2004 of three DMU vehicles. During Phase 1 service is initiated and expanded from 4 round trips in 2005 to 6 in 2009.
- 2) Ridership estimate for 2005 w/ 4 Rts (922) is increased over 10 years to reach the estimate for 2015 w/ 12 Rtps.
- 3) The Maximum load point is an estimate of the maximum passenger load during a typical day for the DMU vehicle operating during the peak season.
- 4) The maximum seating capacity of all passenger rail vehicles manufactured today is reduced as amenities are added. ADA compliant restrooms will remove 6-10 seats. Space for 5 bikes on an IC3 Flexliner is estimated to reduce seating from 140 to 137.
- 5) Based on the Ridership, Maximum load point and the maximum seating capacity, the number of vehicles required for service is defined. For four round trips, one vehicle would leave each end point approximately every 3 hours. As frequency of service increases beyond 2009, AM and PM peak period ridership will increase at a higher rate and at least one additional car would be needed for portions of the day. Peak Service O&M costs reflect these extra car miles.

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A key issue would be the procedure for controlling daily Around the Bay trains if they are not on time (within their "slot"). If trains are delayed, the agreements will govern how the UP treats the passenger service if they conflict with freight trains or Amtrak passenger trains. Ideally, the agreements would provide priority to Around the Bay trains within a specified level of delay.

### **Improvements Required and Estimated Capital Costs**

The additional investments to achieve daily Around the Bay rail service, above and beyond intercity service, represent a new direction in for the region. However, capital improvements to implement Alternative 3 Intercity Weekend service contain significant overlaps with daily Around the Bay service including costs for a DMU maintenance facility and equipment. The synergy has the potential to lower total capital costs across both services and to increase the appeal of the investments for local, state and federal approvals. Table 4.7 presents the improvements required to implement Daily DMU service with prior Intercity Weekend Service capital improvements in place.

The daily Around the Bay capital program would be a joint-county program building on the coordinated service experience and agreements established under Alternative 3. For example, conceptual planning estimates are included for extensions from Seaside to Monterey and from the Boardwalk to Union Street at \$3.0 million each. While the locations are in two counties, it is expected that the extensions represent one of several projects that would be implemented concurrently as part of a joint program and that both counties would contribute the joint program based on their improvement goals and mutual agreements.

Table 4.7 shows five Santa Cruz County stations: Union Street, Seabright, 17th Avenue, 41st Avenue, and Cabrillo. Three Monterey County stations include Castroville, Marina and CSU Monterey. An average cost of \$135,000 was used for each station with the exception of the stations in the central business districts of Monterey and Santa Cruz.

Daily Around the Bay service uses Intercity Weekend vehicles (and spare) during week. Two additional DMUs would be needed for daily service during the weekend at an estimated cost of \$3.7M each or \$7.5 million.

### **Stations and Parking**

Phased in daily Around the Bay service would begin with four (4) daily round-trips between Santa Cruz and Monterey and growing to as many as twelve (12) round-trips by 2015. As the frequency increases, the number of work trips and

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**Table 4.7 Daily Service "Around the Bay" Capital Costs**

(with Alternative 3 Intercity Weekend Service in place)

### Key Assumptions

- The table is a summary of conceptual planning capital cost estimates for Daily DMU Service to begin 2005.
- Weekend DMU Service is in place including Maintenance Facility, Pajaro Station and first DMU vehicles.
- Assumes an integrated rail program of both Intercity Weekend Service and Daily Service.
- The 2000-2002 cost estimates are for Alternative 1. Total estimates are without and with Alt. 1 costs included.
- The daily Around the Bay rail service capital investments build on DMU improvements in Alternative 3.

Daily Service	2000-2002	2002	2003	2004	2005-2009	2010	Total	10 Yr. Total
(with Intercity service)	Alternative 1			2 DMUs Purchased		1 DMU purchased	Without Alt. 1	With Alt. 1
Extension to Monterey			\$3,000,000	\$0	\$0	\$0	\$3,000,000	\$3,000,000
Extension to Union Street			\$3,000,000	\$0	\$0	\$0	\$3,000,000	\$3,000,000
Stations Santa Cruz	\$600,000	\$350,000	\$350,000	\$0	\$0	\$0	\$700,000	\$1,300,000
Stations Monterey	\$2,000,000	\$350,000	\$0	\$0	\$0	\$0	\$350,000	\$2,350,000
Pajaro Station (1)		\$0	\$0	\$0	\$0	\$0	\$0	\$0
Tracks and Signals	\$24,300,000		\$0	\$0	\$0	\$0	\$0	\$24,300,000
Tracks/Signals (Access) (2)		\$0	\$2,500,000	\$0	\$0	\$0	\$2,500,000	\$2,500,000
Passing Sidings (3)		\$0	\$0	\$0	\$2,500,000	\$2,500,000	\$5,000,000	\$5,000,000
Maintenance Base (4)			\$0	\$1,000,000	\$0	\$0	\$1,000,000	\$1,000,000
Daily Service DMUs (5)			\$0	\$7,400,000	\$0	\$3,700,000	\$11,100,000	\$11,100,000
<b>Total</b>	<b>\$26,900,000</b>	<b>\$700,000</b>	<b>\$8,850,000</b>	<b>\$8,400,000</b>	<b>\$2,500,000</b>	<b>\$6,200,000</b>	<b>\$26,650,000</b>	<b>\$53,550,000</b>

### Notes for Daily Around the Bay Capital Costs:

- 1) Pajaro Valley Station improvements are completed as part of Alternative 2 and 3.
- 2) Track and signal improvements needed to achieve access from UPRR between Pajaro and Castroville.
- 3) Initial track and signal improvements are completed as part of Alternative 3. Passing sidings are phased in to provide additional capacity for daily service with intercity and to increase average speeds.
- 4) The new DMU maintenance base is completed as part of Alternative 3. Additional \$1.5 million for Daily Service.
- 5) Daily Around the Bay service uses Weekend Intercity vehicles (and spare) during week. Two additional DMUs needed at \$3.7M each = \$7.5 M.

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**Table 4.8 Proposed Daily Rail Service Stations 2005-2015**

	Daily Rail Transit w/ Stations	Stations w/ bus trans- fers, etc.	Ridership Attractions (Assumptions regarding station Improvements)	1997 Population	Miles to Santa Cruz Wharf
<b>Santa Cruz Line</b>					
1 Union Street/CBD	☐	■	JCSC, central bus. distric Locate transit transfers	53,200	1.0
2 Santa Cruz Wharf/Boardwal	●	■	Wharf, hotels, Boardwalk Monterey Bay in Santa Cruz	These Stations	<b>0.0</b>
3 Seabright	☐		Residential/Retail		1.4
4 17th Avenue	☐		Residential/Retail		2.3
5 41st Avenue	☐		Transfer to Capitola Mall, etc.		3.5
6 Capitola	●		Tourist center, beach	10,900	4.8
7 N. Brighton/Cabrillo Cllg.	☐	■	State Park & College		6.2
8 Aptos Village	●		Tourist center, Forest of Nisene Marks State Park		7.4
9 Seascape	●		Beach, resort, residential	Unincrprrtd	10.3
10 Watsonville	●	■	Business District Relocated transit Center	36,700	18.6
<b>Pajaro/Castroville Line</b>					
11 Pajaro/Watsonville Junction	●	■	Major transfer point with weekend intercity service Proposed Redevelopment Track & platform reconfg	3,000	20.2
12 Castroville	☐	■	Key service junction for Daily DMU service New transit transfer point	5,300	30.2
13 Salinas	(see notes below)		Amtrak Intercity Station Local transit transfer point Steinbeck Center, shuttle to central business dist. Transit to San Benito County	123,300	38.0
<b>Monterey Line</b>					
14 Marina	☐		Residential, northern edge of t	17,550	37.3
15 CSU Monterey Bay	☐	■	Fort Ord, CSU, hospital	10,000 (est)	39.9
16 Seaside	●	■	Hotels, bus connections	29,000	43.3
17 Monterey serving Pacific Grove/Carmel	☐	■	ourist & Conference Cent Aquarium, Monterey Bay Hotels, local transit transfer center, Amtrak feeder bus	33,000 22,000	47.4
<b>Total Daily Rail Service Statio</b>	<b>17</b>	<b>10</b>			

**Notes**

- ☐ Sixteen new stations in addition to weekend service stations are assumed for Daily Service by 2015  
These eight stations (in bold type) would be phased in for daily Around the Bay service in addition to 8 static in place for weekend service. Salinas is 17th station that could be served by shuttles 2010-2015.
- These eight stations are assumed to be phased in as part of the Intercity weekend service starting in 2002.
- Ten stations are assumed to have enhanced access elements; see "Smart Access", Section 5 Ridership Est



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trips involving auto travel at the origin end will require parking at high use stations (e.g. Castroville). Around the Bay stations are shown in Table 4.8. Table 4.9 presents the total expected parking demand for each county in 2015 based on the ridership estimates in Section 5. A detailed parking analysis would identify specific locations based on local community plans and space availability.

**Table 4.9 2015 Park and Ride Space Requirements by Mode of Access and by County**

County	Ridership	Trips	Park and Ride	Kiss-Ride	Walk	Feeder Bus	Parking Spaces Need (2)
<b>Santa Cruz (1)</b>	<b>4,359</b>	<b>2,179</b>	<b>654</b>	<b>218</b>	<b>872</b>	<b>436</b>	<b>545</b>
<b>Monterey</b>	<b>3,073</b>	<b>1,536</b>	<b>461</b>	<b>154</b>	<b>615</b>	<b>307</b>	<b>384</b>
<b>Percentage</b>			<b>30%</b>	<b>10%</b>	<b>40%</b>	<b>20%</b>	

Notes:

- 1) 1996 SCCRTC Intercity Recreational Study projected a 10 percent park-ride. It is assumed with the DMU vehicles during the peak season that this number is too low for longer distance trips. No assumptions were shown in Monterey studies given the schedule focus on in-bound visitors.
- 2) Assumes 1.2 vehicle occupancy.

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### Estimated Operating and Maintenance Costs

Table 4.9 presents the Operating and Maintenance daily service with 4 round trips in 2005 and 8 round trips in 2010. A base of daily O&M costs was established using DMU standard costs under a Caltrain operator. A scenario of additional costs for Administration and Maintenance of Way were then added.

**Table 4.9 Daily Around the Bay Rail Service Estimated O&M Costs 2005 and 2010**

	2005	2010
<b>Service Operator</b>	<b>Monterey/Santa Cruz Agency</b>	
<b>Service Plan</b>	<b>Daily DMU</b>	<b>Daily DMU</b>
<b>Daily Rail Transit Train Size (1)</b>	<b>One Car</b>	<b>One Car</b>
<b>Round Trips Santa Cruz-Monterey</b>	<b>4</b>	<b>8</b>
<b>Annual Revenue Train Miles</b>	<b>138,437</b>	<b>276,874</b>
<b>Base Daily Service Train O&amp;M Costs (2)</b>	<b>\$1,186,259</b>	<b>\$2,272,518</b>
<b>Track Maintenance for 47 miles (3)</b>	<b>282,000</b>	<b>310,200</b>
<b>UPRR Track Access (4)</b>	<b>176,728</b>	<b>353,457</b>
<b>Station Maintenance (5)</b>	<b>180,000</b>	<b>225,000</b>
<i>Subtotal:</i>	<i>1,542,988</i>	<i>2,850,975</i>
<b>Administration (15%)</b>	<b>231,448</b>	<b>427,646</b>
<i>Subtotal:</i>	<i>1,774,436</i>	<i>3,278,621</i>
<b>Contingency (16%)</b>	<b>283,910</b>	<b>524,579</b>
<b>Total Daily O&amp;M Costs</b>	<b>\$2,058,345</b>	<b>\$3,803,201</b>

#### Notes

1) The O&M costs are based DMU vehicle and fleet size sufficient to carry projected ridership. The capital program shown in Table 4.5 includes additional vehicles that would be needed for larger loads from special events and festivals.

2) Train operations and maintenance only. The labor costs were based on Caltrain labor standards that are derived from railroad collective bargaining agreements. It is possible that local transit forces could conduct daily DMU operations or maintenance and thereby reduce the operating costs.

3) Track Maintenance costs for daily Around the Bay rail transit service is an incremental addition to the track and signal maintenance required for intercity weekend service. The estimated annual costs for intercity weekend track maintenance are \$12,000 per mile, or \$240,000 for 20 miles. The estimates annual costs for daily rail transit track maintenance is an additional \$6,000 per mile for the 47 mile daily route or \$282,000.

4) UPRR Track Access costs are the estimated annual costs to the Union Pacific Railroad to operate daily service on the 10 miles of the UPRR Coast Line between Pajaro and Castroville. The costs are based on an estimate of \$6.00 per train mile for this track segment. A higher UPRR track access fee is assumed for daily service than intercity service in anticipation of UPRR expecting more dispatching activity as DMUs enter and depart the 10 mile segment between Pajaro and Castroville.

5) Station Maintenance costs for 2005 are based on annual labor costs of 1.5 FTEs to provide maintenance at \$150,000 plus \$30,000 annual costs in maintenance materials. It is assumed that a portion of the labor forces used for track maintenance will be used for station maintenance.

Each DMU contains a power plant. DMU trains will require the same level of inspections and testing as locomotives since they are recognized and regulated by the Federal Railroad Administration as if they are locomotives. This level of inspection and testing is consistent with ordinary railroad maintenance practices.

### **Track Capacity from Pajaro to Castroville**

The 10 mile segment of Coast Main Line, between the junctions with the Santa Cruz and Monterey lines, was investigated to determine if a second track or passing tracks could be added to separate daily DMU trains from existing freight and Amtrak trains between Pajaro and Castroville.

The possibility of adding a second 10-mile track along the Main Line has been raised as a means to reduce conflicts with Union Pacific freight and Amtrak service for DMU operations. As branches, both the 20 mile Santa Cruz Line and the 16 mile Monterey Line have the potential for DMU operations with little to no conflict with Union Pacific freight or Amtrak intercity trains. Both single-track branch lines approach the Coast Main Line on its western side. A second track, located on the western side of the existing line, could completely avoid the engineering and operating complexity of entering or crossing over the existing main line at any point between Santa Cruz and Monterey.

The investigation included:

- A field inspection was made of the entire 10-mile route. Photos were taken approximately every  $\frac{1}{4}$  mile.
- California Department of Fish and Game maps were obtained of the Elkhorn Reserve.
- Staff at the Elkhorn State Fish and Game office was interviewed by telephone.
- Federal and state web sites that include references to active studies on the Elkhorn Slough Reserve were examined and discussed in the phone interviews.

The key constraint on this segment of track is the Elkhorn Reserve (Mile Post 107.5 to 103). This 4-mile section, at the center point between Monterey and Santa Cruz, contains major environmental and physical constraints to widening the existing single-track line. At the end of the Moss Landing siding, a single track descends down a mild slope and proceeds through the 1,400 acre Elkhorn Slough Reserve. The Elkhorn Slough is one of the major marine estuaries in California. The track crosses water on rock fill and numerous small wooden pier bridges. On the ocean (western) side of the track bed, at high tide, the slough water touches the toe of the ballast approximately 6-8 feet from the edge of the ties.

- Historically, the rail bed was a small levee that acted as a barrier for low farmlands. These lands were used for grazing until the late 1970's when statewide coastal preservation programs identified the Elkhorn Slough as a major natural resource. The slough and its surrounding environs, have been the subjects of continuous restoration

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programs and expansion for twenty years. The Reserve is home to seals and other wildlife mammals, 260 bird species and 400 species of invertebrates. Several species are listed as endangered.

- For much of its length, the rail bed is now part of an adapted and managed ecological system that has been modified over several years. Beginning in the 1980's State Fish and Game projects, resulting from negotiations with the Southern Pacific, created a series of controlled openings in the track ballast. These openings allow tidal action to extend into wetlands on both sides of the tracks. At the same time, the track ballast continues to act as a barrier to large scale tidal flooding to the east during the peak of the winter season.
- For approximately 6 months of the year the water level of the slough is raised by winter storm tides and run-off from rainfall along the large coastal hills approximately 1 mile to the east. As a result, the slough waters expand into several hundred acres on the eastern side of the track. Water approaches the toe of the ballast on both sides of the single-track bed.
- For a number of segments ranging from several feet to several hundred feet, a second track could require new, elevated structures. This construction could be expected to cost approximately \$15-\$30 million per mile. Costs for adding a second track through the entire segment could be expected to range from \$30 to more than \$60 million in 1998 dollars. Such construction could require costly additional construction mitigation and complex multi-agency negotiations.

Based on the review of the right of way, a second track or passing tracks for approximately three miles through the Elkhorn Slough Reserve is not feasible. The addition of a second track for the entire length can be expected to require elevated track structures through the Elkhorn Slough Reserve. However, passing tracks within the 6 miles of northern and southern segments are, highly feasible and are recommended for further investigation.

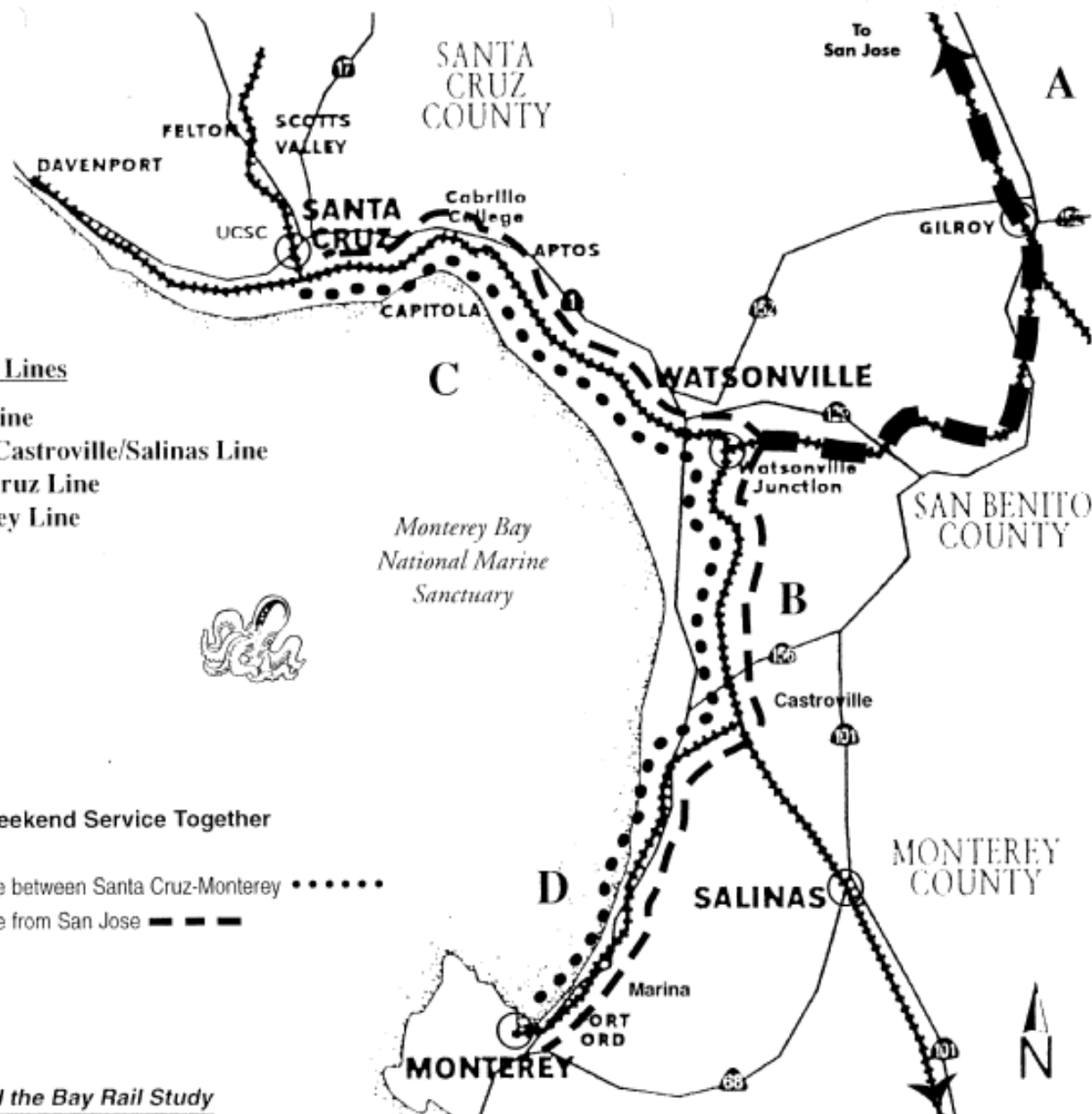
- Rail Lines**
- A. Coast Line
  - B. Pajaro/Castroville/Salinas Line
  - C. Santa Cruz Line
  - D. Monterey Line

**Daily & Weekend Service Together**

DMU Service between Santa Cruz-Monterey .....  
 DMU Service from San Jose - - -

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## **5.0 RIDERSHIP FORECASTS**

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### **5.1 SUMMARY**

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This section analyzes the potential ridership for weekend service and Around the Bay daily service using existing estimates and projections and spreadsheet techniques.

#### **Key Issues**

Sources for ridership analyses are numerous, however, none were specific to the operations under study.

1. A sketch planning methodology was developed to take into account prior work, all existing sources, and the nature of the travel market being served with each service type.
2. The work was accomplished without extensive travel demand modeling or sophisticated and time-consuming techniques, however, it provides a credible estimate of ridership.

#### **Findings**

1. Typical intercity weekend day seasonal (mid-spring to mid-fall) ridership for the full service alternative (Alternative 3) to both counties is estimated to be approximately 1,800 passengers in 2005 and 2,100 in 2015.
2. Annual ridership for intercity weekend service for the full service Alternative (Alternative 3) to both counties is estimated to be approximately 178,900 passengers in 2005 and 213,700 in 2015.
3. Typical weekday ridership for Around the Bay daily service in 2015 is estimated to be approximately 4,000 passengers with hourly service (12 trips per day) and 8,340 with hourly service plus the operation of train shuttle extensions at both ends.

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## **5.2 INTRODUCTION**

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This section contains information about sketch-planning ridership forecasts developed for the Around the Bay rail study. This section contains a survey of existing forecasts developed for various studies, a discussion of types of travel markets to be served by the proposed rail service, a definition of overall analysis districts in this study, an explanation of ridership methodology and results for proposed weekend service, and a similar methodology and results for the proposed Around the Bay daily service.

In general, each potential market is evaluated in terms of its ability to use the rail, and then the market share of these markets is assigned based on travel times, potential fares and other variables. The origin of this methodology is to separate the “probability” aspects of ridership from the “deterministic” aspects. Consider this example:

If a California State University – Monterey Bay (CSU-MB) student has an 8:00 am class and the train will not arrive there until 8:15 am, the student will not consider the train a viable option. Further, if the train would arrive in time, but the student cannot use the train to get home, the train again is not a viable option. Finally, if the student must make a connection using a fixed-route bus service to take the train and the transfer times are not convenient, the student again will choose not to take the train.

This logic further assumes that the regularity of service on the corridor is infrequent enough so that many persons who miss one train will frequently not want to wait for the next one. At a service level of every one to three hours, this assumption is intuitively logical.

The market and forecast ridership for rail transit varies according to trip purpose, train service directness, and span of hours of service or number of trains in a given day. Because many different variables can be considered in ridership forecasting, the efforts to produce detailed forecasts could require a level of effort greater than the entire effort for this study. At the outset of this study, a forecast methodology was presented which creates a “sketch planning” level forecast based on past studies, past travel behaviors and proven elasticity factors developed in past studies. Finally, in cases where assumptions were not readily available, professional estimation was required to factor trips appropriately.

As sketch planning ridership, the results in this study are not restricted to Federal Transit Administration rules of forecasting tool development and application for new start evaluation.

The horizon years selected for this project include 2005 and 2015. The ridership scenarios will contain a forecast for the service expected to be funded and in place at that time. It should be noted that actual service would be added incrementally, based on equipment, funding and demand.

A “smart access” system is assumed for this study. A system such as this assumes that access to and from a given station is available to a point that distance from the station does not become a significantly constricting factor. Possible components of a smart access system include:

- Easy pedestrian connections
- Easy bicycle connections
- Free bicycle availability
- Bicycle storage at stations
- Bicycles allowed on train
- Pay phone availability
- Security systems
- Instantaneous and interactive traveler information systems
- Available park-and-ride spaces
- Available “smart shuttle” services or subsidized taxi
- Availability of electric cars or rental cars
- Timed-transfers for fixed-route transit service
- Automatic fare collection/purchase

It is unrealistic to assume that each of these components will be available at every station. Particular access strategies will be developed as service develops and local residents better define their service needs.

A “smart access assumption” assumes a minimum penalty for using the service. However, it also assumes that all riders would have an access restriction. Reliable local bus services in the two counties that comprise the primary study are also available. These conditions combine to create a concept of this service – to primarily serve trip-makers who are traveling from one area to another and traveling at least 10 or 15 miles one-way.



As a mode designed for long-distance regional trips, the rail mode is not intended to replace or duplicate short (less than 3 to 5 miles) local bus service. In fact, a strong local bus system will be required to allow for “smart access” to be operational.

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### **5.3 SUMMARY OF RECENT TRAVEL FORECASTS**

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Several recently completed studies provide useful information for this study. Most of these forecasting efforts have involved considerable resources and review, and represent a more comprehensive forecasting method than the one in use for this study. This section of the report summarizes various data sources and assesses their usefulness for this study.

**AMBAG** The most recent source for regional travel is the trip tables recently developed by AMBAG for different trip purposes in the three-county region. These tables are a result of a lengthy review process which examined terminal times, roadway segment lengths and travel survey information available from a variety of studies.

The AMBAG studies have trip tables organized in a variety of purposes, including home-based work-trips, home-based college/university trips, home-based secondary school trips, home-based social recreational trips, and non-home based trips.

AMBAG trip tables are available by traffic analysis zones (TAZ). These tables have not yet been summarized in a district (or zone group) format; this work will be done in the study geography proposed in this report as part of our study.

**Santa Cruz Major Transportation Investment Study.** This study is currently approaching completion. The study evaluates a number of corridor options between Santa Cruz and Watsonville including several light rail scenarios, assuming a regularly operating light rail system.

Forecasting within this study reflects a considerable amount of calibration and research. Of particular interest is the “nested logit” mode choice component, which structures mode choices beyond one generic transit mode into types of transit (such as rail and bus) and modes of access (such as walk, bicycle, connecting bus and park-and-ride).

This study also provides information about ons-and-offs at different station locations in the corridor. This information will be a useful guidepost in determining appropriate station locations and amenities.

**San Francisco-Monterey Rail Implementation Project.** The forecasting studies associated with this study were completed in December of 1996. This study identified the market potential of linking the two areas with different types of inter-city (Amtrak) and commuter (Caltrain) service.

Forecasts for this study were also developed using data from other sources, including case studies from other California corridors, forecast tools for California inter-city rail, and surveys by local and nearby individuals.

This study references several factors that were developed from other studies. The elasticity factors associated with train frequency, fares and travel time were shown to be more sensitive issues for inter-city rail passengers than for commuter rail passengers.

Because the forecasts within this study are based on aggregate demand of travel behavior in other corridors, the results do not describe different travel markets within the study area corridor. However, this document provides a substantial body of research on corridor travel patterns and surveys that will be useful when evaluating these markets.

**Intercity Recreational Rail Study.** This study, completed in August of 1996, provides an estimate of ridership between the Bay Area and Santa Cruz if a recreational rail system were to be implemented. The study also contains general travel information about trips between the Bay Area and Santa Cruz. The study is focused on a one-directional system that would arrive in Santa Cruz in the morning and leave in the evening. Markets are evaluated as day visitors and overnight visitors.

Particularly useful in this study is information about seasonal variations in travel demand. This study also identifies market segments for both weekday and weekend conditions. Finally, the study identifies trip patterns from different parts of the San Francisco Bay area to Santa Cruz.

The study also identifies proposed Santa Cruz stations for the service at Pajaro/Watsonville, Aptos Village, Capitola and Santa Cruz Boardwalk. The study assumes a travel time between Watsonville and Santa Cruz of about 100 minutes, and indicates that track improvements could improve this travel time to between 45 and 55 minutes.

**Summer Weekend Travel Survey.** This study, completed in July of 1996, records the results of surveys distributed during the Sun Tan Special weekend, the Rail Fair at the Boardwalk, and at Watsonville and Aptos Village whistle stops. This study is not a random sample study, so its results reflect participants at these events.

The selection of rail transit is highly sensitive to fares, which is documented in surveys of tourists on the Sun Tan Special. A 100 percent difference in fares produces an 80 percent increased negative response rate of riders.

The results of this study reflect acceptability of train operating conditions. The survey includes questions about maximum acceptable travel times, fares and frequency for both Santa Cruz/San Jose service and Santa Cruz/Monterey service.

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## **5.4 GENERAL TRAVEL MARKETS**

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While many sources of information exist, a study is not available that identifies the market potential of the specific service scenarios being discussed for this study. The result is that prior studies provide a useful platform for making comparisons in the future.

**Workers in the Corridor.** Most daily rail systems rely on work-trip users as the main users of their system. While local bus systems frequently have between 30 to 50 percent of the users making work-trips, these percentages typically climb for longer trips and for rail service.

Work-trip behavior is developable from a variety of sources, including AMBAG regional trip tables, census data, and Caltrans Statewide Travel Survey results (for time of day information). Information on households with no vehicle available also provides key information about work-trip ridership potential.

AMBAG trip tables are not completely updated to reflect future year forecasts of each trip interchange. As discussed in the forecasting steps below, assumptions of future work-trip patterns in the area will need to be factored using a growth factor, or Fratar, method. This factoring method will provide a useful forecast for each horizon year.

Additional information will be provided for San Francisco Bay area counties. For this study, the San Francisco Bay area will be divided into three parts: Santa Clara County, Peninsula/San Francisco and North/East San Francisco Bay area. This additional information will include tourist use, student use, and trip purposes.

**Nearby and Local Tourists.** Studies have shown that local and nearby tourists are primarily a weekend and seasonal market, although they have some potential to generate ridership during weekdays. These markets have been surveyed in studies for both Santa Cruz and Monterey.

Weekend travel behavior will include an additional trip table to be derived from local tourist and other rail studies performed for both the Santa Cruz and Monterey markets.

**Long-Distance Tourists.** Data on this market are not as readily available. Further research on travel potential of this market will be made by looking at the home locations of tourists to major trip destinations in the corridor. Conversely, the market potential of using rail to connect local residents with airports will be assessed.

**Students.** Most students expected to use rail service will come from distances far enough to make rail a reasonable choice. Home-based school trips will be examined based on school/university trip tables available from AMBAG. These will be reviewed for reasonableness based on other information received about particular school and university plans. These tables may be enhanced with further information on specialty markets, such as particular schools and targeted programs.

**Local Recreational/Personal Business Trips.** There is a potential to augment ridership by providing some mode for local recreational and personal business trips. Examples include trips to visit family and friends. Retired residents, families with children, and students are three specific age groups who could use this service.

**Other Trip Purposes.** A final category of other trip purposes is available to adjust the forecasts for other trips which typically would not use the rail service. This includes such trip types that are typically too short to use the rail system. These trip types include shopping and medical trips.

### **Study Districts**

Based on the anticipated general locations of stations, corridor study districts were developed. These districts are comprised of census tract groupings. Other considerations are also included in the designation, such as city and county boundaries and districts from the Santa Cruz Major Transportation Investment Study.

Districts on the corridor were assumed to have at least one station site in or close to it. Because market trip lengths are several miles at a minimum and the methodology was a sketch planning tool, the exact location site or number of stations in the district was not assigned any sensitivity to the variable. Thus, these districts should not be directly interpreted as station locations.

Other districts were created outside of the corridor study area to reflect general travel movements in these areas. In several cases, these out-of-corridor districts reflect a large section of the study area rather than a single community.

A map showing these districts is attached. The specific districts include:

### **Santa Cruz County**

- North Santa Cruz County/Scotts Valley
- Central Santa Cruz
- Capitola/Soquel
- Aptos/Summit (including Seascapes Resort area)
- Watsonville (including La Selva Beach)

### **Monterey County**

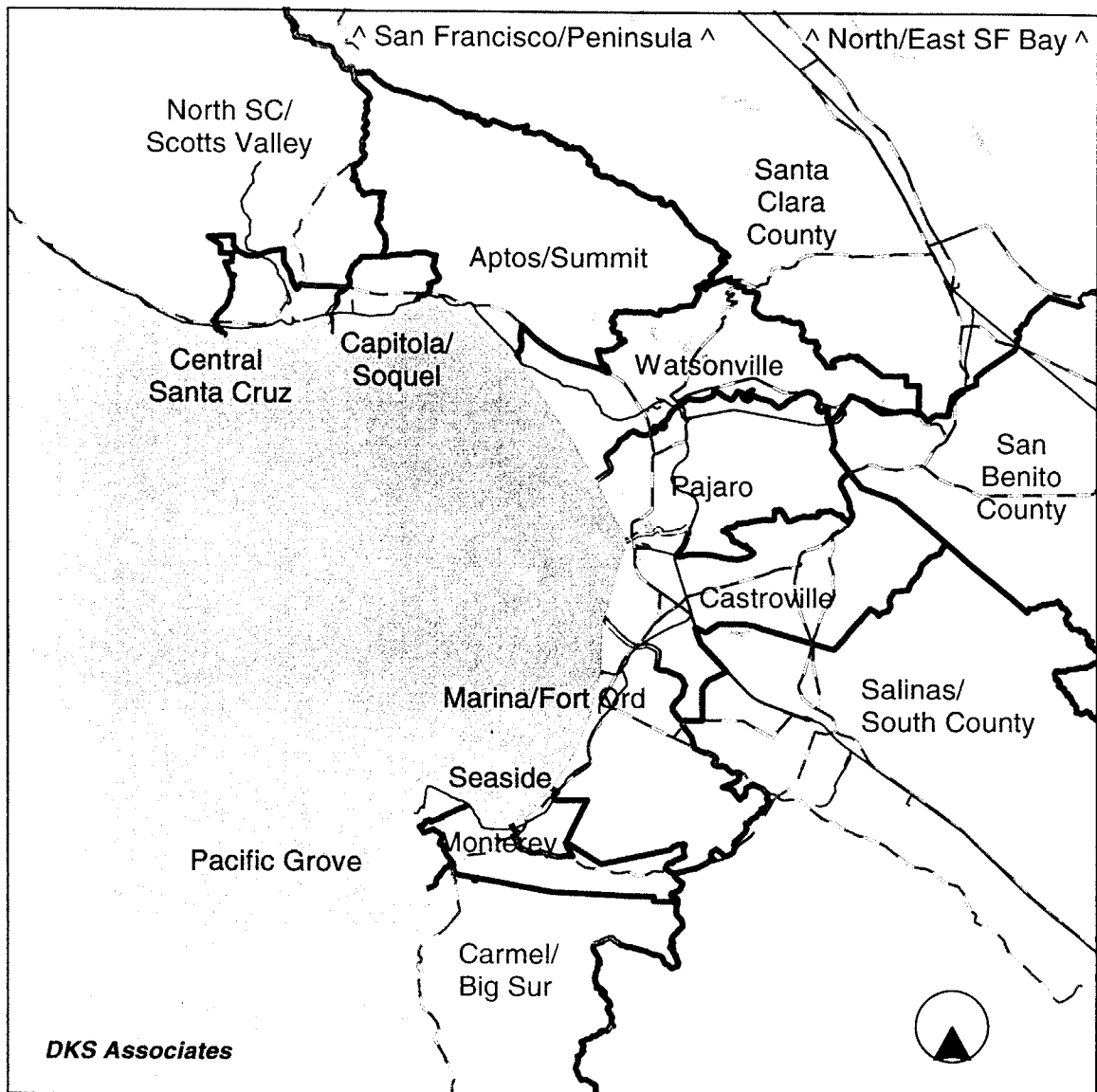
- Pajaro
- Castroville
- Marina/Fort Ord
- Seaside
- Monterey
- Pacific Grove
- Carmel/Big Sur
- Salinas/South County

### **San Benito County**

### **San Francisco Bay Area**

- Santa Clara County
- San Francisco/San Mateo
- East/North San Francisco Bay

## Around-the-Bay Rail Study Forecasting Districts



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### **5.5 WEEKEND SERVICE RIDERSHIP FORECASTS**

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The attractiveness of weekend rail service depends on many factors. Specialized studies for both Santa Cruz and Monterey Counties have examined weekend ridership forecasts and determined the markets served when operating during different seasons and on different days of the week. These studies have included surveys of different travel markets using a variety of methods, and examined tourism information available from local attractions.

#### ***Methodology***

This study examined ridership for weekend service based on proposals to use rail service to connect Santa Cruz and Monterey Counties with the San Francisco Bay area. The study estimates the number of trip ends between the two areas, based on demand identified from past studies.

Each of the recently-proposed weekend services had a different start-up year. This study developed that information for estimates of a 2005 service by applying a growth rate to the start up year. Growth in travel between 2005 and 2015 was assumed at the same rate that employment grew in each of the two study area counties.

Weekend market potential tables were created by examining San Francisco Bay Area destination attractiveness to rail corridor destinations. These tables were designed to be sensitive to weekdays and weekend days, as well as season and non-season variations, and were based on prior forecasts of recreational service.

Previous studies have discussed the feasibility of through-train connections to San Francisco and timed transfer service to the East Bay, rather than stopping in San Jose. For purposes of the ridership forecasts, all connectivity to the various locations in the San Francisco Bay area is viewed as “seamless” with minimal layover time in San Jose, regardless of whether a train-to-train transfer is required or not. Dampening of forecasted ridership volumes from San Francisco and the East Bay would be required if additional wait time was required.

Prior studies had also identified a number of relationships about market segments. Many of these relationships were identified from travel surveys or other weekend rail operations. These relationships were repeated in the ridership analysis for this study. They include:

- A general market share target of 4 to 4.4 percent between the two areas was determined in prior studies. This was disaggregated to Santa Clara County, San Francisco/Peninsula and East/North Bay. The disaggregation was based on approximate free-flow travel times and number of trip ends from the two counties. To highlight the differentiation of attractiveness of these areas, the base used was 6 percent for San Francisco/San Mateo trips (because of higher transit orientation in this market) and 4 percent for Santa Clara County and East/North Bay trips. These percentages generally assume that a timed-transfer or direct connection into Santa Cruz and Monterey Counties is possible from all of these areas.
- One of these studies examined service elasticity multipliers based on the number of trains per day. This was used to further define the peak weekend day ridership scenarios.

Using this peak weekend day information, annual ridership totals were developed. These totals took into account different seasonal issues discussed in past studies. Thus, this study made a general differentiation between season and non-season weekends, and Saturdays and Sundays as opposed to Thursdays and Fridays. Although these items were presented differently in each study, a general relationship was identifiable based on information from these studies.

### ***Year 2005 and 2015 Forecasts***

The previous forecasts for weekend travel between the intercity weekend studies for Santa Cruz and Monterey counties are generally consistent. By using information from these studies, the typical weekend day in peak season ridership can be derived for the weekend service. A number of issues shape the discussion of projecting typical weekend day travel from the San Francisco/San Jose Bay areas.

First, travel demand is greatest (for 70% of the visitors) to reach the end line stations within the cities of Monterey and Santa Cruz. As popular day tourist and resort destinations, these areas are logically the most attractive for special weekend service. Further disaggregation of these data is available in the Appendix for Section 5.

Second, it should be noted that low market shares such as these (4 to 6 percent) are subject to wide fluctuations. Given the long distance of the train trip, non-travel time issues such as promotions and hotel shuttles can significantly affect the actual ridership. The ridership projections assume that the train service will be a part of



## ***Around the Bay Rail Study***

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the promotion and advertising of virtually all festivals and special events during the year may. Such promotion are expected to have a notable impact on ridership.

Third, it is assumed that fares would be bundled with promotions of major events and attractions including larger hotels, the Monterey Bay Aquarium and the Boardwalk in Santa Cruz to name but a few. Surveys by both counties support fares based on .13 to .15 cents per mile, or a one-way adult fare of approximately \$10 from San Jose. This revenue yield per mile is the same as that of the Capitol Corridor. To be conservative as well as to incorporate the projected use of promotional fares and bundling fares with major attractions, a deeply discounted average one way fare of \$6.63 was used to calculate annual fare box revenues for intercity weekend service throughout this analysis.

Substantial experience has been acquired in the last five years of California intercity train service from the use of fare promotions, fare increases and from the impacts of fares on ridership. In general, the experience reveals strong demand for intercity service throughout the state that is relatively insensitive to fare increases. Fare promotions that provide discounts to families ("second person rides free") have resulted in ridership growth in the range of 5-10 percent. When promotions have been targeted to attract families during the off-season, they have induced travel growth to the extent that small percentages in annual revenue growth were achieved. At the same time, small annual fare increases, on the order of 1-5 percent, have resulted in little to no ridership loss. This record of a "peer" experience of strong ridership demand suggest a potential upside to some of the conservative assumptions employed in the Around the Bay Rail Study.

A fourth issue is would train service to Santa Cruz and Monterey at the same time create a competition for ridership between the two? The service from a common market to two relatively contiguous destinations is not projected to notably increase or decrease consumer choice to travel or total train ridership to either destination. For this analysis, each market exists independently with its own identity and set of attractions. The significant distance of nearly fifty miles between the end points makes a halo-effect from new access to both by train, on the positive or negative side for Santa Cruz versus Monterey annual visitors, unlikely.

Because the initial terminus is in Seaside in 2005, allowances were made for increased travel time needed for Downtown Monterey-bound passengers. This allowance was assumed as a 0.9 factor for locally-bound Monterey trips (not Pacific Grove or Carmel trips). The impact of lower ridership in Monterey can be minimized with the installation of hotel and attraction shuttle connections at the Seaside end point.

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An additional allowance to represent the frequency of trains was also included. According to the Monterey County studies, a factor of 0.7 can be applied if one train runs rather than two.

A summary of the forecasts presented in Table 5.1 suggest that about 700 to 1,000 riders per day are possible with each county's proposed service. Note that Table 5.1 presents typical riders per day for each of the Alternatives reviewed in Section 4. The typical riders per day is the same for more than one alternative. Total annual ridership is based on the number of trips per day and the number of days per week for each county. The totals are slightly higher for Santa Cruz County because of the projected service plan to Santa Cruz calls for two daily round trips. These forecasts also vary from those in prior intercity rail studies because the markets are desegregated, the horizon years are changed, and the peak season is adjusted to be 26 weeks.

**Table 5.1 Typical Weekend Day Seasonal Ridership by Line for Weekend Service To/From San Francisco Bay Area**

Alternative	Santa Cruz County		Monterey County*	
	2005	2015	2005	2015
Base Alternative 1	1,072	1,236	726	890
Alternative 2	750	865	726	890
Alternative 3 Full Service	1,072	1,236	726	890

Note:

\* Monterey County alternatives stop at Seaside in 2005.

Source: DKS Associates

Applying factors for times of day, days per week and a season–non season service split for each alternative, annual ridership forecasts were forecasted. Non-season is expressed as 60 percent of Santa Cruz County weekend volume, and 67 percent of Monterey County weekend volume. Both studies suggest that this range is an acceptable differentiation between season and non-season operations if both are defined as 26 weeks each.

Weekday (Thursday and Friday) ridership is assigned as 80 percentage of the total typical weekend day volume. The Monterey studies utilized this percentage as a rule of thumb.

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**Table 5.2 Annual Ridership Summary by Line for Weekend Service To/From San Francisco Bay Area**

<b>Alternative</b>	<b>Santa Cruz County</b>		<b>Monterey County*</b>	
	<b>2005</b>	<b>2015</b>	<b>2005</b>	<b>2015</b>
Base Alternative 1	64,300	74,100	100,900	123,700
Alternative 2	43,700	50,400	44,100	54,100
Alternative 3 Start-Up	78,000	90,000	52,800	64,800
Alternative 3 Full Service	78,000	90,000	100,900	123,700

*Note:*

\* Monterey County alternatives stop at Seaside in 2005.

*Source:* DKS Associates

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### **5.6 WEEKDAY SERVICE RIDERSHIP FORECASTS**

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Weekday ridership is anticipated to reflect more typical urban demand for transit. Such long-distance rail systems typically rely on three types of trips to sustain ridership of this length – work-trips, university trips, and recreational trips.

The AMBAG data already has work-trips and university trips designated. Recreational trips are a subset of the “other” trip category.

#### ***Methodology***

Around the Bay weekday ridership forecasts were conducted by examining three steps. The steps are the development of total trip tables, estimation of the market potential, and estimation of the market share for the rail markets. These steps allow for the markets to be identified before the rail ridership potential is assessed, and provide for the introduction of sensitivity of fares and travel times as variables to determine minimum and maximum ridership forecasts.

**Total Trips.** General trip tables of different trip patterns and trip purposes were developed using AMBAG trip tables as a basis. AMBAG trip tables are available by Traffic Analysis Zones (TAZ). DKS staff combined trips per Traffic Analysis Zones (TAZ) up to a district level.

Available AMBAG trip tables (December 1997) were not completely updated to reflect future year forecasts of each trip interchange. Growth assumptions in the area were factored using a growth factor, or Fratar, method. Different factors were developed for each community in the study area, based on household and employment growth forecasts. (Note that the Fratar method is an often-used allocation method of distributing trips in circumstances where future year trip tables are not yet available.) This factoring method generally provided a useful forecast for each horizon year.

One special adjustment was required from the forecast trip table. This involved evaluating the impacts of recent Fort Ord redevelopment plans. Adjustments were made to university trips to assign the location of students who would attend the developing California State University. Also, minor adjustments were made to housing and employment growth assumptions to account for changes resulting from current development strategies for the area.

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Additional information was provided for San Francisco Bay area counties. The study forecasts divided the Bay area into three parts: Santa Clara County, Peninsula/San Francisco and North/East San Francisco Bay area.

A set of total trip tables for each market was developed from the trip tables for work-trips, university trips and other trips. These tables were further reduced to represent service for a 16-hour hour span of service for the proposed Around the Bay service. This percentage was based on the 1991 Statewide Travel Survey. The percentage reduction for the different purposes is:

Work-trips	84.6 percent
Shopping trips	88.9 percent
Other trips	80.4 percent
Non-home based trips	92.7 percent

**Market Potential.** A market potential set of trip tables were developed to allocate these tables to conditions such as span of service (time of day), general frequency and travel time issues, and other factors that will remove parts of each market because of these considerations. The potential of newly “induced” trips was included here as well. The percentage of total trip markets on a daily basis was assigned interactively with the operating scenarios to be studied. For example, the markets which could use rail increase if the rail service operates over a longer span during the day or more frequently.

Weekday market shares were developed by dividing the market potential into three market categories:

- **Primary markets** were defined in 2005 as those trip interchanges defined as within the corridor, and at distances generally over 20 miles between districts. Because of the long distances involved, it was assumed that transit trips between these markets would be made on the rail system. The same definition was applied to 2015 trips for primary markets, except the trip length was shortened to 15 miles because the higher train frequencies made it more possible to use rail for shorter trips. In general, it was deemed appropriate for users to make two mode transfers when using the rail at these distances.
- **Secondary markets** were defined in 2005 as those trip interchanges defined as within the corridor, and at distances generally between 10 and 20 miles between districts on the rail corridor. Unlike primary markets, secondary markets would have less attractiveness for rail because they may be served by direct auto connections or by parallel bus routes. By 2015, the increased

service levels would make the 5 to 15 mile distance a more acceptable rail market. This study assumes that a supporting bus network would be developed at a later date to maximize timed rail connections.

- **Shuttle markets** were defined as specialized markets that would become available for short-distance trips in the shuttle corridors. By offering effective headways of 30 minute-service in 2015, these markets would represent the attractiveness similar to a limited stop local bus service. These markets would include those trips which could be as short as two or three miles.

**Market Share.** A market share set of trip tables was then developed to demonstrate the modal trade-offs between this rail service and using private vehicles. The market share calculations reflected the general percentages of transit trips that can be expected from each of the counties in the study area.

The process began by determining which travel markets would be served in the horizon years of 2005 and 2015. These travel markets are different because of the frequency of service differences proposed in these two years. The overall market share was then defined for each of the three trip types – primary, secondary and shuttle.

For the primary markets, the base mode choice percentages were assigned at 3.0 percent for work and university trips and 2.4 percent for other trips in the corridor. These percentages reflect approximately a 0.8 percent higher share than the regional survey demonstrates. Secondary trip percentages are set at the regional averages of 2.2 and 1.6 percent for work/university and other trips, respectively.

Further dampening was given to secondary market trips to account for the likelihood that some (assumed as 25 percent) of the transit trips would not use the rail, and would instead use direct parallel bus service. (It is important to note that a well-utilized rail service will require some bus route restructuring to allow for an effective investment. It is anticipated that some—but not all—new routes to service rail stops would be implemented, and that these new route miles and hours would be reallocated from existing routes which run parallel to the rail corridor).

The shuttle trip allowances were assumed to operate similarly to bus routes in the areas, with half-hour frequency and only short distances possible. Thus, 50 percent of the trips between two shuttle travel markets were assumed to occur on parallel bus rather than on the rail.

In 2005, additional allowances had to be made for the extremely long periods between rail services. Using elasticity factors available from the Monterey Rail

Implementation Study, a service reduction factor of 0.7 was used for the two-hour headway (six daily trains) service. An additional 0.7 reduction factor was applied to the three-hour headway (four daily trains) service for work and university trips because these trip types are more time-sensitive. Finally, an additional reduction factor of 0.8 was applied to all trip purposes because rail service would be substantially less attractive with only four trains per day.

In 2015, these additional ridership reductions are removed because hourly service reflects schedules similar to existing longer-distance bus routes in the two counties. The shuttle service options provide two additional ridership benefits:

- The shuttle services allow for shorter-distance trips to also be served by rail.
- The shuttle services improve the desirability of using rail for the secondary and primary market trips within the shuttle corridor, because the headways would be only 30 minutes between trains.

### ***Year 2005 Forecasts***

The year 2005 markets are expressed as having longer minimum distances than markets in 2015 because the use of rail is less desirable if train frequencies are low. The result is that the markets in 2005 are defined as primary for trips greater than 20 miles on the rail, and secondary for trips greater than 10 miles on the rail.

Adjustments for a Seaside end point in 2005 are made when defining markets. The attractiveness of using rail is particularly diminished between Marina/Fort Ord and Monterey/Pacific Grove because transferring to rail for the Seaside-to-Marina portion of the trip is more time consuming than using a bus which already makes this connection more directly and more frequently today.

The application of these markets to regional trip table results in a definition of markets as described in Table 5.3. As this table shows, the markets for the area are mostly non-work/non-university. With work-trips representing only about a quarter of the total market in the corridor, a day-long service would be most appropriate as opposed to a peak hour only service.

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**Table 5.3 Typical Weekday Markets Phase 1: Around the Bay Rail Service – 2005**

Trip Purpose	Primary		Secondary		Total	
	Trips	Percent	Trips	Percent	Trips	Percent
Work-trips	7,150	18%	12,538	28%	19,688	23%
Non-Work/Non-University Trips	25,467	62%	26,577	59%	52,044	60%
University Trips	8,137	20%	6,199	14%	14,336	17%
Total Trips	40,754	100%	45,314	100%	86,068	100%
Source: DKS Associates						

The year 2005 market size is more restricted, due to the limited number of trains proposed during the day. Four-train and six-train scenarios were analyzed. In these cases, it was assumed that the train headways would be equally timed, and that a twelve-hour span of service would be implemented. The four-train service would be defined as service every three hours during the day, while the six-train service would be defined as service every two hours or 120 minutes.

The travel market sizes were determined according to an identification of the types of markets in 2005. Then, the trips within the market were tallied as primary, secondary or limited markets. Because ridership from limited markets would be further limited in 2005 due to the infrequent service, only the primary and secondary market segments were targeted as identifying significant rail ridership.

The resulting ridership shown in Table 5.4 shows that ridership would be about 900 to 1,300 trips per day, or 450 to 650 one-way. The sensitivity of actual operating times, connecting bus services, “smart access,” and promotions could raise or lower this forecast.

The average distances described in the three travel markets above were used to define an average fare \$2.76 for daily rail transit service. The ridership assumptions were made assuming that rail fares would be similar to parallel bus services operating over similar distances in the corridor today.

Should fares for the rail become substantially higher, a significant reduction in rail ridership will result as people shift to parallel bus routes. Otherwise, the overall effect of fares on daily rail transit ridership Around the Bay is estimated to be about an elasticity of  $-0.3$  (a one percent increase in fares will create a 0.3 percent decrease in ridership), as indicated from other rail studies performed in the area.



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**Table 5.4 Average Weekday Ridership Phase 1: Around the Bay Rail Service – 2005**

Trip Purpose	Primary		Secondary		Total	
	4 Round Trips	6 Round Trips	4 Round Trips	6 Round Trips	4 Round Trips	6 Round Trips
Work-trips	84	150	108	193	192	343
Non-Work/Non-University Trips	342	428	238	298	580	726
University Trips	96	171	53	95	149	266
Total Trips	522	749	400	586	922	1,335
Source: DKS Associates						

## Year 2015 Forecasts

The development of year 2015 forecasts began with readjusting for continued growth in the 2005 to 2015 period. In addition, the market sizes for rail would increase as the system begins to operate on a more frequent schedule. Finally, gradual expansion of support facilities to the system, such as better feeder buses, more park-and-ride locations, “smart access” and station amenities will lend further attractiveness to using rail for shorter distances.

The results of the improvements in available rail markets are demonstrated in Table 5.5, Weekday Markets Phase 3. As this table shows, the market size will approach 200,000 typical weekday trips in 2015. This share is more than double the 2005 market share. The total number of work, non-work and university trips all grow significantly, but the general shares of trips remain about the same.

**Table 5.5 Weekday Markets Phase 3: Daily Around the Bay Rail Service – 2015**

Trip Purpose	Primary		Secondary		Total	
	Trips	Percent	Trips	Percent	Trips	Percent
Work-trips	18,531	22%	26,167	23%	44,698	23%
Non-Work/Non-Univ Trips	51,441	60%	61,272	55%	112,713	57%
University Trips	15,463	18%	24,635	22%	40,098	20%
Total Trips	85,435	100%	112,074	100%	197,509	100%
Source: DKS Associates						

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The result of the improved market is a significantly higher ridership forecast in 2015 for the hourly Around the Bay service. As is shown in Table 5.6, the overall forecast would grow to over 4,000 riders per day in 2015. The addition of shuttles in Santa Cruz and Monterey would add an increase of 2,100 and 1,200 more riders respectively. Shuttles to connect Salinas with the Around the Bay daily service were briefly examined, and the limited market for this shuttle was forecasted to produce ridership at fewer than 600 riders a day.

One additional related train service not presented in this study could increase Around the Bay transit patronage in 2015. Should daily intercity service to and from the San Francisco Bay Area become operational, the Around the Bay service could provide a timed-transfer feeder rail link for these larger distance trips and ridership would grow. Additional ridership resulting from such a connection would be a function of transfer times and train frequency of each service.

# Around the Bay Rail Study

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**Table 5.6 Average Weekday Ridership – 12 Roundtrips Phase 3: Around the Bay Rail Service – 2015**

Trip Purpose	Primary Market Riders			Secondary Market Riders			Shuttle Market Riders		Total Riders	
	Hourly	Additional Shuttles		Hourly	Additional Shuttles		Santa Cruz	Monterey	Hourly	Hourly with Shuttles
		Santa Cruz	Monterey		Santa Cruz	Monterey				
Work-trips	556	0	22	589	65	123	345	316	1,145	2,016
Non-Work/Non-Univ Trips	1,029	0	68	919	215	177	1,614	738	1,948	4,759
University Trips	464	0	0	554	155	82	181	128	1,018	1,565
Total Trips	2,049	0	90	2,062	435	383	2,139	1,182	4,111	8,340
Note: Prepared February 27, 1998 by DKS Associates Source: DKS Associates										

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## **6.0 FINANCIAL PLAN**

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### **6.1 SUMMARY**

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Section 1.5 of the Executive Summary shows the capital investment costs for each alternative and the corresponding annual operating subsidies. Section 6 presents the costs and funding requirements for intercity weekend and daily Around the Bay rail service in greater detail. Potential cost sharing formulas applicable to Monterey and Santa Cruz Counties to pay for the rail service are reviewed. Section 6 reports the following tasks:

1. Subsidy requirements and funding sources to pay for the service were identified.
2. The existing federal, state and regional funding programs that each county relies on to fund their current transit services and transportation improvement programs were reviewed with the two county transportation planning agencies. These programs include federal transit funds which support the Santa Cruz Metropolitan Transit District (SCMTD) and the Monterey-Salinas Transit System (MST).
3. Other federal and state capital funding programs that are available to support other transportation modes including highway and local streets/road improvements were reviewed and documented for this report.
4. Local funds, such as the Local Transportation Fund, which is primarily allocated for, transit and paratransit services in both counties were identified. In Santa Cruz County a local ½ cent sales tax is dedicated to the Santa Cruz Metropolitan Transit District. These existing sources were designated to be outside of the potential funding sources for this study. No similar sales tax is dedicated to transportation in Monterey County.
5. Additional local funding opportunities which could be used to help pay for regional rail program were reviewed.
6. Cost sharing strategies for Santa Cruz and Monterey Counties to cooperatively fund the service were discussed and used for projecting funding and costs of the new passenger rail service.

## **Key Issues**

1. The combination of significant new capital investments described in Section 4 and ongoing operating subsidy requirements exceed the current revenue resources of Santa Cruz and Monterey Counties. New capital and operating revenues are required.
2. There is significant demand for existing transportation revenues in Santa Cruz and Monterey Counties. In addition to major commitments from traditional state, federal and local transportation revenues, new locally generated revenues in Santa Cruz and Monterey Counties are required to pay for the regional rail program. Santa Cruz County has expressed interest in a gas tax increase and Monterey County is pursuing a ½ cent sales tax. Both tax increases would require a 2/3 majority vote.
3. Based on “peer” rail services, a straightforward easy-to-use cost allocation formula is proposed for initial start-up service.

## **Recommendations**

1. Based on the projected annual operating costs and the estimated passenger fares, annual operating subsidies will be required. This amount ranges from a low of \$1.6 million in 2002 and increases too \$4.4 million in 2010. The actual operating subsidy requirement for each year is shown in Table 6.1.
2. Local and regional funds are needed for the proposed regional rail program to provide the required match to federal and state grants and to support the ongoing operating costs. These funds could come from a variety of sources including Transportation Development Act (TDA) and State Transit Assistance (STA) funds, AB 2766 Funds (from the Monterey Bay Unified Air Pollution Control District), and private contributions through the hospitality industry.
3. Polling has indicated that the most likely new funding opportunity to successfully meet the two-thirds majority electoral challenge in Monterey County is a ½ cent sales tax, whereas, in Santa Cruz County there is more interest in a gasoline tax.
4. The recommended cost sharing strategy for the initial years of the Around the Bay Rail Service include:

- Sharing of operating costs would be based on passenger boardings and alightings. Initially, ridership would have to be estimated or assumed to be equally; the initial assumptions could be confirmed through passenger surveys after the first two years of service.
- Capital costs would be evenly split between the counties for shared items, and improvements benefiting a specific county (such as a new station or platform) would be solely the financial responsibility of that county.
- After an initial start-up period (one to two years), it would be appropriate to revisit the operating and cost sharing formulas to determine if they are fair and equitable to both counties and they achieve the longer-term financial objectives of the regional rail program.

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## **6.2 CAPITAL AND OPERATING COST SUMMARY**

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A summary of the operating and capital costs for intercity weekend and daily Around the Bay Rail Service is presented in Table 6.1.

### **Capital Costs**

All costs are presented in 1998 (constant) dollars. Capital costs range from a low of \$5.4 million to a high of \$27.5 million per year. Capital expenses vary depending upon on the number of stations, level of track improvements, and proposed DMU vehicle purchases. Capital expenditures are lowest in years 2002 and 2010, ranging between \$5 million and \$6 million per year. In 2003, 2004 and 2005 costs increase significantly due to the capital investments required for DMU service including a new maintenance base and DMU vehicles.

### **Operating Costs**

The operating costs are presented separately for intercity weekend service and Around the Bay daily service in Table 6.1. It shows that operating costs for alternate weekend service is nearly \$2.2 million and would increase to \$2.6 million under Alternative 3 in year 2010 under enhanced service levels (two weekend trains to Santa Cruz and one weekend train to Monterey). Operating costs are added to intercity weekend costs in years 2005 and 2010 when four and eight daily trains are proposed. Estimated costs for daily service ranges between \$2.6 million and \$4.6 million in years 2005 and 2010 respectively. Total

operating costs for the combined services are estimated at \$4.7 million in 2005 and nearly \$7.3 million in 2010.

Table 6.1 also incorporates projected passenger fare revenues to determine the projected system subsidy requirements for the Around the Bay Rail Service. The financial requirements for the regional rail program should be shared between the two counties, as discussed in the following sections.

**Table 6.1 Summary of Capital and Operating Costs  
Combined Intercity Weekend and Daily Service (2002 - 2010)**

	2002	2003	2004	2005	2010
	Alt. 2 service (under contract) as start up bridge service	Alt. 2 Weekend Service continues. Investments for Alternative 3, Intercity DMU service begin.	Alt. 3 is phased in. Alt. 2 wknd phased out. Daily DMU ATB service begins 4-6 RTs and grows to 8 RTs in 2010.		
Annual Operating Costs					
Intercity Weekend	\$2,178,028	\$2,177,940	\$2,177,940	\$2,200,580	\$2,630,590
Daily (begins 2005)	\$0	\$0	\$0	\$2,058,345	\$3,803,201
<b>Total Operating Costs</b>	<b>\$2,178,028</b>	<b>\$2,177,940</b>	<b>\$2,177,940</b>	<b>\$4,258,925</b>	<b>\$6,433,791</b>
Annual Fare Revenues	\$550,290	\$550,290	\$550,290	\$1,992,147	\$3,182,895
<b>Operating Subsidy Required</b>	<b>\$1,627,738</b>	<b>\$1,627,650</b>	<b>\$1,627,650</b>	<b>\$2,266,778</b>	<b>\$3,250,896</b>
Capital Costs	\$5,450,000	\$23,216,667	\$27,516,667	\$18,616,667	\$6,200,000
<b>Total Funding Requirements</b>	<b>\$7,077,738</b>	<b>\$24,844,317</b>	<b>\$29,144,317</b>	<b>\$20,883,445</b>	<b>\$9,450,896</b>



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## 6.3 COST ALLOCATION METHODS

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There are several different methods agencies use to cooperatively fund inter-jurisdictional transit services. Common among regional *bus* services are formulas based on population, service quantity (hours or miles), or ridership. Each has inherent limitations and there is no single ideal cost sharing methodology. An important consideration in selecting a funding methodology is the ease of implementation, equity between funding partners and the costs in day-to-day administration.

To better understand how intercounty regional *rail* services approach cost sharing, we have reviewed the funding formula employed by both the Peninsula Corridor Joint Powers Board (PCJPB) which administers Caltrain service, and the proposed cost sharing allocations for the Altamont Commuter Express (ACE) service.

### Caltrain Peninsula Commute Service

An operating and capital cost sharing plan for the three member agencies of the Peninsula Corridor Joint Powers Board- PCJPB (City of San Francisco, San Mateo County Transit District, and Santa Clara Valley Transportation Authority) was outlined in the 1991 Joint Powers Agreement. The basic principles of the agreed upon formula are still in effect today. The funding principles are based on the following elements:

#### Operating Cost Sharing

The current formula is based on a.m. peak boardings and is verified annually based on morning peak boarding counts. This formula applies to Mainline (San Francisco to Tamien) service. The Santa Clara Valley Transportation Authority (SCVTA) pays 100% of the net operating and maintenance costs for service between Tamien and Gilroy.

#### Capital Cost Sharing

Capital costs for replacement and enhancement projects for Mainline Service are split evenly among the three counties. The goal is to leverage outside funding grants so the PCJPB is only responsible for the local match requirement. Cost sharing for *expansion* projects is handled on a case-by-case basis. Capital costs associated with the Gilroy Extension (or any other extension) are the responsibility of the respective county.

## **Administrative costs**

Administrative expenses are shared equally by the member agencies.

## **Altamont Commute Service (ACE)**

In 1997, a Joint Exercise of Powers Agreement for the Altamont Commuter Express (ACE) service was signed among three agencies - the Alameda County Congestion Management Agency (ACCMA), the Santa Clara Valley Transportation Authority (SCVTA), and the San Joaquin Regional Rail Commission (SJRRRC). This agreement spells out the obligations of each member agency during an initial commitment period and outlines plans for continued service. The proposed allocation of costs is described below.

## **Operating Cost Sharing**

ACE is a new rail service without a performance track record, and therefore, the operating cost sharing agreement has been designed to be reevaluated and potentially revised, after the service has been established. The formula for sharing operating costs among the JPA partners during the first four years of service is as follows:

**Year 1** costs will be split equally among the three funding partners, rather than on passenger boardings because the JPA is unable to project ridership by origin and destination with a high degree of accuracy.

**Years 2 & 3** will be based on passenger boardings and alightings based on annual passenger surveys.

**Year 4** will develop a long-term agreement based upon the results of the first three years of service operation.

## **Capital Cost Sharing**

The approach to capital cost sharing is for each county to assume financial responsibility for station and track improvements with their jurisdiction (including tracks and stations). SJRRRC will be purchasing the initial rolling stock (with Proposition 116 funds and local sales tax revenues) to move the project forward. Subsequent purchases will be made by Santa Clara and Alameda Counties and will be handled on a case-by-case basis.

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## **6.4 COST SHARING STRATEGY**

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The cost sharing formulas of the existing Caltrain service and the proposed ACE service follow the same basic funding principles. Operating subsidies are based on ridership. Capital cost contributions are a combination of shared costs, as well as, individual counties assuming financial responsibility for improvements within their jurisdiction. Now that the PCJPB has nearly nine years of experience with its funding formulas, it is beginning to review its basic funding principles to reflect current operating conditions and the financial climate of member agencies. ACE has just completed negotiations and has yet to initiate service. Although the agencies have different experiences with these funding formulas, there are some obvious benefits and limitations in a ridership based operating formula.

### **Advantages**

An operating cost sharing formula based on boardings is easy to managing using a relatively low cost annual passenger count. More elaborate formulas are based on service quantity, such as service miles or hours. The advantage of this type of approach is that funding partners pay for the level of services received. Those who invest in shorter travel time and greater attractiveness and efficiency of their service are rewarded by funding fewer hours of service.

### **Disadvantages**

One of the major disadvantages with an operating formula based on boardings is that it penalizes a county for increasing ridership rather than rewarding ridership growth. This could potentially discourage a member agency from marketing its services to increase ridership when the result may be increasing its operating subsidy. Another disadvantage with this formula for counties that see a high percentage of its riders traveling to the adjacent county is that there is no account for the economic benefits derived from these commuters by the "destination" county. For example, riders traveling into a county will likely be spending money on goods and services and increase sales tax revenues in that county. There are also disadvantages associated with other cost sharing formulas. For instance, bus services that apply a service quality based funding formulas find its major disadvantage to be that it must be adjusted with every service level and schedule change. There are also systems that employ a hybrid approach, although they can be complicated and difficult to administer, particularly with a new or start-up services.

## **Recommendation**

Given the complexities in initiating service, it is recommended that Santa Cruz and Monterey Counties follow a similar cost sharing approach to Caltrain and ACE, at least during the initial start-up period. Experience has shown that negotiating funding formulas can be a time consuming effort and it is reasonable to proceed initially with a funding formula that is "tried and true" and easy to administer.

The recommended cost sharing strategy for the initial years of the Around the Bay Rail Service include:

- Sharing of operating costs would be based on passenger boardings and alightings. Initially, ridership would have to be estimated, but these assumptions should be confirmed through passenger surveys after the first two years of service.
- Capital costs would be evenly split between the counties for shared items, and improvements benefiting a specific county (such as a new station or platform) would be solely the financial responsibility of that county.

After an initial start-up period (one to two years), it would be appropriate to revisit the operating and cost sharing formulas to determine if they are fair and equitable to both counties and they achieve the longer-term financial objectives of the services.

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## **6.5 EXISTING MAJOR FUNDING PROGRAMS**

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This section reviews the existing major funding programs currently available within Santa Cruz and Monterey Counties. Table 6.2 summarizes these programs. It identifies how each funding source can be used including transit capital, operating assistance, rail capital, etc. For each fund source the table shows separately for Monterey and Santa Cruz Counties the estimated annual revenue projections, current use or demands on the funds and whether these funds would potentially be available for Around the Bay Rail Service.

### **Federal**

#### **Federal Transit Administration (FTA) Section 5309 Earmark**

In February 1997, a FTA Section 5309 Earmark request for the Santa Cruz Fixed Guideway Project was submitted for consideration in the ISTEA Reauthorization Bill. The request was for \$20 million in federal capital funds with a proposed \$20 million match in local/state funds. The designated recipient of these funds was the Santa Cruz County Regional Transportation Commission. It is likely that these funds could be used for any of the rail services in the Around the Bay Rail Study.

#### **FTA Section 5307 Formula Funds**

This is a federal formula program that allocates funds for capital improvements and operating assistance to urbanized areas over 50,000 in population. MST and SCMTD receive FTA Section 5307 allocations. Both transit operators rely on these funds for ongoing public support and for needed capital funds to pay for vehicle purchases and other routine replacements. In FY 1997/98 SCMTD expects to receive about \$1.3 million with \$500,000 used as operating assistance and \$792,000 for capital purchases. MST's estimated FTA allocation is nearly \$1.5 million with \$458,000 to be used for operating revenue and the balance for capital expenses. Given that SCMTD and MST rely on these federal transit funds, particularly for their day-to-day operation, it is very unlikely that these funds could be available for new rail services.

#### **CMAQ Funds (Capital)**

Under the Transportation Equity Act (TEA-21) Reauthorization, there will be ISTEA funds for new rail service under the Congestion Mitigation and Air Quality (CMAQ) Program or the Regional Surface Transportation Program (RSTP).

**TABLE 6.2 EXISTING TRANSPORTATION REVENUES SANTA CRUZ AND MONTEREY COUNTIES**

<b>Funding Source/Eligible Use</b>	<b>Region</b>	<b>Estimated Revenue</b>	<b>Other Demands or Current Uses for These Funds</b>	<b>Comments</b>
<b>FTA SECTION 5309 (FORMERLY SECTION 3) EARMARK</b> Transit Capital Projects	Santa Cruz	\$20 M in Federal Funds with \$20M local/state match	Santa Cruz Fixed Guideway Project	Earmark Funding Request could be used for any of the proposed rail services under study.
<b>FTA SECTION 5307 (FORMERLY SECTION 9) FORMULA FUNDS</b> Transit Capital and Operating Assistance to urbanized areas (50,000+)	Santa Cruz	\$505,000 operating \$192,000 capital	Santa Cruz Metropolitan Transit District is recipient of FTA Section 5307 (formerly Section 9) funds in County.	SCMTD relies on these funds and it is very unlikely that they would be available for new rail services.
	Monterey	\$458,000 operating \$1M capital	Monterey-Salinas Transit (MST) is recipient of FTA Section 5307 (formerly Section 9) funds in County.	MST relies on these funds and it is very unlikely that they would be available for new rail services.
<b>ISTEA: CMAQ</b> CMAQ funds must be used for projects which contribute to attainment/ maintenance of federal air quality standards	Santa Cruz	\$725,000 per year	All eligible agencies in Santa Cruz County will be competing for CMAQ funds including other rail projects and bus.	Transit projects are usually excellent candidates for CMAQ funds.
	Monterey	\$1.3 M per year	All eligible agencies in Monterey County will be competing for CMAQ funds including other rail projects and bus.	Transit projects are usually excellent candidates for CMAQ funds.
<b>CMAQ FUNDS</b> Operations for New Rail Service	Monterey	\$400,000 in start-up funds	These funds would likely be used for Monterey-San Francisco rail service to fund farebox deficit.	TAMC could explore whether these funds could apply toward Santa Cruz to Monterey rail service.

**TABLE 6.2 EXISTING TRANSPORTATION REVENUES SANTA CRUZ AND MONTEREY COUNTIES**

Funding Source/Eligible Use	Region	Estimated Revenue	Other Demands or Current Uses for These Funds	Comments
<b>ISTEA: RSTP</b> Roadway improvements, transit capital and non-motorized projects	Santa Cruz	\$1.7 M per year	All eligible agencies in Santa Cruz and Monterey Counties will compete for STP funds.	
	Monterey	\$3 M per year		
<b>TRANSPORTATION ENHANCEMENT ACTIVITIES (TEA)</b> Small scale non-routine projects such as bicycle and pedestrian, ROW, preservation of abandoned rail corridors, etc.	Santa Cruz	Bid target for Santa Cruz County target \$1.6 M	All public agencies in County are eligible to apply for funds.	Projects are prioritized at regional level. Traditionally, TEA is a large source for bicycle projects.
	Monterey	Bid target for Monterey County is about \$1.9 M.	All public agencies in County are eligible to apply for funds.	Projects are prioritized at regional level. Traditionally, TEA is a large source for bicycle projects.
<b>PROPOSITION 116/RAIL</b> Rail Capital projects	Santa Cruz	\$11 M available to Santa Cruz County; must be programmed by year 2000	SCCRTC plans to use these funds to pay for upgrade of the Santa Cruz branch line and for stations.	The funds are administered by the CTC.
	Monterey	\$17 M available to Monterey County; must be programmed by year 2000	TAMC plans to use these funds to purchase and repair Monterey Branch Line have access rights to Main Line.	

**TABLE 6.2 EXISTING TRANSPORTATION REVENUES SANTA CRUZ AND MONTEREY COUNTIES**

<b>Funding Source/Eligible Use</b>	<b>Region</b>	<b>Estimated Revenue</b>	<b>Other Demands or Current Uses for These Funds</b>	<b>Comments</b>
<b>STIP FUNDING 75% REGIONAL SHARES</b>	Santa Cruz	Capital Projects only compete with other County projects; subject to 4 year County minimums  Santa Cruz = \$25 M	\$54M in projects competing for \$25 M for 1998 STIP.	STIP no longer has separate funding pots, so all county-wide projects compete for 75% regional shares.
	Monterey	Capital Projects only compete with other County projects; subject to 4 year County minimums		
<b>STIP FUNDING 25% INTERREGIONAL SHARES</b>	Santa Cruz	Capital Projects only. 10% for N/S split and 15% for nonurbanized areas.	Competes with projects statewide.	Projects for IIP funds submitted by sponsors and recommended by Caltrans.
	Monterey	Capital Projects only. 10% for N/S split and 15% for nonurbanized areas.	Competes with projects statewide.	



**TABLE 6.2 EXISTING TRANSPORTATION REVENUES SANTA CRUZ AND MONTEREY COUNTIES**

<b>Funding Source/Eligible Use</b>	<b>Region</b>	<b>Estimated Revenue</b>	<b>Other Demands or Current Uses for These Funds</b>	<b>Comments</b>
<b>TRANSIT CAPITAL IMPROVEMENT (TCI)</b> <i>(Old Grants)</i> Transit Capital projects: abandoned railroad ROW acquisition, bus rehab, transit guideways, rolling stock intermodal stations & short-line railroad rehab	Santa Cruz	\$313,000 from FY 1995/96 TCI grant and a FY 1996/97 TCI grant for \$320,000 . Funds expire in June 1999	Funds are planned for use on Preliminary Engineering for Intercity Rail track upgrades.	With passage of SB45, TCI funds collapsed into "Regional Shares." Greater decision-making at regional level.
	Monterey		Funds are planned for use on Preliminary Engineering for Intercity Rail track upgrades.	With passage of SB45, TCI funds collapsed into "Regional Shares." Greater decision-making at regional level.
<b>STATE TRANSIT ASSISTANCE (STA)</b> Transit Capital projects and transit operating subsidy	Santa Cruz	Has fluctuated tremendously In FY 1997/98 estimated at \$675,000	100% of STA funds have been allocated to SCMTD.	Potential for any increase in STA funds <b>could</b> be considered for new passenger rail services.
	Monterey	Has fluctuated tremendously In FY 1997/98 estimated between \$500,000-\$600,000	100% of STA funds have been allocated to MST and paratransit.	Potential for any increase in STA funds <b>could</b> be considered for new passenger rail services.

**TABLE 6.2 EXISTING TRANSPORTATION REVENUES SANTA CRUZ AND MONTEREY COUNTIES**

<b>Funding Source/Eligible Use</b>	<b>Region</b>	<b>Estimated Revenue</b>	<b>Other Demands or Current Uses for These Funds</b>	<b>Comments</b>
<b>AB 2766 (MBUAPCD)</b> Projects aimed at reducing mobile sources of air pollution.	Santa Cruz	Fluctuates yearly based on project submittals	Wide variety of agencies compete for funds.	Funds for these regional revenues are derived from \$4 vehicle registration surcharge.
	Monterey			
<b>LOCAL TRANSPORTATION FUNDS (LTF)</b> Street and road improvements if no unmet transit needs that is "reasonable to meet." Funds for transit can be used for operating or capital.	Santa Cruz	\$5.6 M in FY 1997/98	100% of LTF funds (available for allocation) are allocated to SCMTD for transit and paratransit operations and capital improvements.	Potential for any increase in LTF funds <i>could</i> be considered for new passenger rail services.
	Monterey	\$9.3 M in FY 1997/98	About 75% allocated for MST and paratransit. Remaining 25% is for streets/roads and local transit services.	
<b>ONE-HALF CENT TRANSIT SALES TAX</b> Transit operating or capital	Santa Cruz	\$12.2 M in FY 1997/98	SCMTD is the only eligible recipient of these revenues.	This local ½ cent sales tax has no sunset clause. The SCMTD has discretion on how to spend revenues.

The federal CMAQ program provides funds for projects that contribute to the attainment or maintenance of federal air quality standards. The estimated annual estimate for SCCRTC is \$725,000. Monterey County expects to receive an annual CMAQ allocation of \$1.3 million. A wide variety of public agencies are eligible to apply for CMAQ funds. SCCRTC and TAMC screen and rank projects and include high priority projects in the Regional Transportation Improvement Plan.

Although CMAQ funds are primarily dedicated for capital projects, CMAQ funds can be used for operating purposes for a three-year period. TAMC has successfully secured \$400,000 in CMAQ funds for start-up of new rail services. As of this writing, TAMC has not committed these funds to a specific rail project, although it is likely that these funds would be used for the intercity rail service because this is the agency's highest priority.

## **RSTP**

These funds can be used for roadway projects as well as alternative forms of transportation including transit capital and non-motorized projects. Monterey County's RSTP funding pot is anticipated at \$3 million in FY 1997/98 of which only \$1.1 million is unencumbered. Approximately \$1.3 million is the projected RSTP share in Santa Cruz County. RSTP funds are allocated by TAMC and SCCRTC, the regional agencies who may have discretion to earmark a portion of these funds for new rail services.

## **Transportation Enhancement Activities (TEA)**

TEA is a grant program established by ISTEA designed to fund environmental and alternative transportation projects which would not necessarily have other available fund sources. A wide variety of public agencies in Santa Cruz and Monterey Counties would be eligible for TEA funds. Projects are submitted to TAMC and SCCRTC who are responsible for prioritizing projects. A new rail project could be eligible for TEA funds especially for rail station improvements.

## **State**

### **Proposition 116**

In 1990 California voters approved Proposition 116, the Clean Air and Transportation Improvement Act. It provided new funding statewide for rail capital improvements. TAMC has been assigned \$17 million in Proposition 116

funds for rail services in Monterey County. Santa Cruz County has \$11 million available. Applications for Proposition 116 funds are due to the state by the year 2000. TAMC plans to use its Proposition 116 funds to purchase and repair the Monterey Branch line and to have access rights to the Mainline. TAMC intends to apply by June 1998. SCCRTC has not yet committed its \$11 million to a specific rail project, but tentatively plans to use the funds to construct platforms and upgrade the tracks and signals of the Santa Cruz Branch Line.

### **STIP Reform (SB 45)**

Effective January 1, 1998, SB 45 became law. This bill made sweeping changes to the State Transportation Improvement Plan (STIP). It is intended to streamline the state's transportation funding mechanisms and assign more responsibility for funding decisions at the regional level so that those closest to the issues decide on transportation investments. While all of the implications of SB 45 are not yet clear, it is certain that both TAMC and SCCRTC will have greater authority on state funding decisions.

SB 45 consolidates numerous existing funding programs which were previously programmed as part of, or outside, the STIP process. Funds normally programmed through the STIP, primarily the Flexible Congestion Relief (FCR), the Transit Capital Improvement (TCI) Program, the Transportation Systems Management (TSM) program and the State and Local Partnership program are now combined. Under SB 45, there are two major programs:

- **Regional Improvement Program Funds** - This will consist of projects nominated by regional transportation planning agencies (SCCRTC and TAMC). Seventy-five percent of available statewide resources will be distributed by "County Regional Shares" and will be included in the RTIP. Eligible projects will include:
  - State Highways and local/streets roads
  - Public Transit (*for capital only, not operations*)
  - Pedestrian and bicycle projects
  - Grade Separation
  - Transportation Systems Management (TSM)
  - Transportation Demand Management (TDM)
  - Intermodal facilities

- **Interregional Improvement Program Funds** - These funds make up the remaining 25% of statewide funds for capital improvements. These funds are further split into two parts:
  - 15% for interregional improvements. These projects will be proposed by Caltrans and intended for interregional roads and intercity rail projects. Of these interregional funds, at least 15% must go to intercity rail projects.
  - A total of 10% for discretionary improvements. The CTC programs these funds, although regions can offer nominations.

Given the sweeping change with state funding, there may be opportunities for Santa Cruz and Monterey Counties to receive state funds for capital rail investments.

## **State Transit Assistance (STA)**

STA funds are intended for transit capital projects and for transit operating subsidy. Monterey County receives between \$500,000 and \$600,000 per year and these funds are exclusively used by MST fixed route and paratransit operations. SCMTD is expected to receive \$675,000 in STA funds in FY 1997/98. STA funds have been used exclusively by the two transit agencies who rely on these funds for ongoing operations and for local match to federally funded capital projects.

## **Regional**

### **The Monterey Bay Unified Air Pollution Control District**

The MBUAPCD administers the AB 2766 grant program from a \$4 vehicle registration surcharge. The Air District awards grants to programs aimed at reducing mobile sources of air pollution. If the Air District were to fund new rail services it would likely provide funds for demonstration start-up services and would be available on a limited basis for operations. It is possible that funds could also be available for small-scale capital improvements or for marketing services.

### **Local**

#### **Transportation Development Act (TDA)**

The Transportation Development Act fund is derived from a 1/4 cent sales tax returned to the county and distributed to the jurisdictions based on their population. In Monterey and Santa Cruz Counties, these funds are allocated by the SCCRTC and TAMC. The TDA estimate in Santa Cruz County for FY 1997/98 is \$5.6 million. Eighty-five and one-half percent of the available funds are allocated to SCMTD after funding all costs associated with administering the TDA and special transit services. In Monterey County the TDA estimate for FY 1997/98 is \$9.3 million. About 75% of these local revenues are allocated for transit and paratransit services with the remaining 25% use for streets/roads. TDA is the primary operating subsidy for most transit systems in California and SCMTD and MST rely on these funds for both operating needs and to match federal capital grants.

#### **Santa Cruz County Sales Tax**

Santa Cruz County has an existing 1/2 cent sales tax dedicated exclusively for public transit. This sales tax generates about \$12 million annually and accounts for approximately 50% of SCMTD's operating revenues. These funds are administered by the SCMTD which has full discretion on how to spend the revenues. Unlike most "self help" counties, this sales tax has no sunset clause.

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## **6.6 NEW LOCAL FUNDING OPPORTUNITIES**

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This section identifies new funding mechanisms at the local level. A review of these funding opportunities is presented in Table 6.3 and discussed in the following sections. The table lists the revenue sources, provides the estimated annual yield (if available), the process for approving new funds, and other relevant information.

### **Dedicated Tax Sources**

Under existing law, counties have the authority to place initiatives before the voters to authorize a sales tax for transportation improvements. Up to one-cent additional sales tax can be levied if approved by a two-thirds majority vote of the county electorate. In Santa Cruz County, the current sales tax rate is 8.5%. The sales tax rate in Monterey County is 7.25%.

In 1978, Santa Cruz County voters approved a perpetual local one-half cent sales tax for transit purposes. The approximately \$12 million in annual revenues (estimate for FY 1997/98) is devoted to SCMTD. Although there is the potential to increase the sales tax by one-quarter cent, it would be difficult to get the two-thirds majority approval particularly for transportation purposes when there is pressure for other community services.

Monterey County is currently considering a one-half cent sales tax measure for the November 1998 ballot. The last time a sales tax went before the voters was in the late 1980s. The voters approved the sales tax measure with a 50% majority and it was overruled by the courts because there was not a 2/3 majority. This tax was for "general fund purposes" and identified three areas:

- County hospital
- Library
- Transportation

In 1995, TAMC established an Ad Hoc Committee to review the types of transportation improvements and funding mechanisms which would be supported by a broad spectrum of the population. Following completion of a funding study,<sup>1</sup> TAMC conducted a public opinion poll to test support for several new funding mechanisms. In February 1996, a telephone survey was conducted of 600

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<sup>1</sup>Transportation Financial Options Study, Transportation Agency for Monterey County, June 1995

**TABLE 6.3 LOCALLY GENERATED FUNDING OPPORTUNITIES**

Revenue Source	User-Based	Estimated Annual Yield	Process for Approving Revenues	Approximate Lead Time	Comments
Dedicated Sales Tax (½ cent local sales tax)	No	Santa Cruz County: \$10 M (1) Monterey County: \$ 18M (2)	Counties place an initiative before the voters to authorize a sales tax increase. Requires 2/3 majority vote for approval	2-4 years	Dedicated sales tax revenues provides counties with substantial revenues to fund specific transportation improvements.
Local/Regional Motor Vehicle Fuel Tax	Yes	Santa Cruz County: 10-12-cent gallon tax = \$10 M (3) Monterey County: To Be Determined	Requires special legislation if SCCRTC or TAMC wanted to pursue increase in fuel tax. Counties currently have authority to place a gasoline tax before the voters. Requires 2/3 majority vote for approval	4+ years	AB 595, a regional gas tax measure was approved by the Legislature in 1996 allowing MTC to go to the voters for up to 10-cent per gallon increase on gasoline. Lessons to be learned from MTC's experiences
Local/Regional Sales Tax on Fuel	Yes	Santa Cruz County: To Be Determined Monterey County: 1% = \$1.5 M (4)	Requires special legislation if SCCRTC or TAMC wanted to pursue a sales tax on fuel. Requires 2/3 majority vote for approval	4+ years	A sales tax on gasoline would generate more revenues than an excise tax. MTC initially pursued a sales tax (AB 877) but dropped after several failed attempts.
Transportation Impact Fees	No	Depending upon fee structure and development growth	Established by local ordinance	Varies tremendously. Dependent upon Policy Board	Impact fees are already collected in most Santa Cruz County jurisdictions. Fees collected are used for traffic improvements, not transit-related improvements.
Transient Occupancy Tax (Hotel/Motel Tax)	No	Fluctuates based on tourist economy	Established by local ordinance	Varies tremendously. Dependent upon Policy Board	TOT in Santa Cruz and Monterey Counties varies by jurisdiction. Revenues are not used for transportation improvement projects
Mello-Roos Special Tax	No	Depends upon structure of the special tax	Authorized by a vote of residents of the district. Requires a 2/3 majority vote.	Varies	Special tax levied on properties within a defined district to pay for public facilities (including transit). Unlikely that these revenues would be used for rail service.



**TABLE 6.3 LOCALLY GENERATED FUNDING OPPORTUNITIES**

Revenue Source	User-Based	Estimated Annual Yield	Process for Approving Revenues	Approximate Lead Time	Comments
Enhanced Transit Advertising Fees	No	\$100,000 - \$200,000	Approval of Transit District Policy Board to "aggressively" pursue advertising revenues	1-2 years	SCMTD currently has advertising contract that generates about \$100,000 per year. MST also advertises on-board its vehicles. Enhanced advertising on board vehicles and other locations could increase revenues.
PVEA Grant	No	Highly discretionary	Requires endorsement by local legislator	1-2 years	Project should relate to clean air transportation.
Private Contributions (Tourist-Related Businesses)	No	Potential to generate significant revenues.	Negotiations with Hospitality Associations and other tourist oriented attractions	2+ years	TAMC and SCCRTC have initiated discussions with private tourist-related businesses. Some funding commitments have been received in Santa Cruz County.

- (1) Estimate from MTIS Financial Analysis, SCCRTC, September 1995. This total amount available is for all transportation projects and a designated share could be programmed for Around the Bay Rail service.
- (2) Estimate from Transportation Financial Options Study, TAMC, June, 1995. This total amount available is for all transportation projects and a designated share could be programmed for Around the Bay Rail service.
- (3) Estimate from MTIS Financial Analysis, SCCRTC, September 1995
- (4) Estimate from Transportation Financial Options Study, TAMC, June 1995

randomly selected registered voters. The survey revealed that a sales tax increase would have the greatest chance of receiving the required two-thirds majority when compared to the other funding options. An increase in the gasoline tax was the least supported funding mechanism. More recently, the Monterey County Business Council sponsored a poll to test the support for a half-cent sales tax and to assess support for a variety of transportation projects. The results of this poll, released in November 1997, show that about 60% of those polled would support a sales tax measure. The most important transportation improvement project identified in the poll is the Prunedale Bypass. Clearly, highway and road safety are the highest priority projects, although rail transportation in the county also received some support.

### **Fuel Tax**

This proposal is for a local tax on fuel at the county or regional level. As with all new taxes, this would require a two-thirds majority approval of the voters. Santa Cruz and Monterey Counties currently have the authority to place a gasoline tax initiative before the voters. If a gasoline tax were pursued at the regional level, it would require special legislation similar to AB595, recently passed in the San Francisco Bay Area. This bill allows MTC to go to the voters for up to a 10-cent per gallon increase on gasoline. This would be expected to generate \$1 billion over 20 years. A 2/3 majority would be required to pass a gasoline tax in the Bay Region and would be very difficult to achieve.

The 1995 poll results in Monterey County reveal that a gasoline tax would not be favorably viewed by the electorate. A gasoline tax increase in Santa Cruz County has more appeal than in Monterey County because there may be a better chance of success at the polls. A 10-cent gas tax in Santa Cruz County is estimated to generate \$10 million annually, which is comparable to increasing the sales tax by ½ cent. This represents a significant revenue source for transportation improvements.

### **Sales Tax on Fuel**

A sales tax on fuel is another option to generate significant revenues. The advantage of a sales tax on gasoline is that it is projected to generate more revenues than a pure gasoline tax. It would increase as inflation raises the cost of fuel. As with a gasoline tax, a two-thirds majority vote is required for approval.

### **Transportation Impact Fees**

A transportation impact fee is a charge imposed on new development to compensate for their impacts on the local transportation infrastructure. A fee is

typically assessed on square footage of planned development. Impact fees can be implemented by local ordinance with specific criteria for establishing an impact fee. Impact fees can be imposed in downtown urban areas or in outlying growth areas. Like all developer fees, transportation fees must show a nexus between the development and service provided. The revenues generated from an impact fee can vary tremendously dependent upon the fee structure and the level of development growth. There are currently impact fees in several Santa Cruz County jurisdictions and the revenues are used for traffic-related improvements. Traffic impact fees are also in place in the cities of Salinas and Greenfield. There are no impact fees in place in either county which contribute revenues for transit improvements.

### **Transient Occupancy Tax (TOT)**

Both Monterey and Santa Cruz Counties have existing hotel/motel taxes. In Santa Cruz County, approximately \$5.6 million was generated by the TOT including taxes in the Cities of Santa Cruz, Capitola, Watsonville, Scotts Valley and the County. In FY 1992/93 the TOT in Monterey County generated about \$23 million. Currently these revenues are not spent on transportation improvements. An increase in the TOT in Santa Cruz or Monterey Counties could be dedicated for rail improvements.

### **Mello-Roos Special**

Community facilities districts (CFDs) are authorized under the Mello-Roos Act of 1982. "Special taxes" are levied on property within a designated CFD to pay for public facilities that benefit the properties of that district. Local jurisdictions may form the district and levy the special tax after the two-thirds majority voter approval. A Mello-Roos special tax provides more flexibility than an impact fee because it does not require that the levy be linked to benefits received. The taxes may be used to fund a wide variety of infrastructure needs including transit. This funding mechanism is currently being explored as part of the Fort Ord Re-use Plan and could have potential application in the Monterey Bay Corridor.

### **Petroleum Violation Escrow Account (PVEA) Funds**

PVEA monies represent fines/forfeitures collected against major gas and oil companies. These monies are intended for transportation-related purposes and are applied for through a local legislator. The amount available from year-to-year fluctuates tremendously. In 1996, there were no PVEA funds available and the amount established for this year is unknown. This is a highly discretionary revenue source, which has the potential to yield significant amounts, particularly if the project can be related to clean air transportation.

### **Private Funds (Tourist-related businesses)**

Local merchants and businesses are often interested in helping to support transportation improvements, particularly if the contributions can bring additional tourists to the area. In Santa Cruz and Monterey Counties there is ample opportunity to work with the hospitality industry and major tourist attractions to generate private contributions. Tourist-related businesses may be willing to become a partner in a transportation funding plan if their contributions were tied to marketing services or for one-time capital improvements such as passenger shelters or benches.

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## **6.7 FUNDING STRATEGIES**

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This section summarizes the capital costs and revenues in Table 6.4 and the operating costs and revenues in Table 6.5. It also identifies the existing and new funding sources that have the highest potential for providing additional revenues for the Around the Bay Rail Service.

The Financial Plan, Table 6.6, combines the operating and capital costs with the revenue projections for the regional rail program. The goal of this financial plan is to develop a plan that incorporates a variety of funding sources including creative, innovative and bold revenue enhancements. Beginning in year 2002, the counties would equally share all capital expenses with the exception of station improvements, based on the above outlined recommended capital cost sharing strategy. Cost sharing for the \$26.9 million two-county program were decided under a separate agreement and are not a part of this Around the Bay Rail study. Table 6.4 shows the individual capital cost contributions for Santa Cruz and Monterey Counties. It shows that Santa Cruz County would be responsible for nearly \$56 million and Monterey County's share would be \$52 million over the ten year period. This is not to suggest that either county would contribute funds from their own local resources, but would cooperatively work together to leverage as much federal and state dollars as possible.

### **Existing Funding Programs**

The previous discussions on existing funding programs reveals there are only limited opportunities to secure funds from these sources for Around the Bay Rail Service. Demand for transit capital and operating revenues will remain high for SCMTD and MST. Other proposed rail projects will also require capital and operating funds which further restricts the possibility of securing existing fund sources for Around the Bay Rail Service. Given the capital costs, ongoing subsidy requirements and existing funding limitations, it is clear that new local funding sources will be required. The following sections discuss the funding sources with the highest potential for providing needed revenue for Around the Bay rail services.

### **FTA "New Starts"**

Table 6.6 summarizes capital and operating costs and funding. The Around the Bay Rail Study assumes that Santa Cruz and Monterey Counties will secure the "New Starts" funds listed separately for both Monterey and Santa Cruz Counties.

## ***Around the Bay Rail Study***

*LS Transit Systems, Inc in association with DKS & Nelson/Nygaard*

The total amount proposed is \$17 million. A key recommendation of the Around the Bay Rail Study is that the prospect for receiving this amount or any significant federal funding is dependent foremost on the two agencies advocating cooperatively to secure a Congressional Earmark.

To match the cash flow required for the capital improvements outlined in Section 4 (track and signal improvements, new vehicles, etc), a majority of the projected FTA funds were "programmed" for implementation of Alternative 3 and daily Around the Bay DMU service. The first expenditures would begin in 2003.

The new federal transportation funding authorization (TEA-21) was approved by congress in June 1998 with historical increases in funds allocated for California transit improvements. At the time of this report's conclusion, it is not clear that the "place-holder" New Starts earmarking has been committed to this project. It is possible that future appropriations could make funds available for the programs outlined here and that these funds would reduce local capital funding requirements.

### **State Funds**

With the passage of SB 45, there are now two major state funding programs - the Regional Improvement Program Funds (or the "County Regional Shares ") and the Interregional Improvement Program (IIP) funds. This plan assumes funding commitments from both the Regional Shares and the IIP. A percentage of the IIP funds are specifically intended for intercity rail projects. Although these are highly competitive statewide funds, this plan assumes that the proposed regional rail program would receive IIP funds in years 2003 to 2005 to help pay for the capital investments associated with DMU service.

**Table 6.4 Summary of Capital Costs and Funding Combined Intercity Weekend and Daily Service (2000 - 2010)**

	2000-2002	2002	2003	2004	2005 - 2009	2010	10 Year Total
<b>CAPITAL COSTS (1)</b>	Alt 1 two-county rail program begins	Alt 2 service under contract	Alt 2 Weekend Service continues. Begin investments for DMU service.		Alt 3 is phased in. Daily DMU service begins; expands as resources permit.		<i>Includes Alt. 1</i>
Santa Cruz ROW Purchase			\$4,866,667	\$4,866,667			\$14,600,000
Extension to Monterey			\$3,000,000				\$3,000,000
Extension to Union Street			\$3,000,000				\$3,000,000
Santa Cruz Stations	\$600,000	\$350,000	\$350,000				\$1,300,000
Monterey Stations	\$2,000,000	\$350,000					\$2,350,000
Pajaro Station		\$2,250,000					\$2,250,000
Tracks and Signals	\$24,300,000	\$2,500,000	\$7,000,000		\$2,000,000		\$35,800,000
Passing Sidings					\$2,500,000	\$2,500,000	\$5,000,000
Maintenance Base			\$5,000,000	\$6,000,000			\$11,000,000
DMUs Weekend Intercity/Daily Transit				\$16,650,000	\$9,250,000	\$3,700,000	\$29,600,000
<b>Total Capital Costs</b>	<b>\$26,900,000</b>	<b>\$5,450,000</b>	<b>\$23,216,667</b>	<b>\$27,516,667</b>	<b>\$18,616,667</b>	<b>\$6,200,000</b>	<b>\$107,900,000</b>
<b>Capital Cost Contributions (2)</b>							
<i>Santa Cruz County Contributions</i>	\$10,600,000	\$2,725,000	\$11,216,667	\$16,191,667	\$11,741,667	\$3,100,000	\$55,575,000
<i>Monterey County Contributions</i>	\$16,300,000	\$2,725,000	\$12,000,000	\$11,325,000	\$6,875,000	\$3,100,000	\$52,325,000
<b>REVENUE SOURCES</b>							
<b><i>Santa Cruz County</i></b>							
Proposition 116 Funds	\$9,320,000	\$1,680,000					\$11,000,000
Transportation Capital Improvement	\$633,000						\$633,000
Interregional Improvement Funds (IIP)			\$430,844	\$2,664,594	\$772,094		\$3,867,533
Future STIP (Regional Choice)			\$1,443,327	\$2,438,327	\$1,548,327		\$5,429,981
Local Funds (3)	\$647,000	\$245,000	\$360,832	\$609,582	\$387,082		\$2,249,495
Transp Enhance Activities (TEA)			\$260,000	\$260,000	\$260,000		\$780,000
ISTEA (CMAQ/RSTP)		\$800,000	\$721,664	\$1,219,164	\$774,164		\$3,514,991
FTA "New Starts"			\$4,000,000	\$5,000,000	\$4,000,000		\$13,000,000
Gas Tax Revenues			\$4,000,000	\$4,000,000	\$4,000,000	\$3,100,000	\$15,100,000
<b>Total for Santa Cruz County</b>	<b>\$10,600,000</b>	<b>\$2,725,000</b>	<b>\$11,216,667</b>	<b>\$16,191,667</b>	<b>\$11,741,667</b>	<b>\$3,100,000</b>	<b>\$55,575,000</b>
<b><i>Monterey County</i></b>							
Proposition 116 Funds	\$14,370,000						\$14,370,000
Transit Capital Improvement (TCI)	\$420,000						\$420,000
Interregional Improvement Funds (IIP)			\$1,100,000	\$965,000			\$2,065,000
Future STIP (Regional Choice)			\$1,650,000	\$1,447,500	\$1,187,500		\$4,285,000
Local Funds (3)	\$1,310,000	\$545,000	\$825,000	\$723,750			\$3,403,750
PVEA	\$200,000						\$200,000
Trans. Enhancement Activities (TEA)		\$817,500	\$825,000	\$723,750			\$2,366,250
ISTEA (CMAQ/RSTP)		\$1,362,500	\$1,100,000	\$965,000	\$1,187,500		\$4,615,000
FTA "New Starts"			\$2,000,000	\$2,000,000			\$4,000,000
Sales Tax Revenues			\$4,500,000	\$4,500,000	\$4,500,000	\$3,100,000	\$16,600,000
<b>Total for Monterey County</b>	<b>\$16,300,000</b>	<b>\$2,725,000</b>	<b>\$12,000,000</b>	<b>\$11,325,000</b>	<b>\$6,875,000</b>	<b>\$3,100,000</b>	<b>\$52,325,000</b>
<b>Total Revenues</b>	<b>\$26,900,000</b>	<b>\$5,450,000</b>	<b>\$23,216,667</b>	<b>\$27,516,667</b>	<b>\$18,616,667</b>	<b>\$6,200,000</b>	<b>\$107,900,000</b>

(1) Based on capital costs developed by LSTS and shown in Table 4. (All costs in 98 Dollars)

(2) Monterey and Santa Cruz Counties pay for 100% of costs for improvements within their jurisdiction. All other costs are split 50/50.

(3) Local Funds could consist of a variety of sources such as TDA, STA, AB 2766, private contributions, etc.

Table 6.5 Operating Costs and Funding For Combined Intercity Weekend and Daily Rail Transit Service 2000 - 2010

	2002	2003	2004	2005	2010
<b>Weekend Intercity Service Plans</b>					
<b>Annual Ridership Estimates (1)</b>					
Intercity Weekend Daily	83,000	83,000	83,000	180,000	193,000
Annual Operating Costs (2)					
Intercity Weekend Daily	\$2,178,028	\$2,177,940	\$2,177,940	\$2,200,580	\$2,630,590
<b>Total Operating Costs</b>	<b>\$2,178,028</b>	<b>\$2,177,940</b>	<b>\$2,177,940</b>	<b>\$4,258,925</b>	<b>\$6,433,791</b>
<b>Operating Revenues</b>					
Passenger Fare Revenues (3)					
Intercity Weekend Daily	550,290	550,290	550,290	1,193,400	1,279,590
<b>Total Passenger Fares</b>	<b>550,290</b>	<b>550,290</b>	<b>550,290</b>	<b>1,992,147</b>	<b>3,182,895</b>
<b>Farebox Recovery Ratio</b>					
Intercity Weekend Daily	25%	25%	25%	54%	49%
<b>Total Operating Subsidy Requirement</b>	<b>\$1,627,738</b>	<b>\$1,627,650</b>	<b>\$1,627,650</b>	<b>\$2,266,778</b>	<b>\$3,250,896</b>
<b>Operating Cost Sharing Formula (4)</b>					
Santa Cruz County Contributions (48%)	\$781,314	\$781,272	\$781,272	\$1,088,054	\$1,560,430
Monterey County Contributions (52%)	\$846,424	\$846,378	\$846,378	\$1,178,725	\$1,690,466
<b>Santa Cruz County Funding</b>					
Local Jurisdictions	\$156,263	\$156,254	\$156,254	\$251,340	\$360,459
Private Contributions	\$156,263	\$156,254	\$156,254	\$258,957	\$371,382
Santa Cruz RTC TDA	\$78,131	\$78,127	\$78,127	\$251,340	\$360,459
Bay Area Public/Private Agencies	\$390,657	\$390,636	\$390,636	\$326,416	\$468,129
Gas Tax Revenues (55%)				\$1,088,054	\$1,560,430
<b>Total Funding for Santa Cruz County</b>	<b>\$781,314</b>	<b>\$781,272</b>	<b>\$781,272</b>	<b>\$1,088,054</b>	<b>\$1,560,430</b>
<b>Monterey County Funding</b>					
Local Jurisdictions	\$129,285	\$129,276	\$129,305	\$388,979	\$557,854
Private Contributions	\$129,285	\$129,276	\$129,305	\$400,766	\$574,758
TAMC - TDA Funds	\$64,642	\$64,638	\$64,638	\$388,979	\$557,854
Bay Area Public/Private Agencies	\$323,212	\$323,189	\$323,189		
CMAQ Start-Up Funds	\$200,000	\$200,000			
<b>Total Funding for Monterey County</b>	<b>\$846,424</b>	<b>\$846,378</b>	<b>\$846,378</b>	<b>\$1,178,725</b>	<b>\$1,690,466</b>
<b>Total Operating Revenues</b>	<b>\$1,627,738</b>	<b>\$1,627,650</b>	<b>\$1,627,650</b>	<b>\$2,266,778</b>	<b>\$3,250,896</b>

(1) Derived from ridership estimates prepared by DKS Associates

(2) O & M costs developed by LSTS. (All costs in 98 Dollars)

(3) Based on \$6.63 average fare per passenger for weekend service and \$2.76 average fare per passenger for daily service.

(4) Proposed cost sharing is based on ridership splits; 48% attributed to Santa Cruz County and 52% for Monterey County



**Table 6.6 Capital and Operating Costs and Revenues for Intercity Weekend and Daily Service (2002-2010)**

	2002	2003	2004	2005	2010
<i>(All costs in '98 Dollars)</i>					
	Alt 2 service under contract	Alt Weekend Service continues. Begin investments for DMU service.		Alt 3 is phased in. Alt. 2 Alternate wknd phased out. Daily DMU ATB service begins	
<b>Capital Costs</b>	\$5,450,000	\$23,216,667	\$27,516,667	\$18,616,667	\$6,200,000
<b>Annual Operating Costs</b>					
Intercity Weekend	\$2,178,028	\$2,177,940	\$2,177,940	\$2,200,580	\$2,630,590
Daily	\$0	\$0	\$0	\$2,058,345	\$3,803,201
<b>Total System Costs</b>	\$7,628,028	\$25,394,607	\$29,694,607	\$22,875,592	\$12,633,791
<b>Passenger Fare Revenues</b>	\$550,290	\$550,290	\$550,290	\$1,992,147	\$3,182,895
<b>Total Funding Requirement</b>	<b>\$7,077,738</b>	<b>\$24,844,317</b>	<b>\$29,144,317</b>	<b>\$20,883,445</b>	<b>\$9,450,896</b>
<b><u>Santa Cruz County</u></b>					
Proposition 116 Funds	\$1,680,000	\$0	\$0	\$0	\$0
Interregional Improvement Funds (IIP)	\$0	\$430,844	\$2,664,594	\$772,094	\$0
Future STIP (Regional Choice)	\$0	\$1,443,327	\$2,438,327	\$1,548,327	\$0
Local Funds	\$635,657	\$751,468	\$1,000,218	\$1,148,719	\$1,092,301
Transp Enhance Activities (TEA)	\$0	\$260,000	\$260,000	\$260,000	\$0
ISTEA (CMAQ/RSTP)	\$800,000	\$721,664	\$1,219,164	\$774,164	\$0
FTA "New Starts"	\$0	\$4,000,000	\$5,000,000	\$4,000,000	\$0
Gas Tax Revenues	\$0	\$4,000,000	\$4,000,000	\$4,326,416	\$3,568,129
Bay Area Public/Private Agencies	\$390,657	\$390,636	\$390,636	\$0	\$0
<b>Total for Santa Cruz County</b>	<b>\$3,506,314</b>	<b>\$11,997,939</b>	<b>\$16,972,939</b>	<b>\$12,829,720</b>	<b>\$3,568,129</b>
<b><u>Monterey County</u></b>					
Interregional Improvement Funds (IIP)	\$0	\$1,100,000	\$965,000	\$0	\$0
Future STIP (Regional Choice)	\$0	\$1,650,000	\$1,447,500	\$1,187,500	\$0
Local Funds	\$1,191,424	\$1,471,378	\$1,570,128	\$1,178,725	\$1,178,725
Trans. Enhancement Activities (TEA)	\$817,500	\$825,000	\$723,750	\$0	\$0
ISTEA (CMAQ/RSTP)	\$1,362,500	\$1,100,000	\$965,000	\$1,187,500	\$0
FTA "New Starts"	\$0	\$2,000,000	\$2,000,000	\$0	\$0
CMAQ Start-Up Funds	\$200,000	\$200,000	\$0	\$0	\$0
Sales Tax Revenues	\$0	\$4,500,000	\$4,500,000	\$4,500,000	\$3,100,000
<b>Total for Monterey County</b>	<b>\$3,571,424</b>	<b>\$12,846,378</b>	<b>\$12,171,378</b>	<b>\$8,053,725</b>	<b>\$4,278,725</b>
<b>Total Funding</b>	<b>\$7,077,738</b>	<b>\$24,844,317</b>	<b>\$29,144,317</b>	<b>\$20,883,445</b>	<b>\$7,846,854</b>

The Around the Bay Rail financial plan assumes that the \$17 million in Proposition 116 Funds allocated to Monterey County will be committed to the two county rail program. Santa Cruz County has tentatively allocated \$11 million in Proposition 116 funds to initiate the rail service described in Alternative 1. The financial plan here assumes that the balance of the Santa Cruz funds, \$1.7 million will be programmed to Intercity Weekend Alternative 2 start-up service.

### **Local/Regional Funds**

Local and regional funds are needed for the proposed regional rail program to provide the required match to federal and state grants and to support the ongoing operating subsidy. The level of local funds needed for Santa Cruz and Monterey County varies year to year. For Santa Cruz County it ranges from a low of \$600,000 to a high of \$1.5 million and for Monterey County it fluctuates from \$1.5 million to \$2.3 million. These funds could come from a variety of sources including Transportation Development Act (TDA) and State Transit Assistance (STA) funds, AB 2766 Funds (from the Monterey Bay Unified Air Pollution Control District), and private contributions through the hospitality industry.

### **Passenger Fares**

Fares should be set high enough to achieve a goal of between 30% and 40% farebox recovery ratio and low enough to attract ridership. It is important to note that a new start-up service will not likely achieve its desired farebox recovery ratio during the first two years of service.

The proposed passenger fare structure is presented in Table 6.7. The one-way passenger fares are distance based and consistent with other regional rail services. The fares are roughly based on an average yield of 13 cents per mile. This means that the average one-way fare for "wharf to wharf" travel is \$6 and travel from San Jose to Santa Cruz is about \$10. Travel within Santa Cruz or Monterey is \$2. As a note of comparison, the bus fare for travel within Monterey on Monterey-Salinas Transit is \$1.50.

Based on the recommended fare structure, the average fare per passenger would be \$6.60 for intercity weekend service and \$2.75 for daily service. The projected farebox recovery ratio for intercity weekend service is 25% when service is operated on alternate weekends. Beginning in 2005, service is to be offered every weekend, increasing ridership levels substantially and the farebox recovery ratio will climb to about 50%. The farebox recovery ratio for daily service is projected at 25% during the first year of service and at 33% in year 2010.

**Table 6.7 Daily Around the Bay and Weekend Rail Service Fares at Sample Stations**

### Preliminary One-Way Fares: (1998 \$s)

Assuming:  cents fare revenue yield per mile. \*

**Average One Way Fares:**

<b>Within Monterey:</b>	<b>\$2</b>
<b>Within Santa Cruz:</b>	<b>\$2</b>
<b>"Wharf to Wharf":</b>	<b>\$6</b>
<b>San Jose:</b>	<b>\$10</b>

[illegible]

**Notes:**

\* The above is an average yield per mile on Capitol Corridor of between 13 cents and 15 cents. Table is not adjusted for a minimum fare, e.g. Seaside to Monterey, or Santa Cruz downtown. Peak and Off Peak seasonal fare yields may vary. Zone fares may also be used to shape yields.

A key feature of the proposed fare structure is a reduced family or group fare. This type of fare is designed to encourage group travel and attract families to the service, particularly the intercity weekend service. Another important discount is for elderly persons and persons with mobility limitations. This is a federal requirement if the service is a recipient of federal funds. While discounted fares can attract riders to the service, they reduce the average fare collected from each passenger and cut into the revenue projections.

A revenue enhancement opportunity for the proposed regional rail service is to operate service for special events. This could include the "First Night" in Santa Cruz and/or Monterey and the "Crosby" golf tournament in Pebble Beach. These services would require coordinated shuttle bus connections. Train service for special events have the potential to attract riders and bring in additional revenue.

### **New Funding Programs**

With demand for existing funds expected to remain high in the future, new sources of dedicated funding are going to be needed to subsidize the operating costs for Around the Bay Rail Service. The following sources are those which are recommended for further study.

#### **Monterey County Sales Tax Revenues**

A dedicated sales tax in Monterey County is needed for the proposed regional rail program to be financially feasible. This plan assumes that Monterey County voters will pass a ½ sales tax in November 1998. This tax would generate approximately \$18 million per year. This plan assumes that 25% of the revenues or \$4.5 million per year would be dedicated for rail capital improvements. Sales tax revenues would be needed beginning in year 2003.

#### **Santa Cruz County Revenues**

A new local revenue source is needed in Santa Cruz County to help pay for its share of the capital costs of the regional rail program. The Around the Bay Rail Study financial plan assumed a local gas tax increase of five cents that would need to be approved by county voters by the year 2002. A five-cent per gallon tax is expected to generate about \$5.8 million per year. This plan assumes about two-thirds of this amount would be dedicated for rail improvements.

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### **6.8 CONCLUSIONS**

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A number of options for generating new revenues at the local and regional level have been reviewed to advance the broad regional rail program outlined in Section 4. Candidates for future consideration include a portion of a new ½ cent sales tax in Monterey County and a new gasoline tax in Santa Cruz County with a sizeable proportion of these revenues dedicated to rail services. Private sector financial contributions and impact fees are other sources.

Joint advocacy, led by the key stakeholders for transportation development in Santa Cruz and Monterey counties, will be required to achieve significant state and federal funds. Recent precedents for federal authorization raise the potential to reduce the local costs if federal funds can be secured.

Finally, an initial cost sharing strategy based is recommended for the Around the Bay Rail service that is easy to use in the first years and that can be adjusted as needed.

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## **7.0 INSTITUTIONAL ARRANGEMENTS AND IMPLEMENTATION**

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### **7.1 SUMMARY**

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This Section contains a discussion of the institutional issues and a set of specific recommendations for implementing a Monterey/Santa Cruz passenger rail project. In other studies, consultants are working on both Monterey and Santa Cruz passenger rail projects separately. This section of the final report provides recommendations on institutional issues and implementation strategies and should be taken into account by the counties as they decide on the next steps to take.

#### **Key Issues**

1. The two counties have each developed separate proposals to initiate passenger rail service.
2. It would be advantageous to find a way to merge the interests of both counties and develop a single passenger rail initiation proposal to reduce costs and make the project more attractive for financing agencies.
3. Responsibility for program implementation and operations oversight needs to be assigned to an organization given the passenger rail assignment for both counties.
4. To assure efficient use of resources and to avoid establishing another Monterey or Santa Cruz transportation agency, it would be best to use existing institutions and resources without creating a new agency for passenger rail. A new policy body should be established from existing policy level transportation decision-making bodies and should use one or more existing agencies to provide all administrative and staff support.

#### **Recommendations**

1. A new policy making body and Joint Powers Authority should be created using a Joint Exercise of Powers Agreement between the Transportation Agency for

Monterey County (TAMC) and the Santa Cruz County Regional Transportation Commission (SCCRTC).

2. Policy body members should be appointed respectively from members of the respective Rail Policy Groups already organized in TAMC and SCCRTC.
3. Three persons, hired sequentially and at an appropriate timetable for implementation, should be put in place as the core staff to run the passenger rail program.
4. A managing agency should be selected among four candidates (TAMC, SCCRTC, SCMTD, MST) to house the core staff and to provide administrative support to the Joint Powers Authority in a similar manner as SAMTRANS houses the PCJPB staff and BART houses the Capitol Corridor Joint Powers Board staff. All work on the rail program would be subject to direction by the Joint Powers Board of the Joint Powers Authority.
5. The Joint Powers Authority should carry out its responsibilities through a small core staff supplemented by administrative support from an existing organization and contracts with third-parties for every other aspect of the operation.

Institutional arrangements must be proposed, considered, and accepted to carry out the plan to implement coordinated passenger rail services linking Santa Cruz and Monterey with the San Francisco Bay area by the year 2002 and, further, to expand the initial service to an Around the Bay passenger rail service that also links the two downtowns (Santa Cruz and Monterey) by the year 2005.

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## **7.2 INSTITUTIONAL ANALYSIS**

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### **Current Institutions**

The Counties of Monterey and Santa Cruz have separately organized transportation functions required by California and Federal law. One organization has multi-county responsibilities as the Metropolitan Planning Organization (AMBAG-the Association of Monterey Bay Area Governments); two organizations are responsible for programming transport planning and project funds (TAMC-the Transportation Agency for Monterey County and SCCRTC-the Santa Cruz County Regional Transportation Commission); and two organizations are responsible for the operation and delivery of public transport services (SCMTD-Santa Cruz Metropolitan Transit District and MST- Monterey-Salinas Transit).

### **Historic Separation**

The nature of the historic separation of the interests of the two counties is an important feature of the consideration of institutional recommendations for passenger rail services. In order to develop proposals that join the counties interests and make it possible to make bi-county decisions in open forums and with a business-like atmosphere, any proposal must be seen as equitable by both counties.

### **Joint Interests**

With respect to passenger rail, the two counties have a mutual interest in initiating services for citizens and tourists. The motivation for these interests is similarly focused on quality of life issues, the needs for mobility options in light of significant constraints for the growth of internal and external highway connections and a keen sense of competition for the attractiveness of each community as a tourist and visitor destination. This latter issue may be internally competitive between the counties, however, given their proximity, they have a mutual interest in competing with other destinations on a national, statewide, and regional basis. In the case of Santa Cruz and Monterey, their combined attraction adds up to a major competitive edge.

### **Intercity Passenger Rail Project Interests**

The Counties are advocating passenger rail services to connect to the San Francisco Bay Area. Each county has defined its project separately, however, the common elements of the projects are extremely important to note:

Both projects seek to tap the potential traveler from the **San Francisco Bay area**, one (Monterey) by establishing direct service from the downtown San Francisco train station at Fourth and Townsend and the other (Santa Cruz) tapping this market by trains leaving from San Jose and connecting in San Jose with Capitol Corridor and Caltrain trains.

Both projects would seek to tap the potential traveler from the greater **San Jose area**.

Both projects would use the Union Pacific Railroad right-of-way used by Caltrain and the subject of a Caltrain/Union Pacific Railroad trackage rights agreement between **San Jose and Gilroy**.

Both projects would use the Union Pacific Railroad right-of-way used only by Amtrak and the Union Pacific Railroad and subject now to no trackage rights agreements for other passenger rail service between **Gilroy and Pajaro**.



Both projects require additional trackage rights agreements or right-of-way acquisition from the **Union Pacific Railroad** (Monterey needs access to the Union Pacific Railroad on the main line from Pajaro to Castroville and on the Monterey Branch line from Castroville to Seaside and Santa Cruz needs access to the Union Pacific Railroad on the Santa Cruz Branch Line from Watsonville to Santa Cruz).

Both projects require administration, cost allocation, financing and the identification of an entity to actually provide for train operations (crews).

Both projects require financing and other agreements with **Caltrans** (California Department of Transportation), the **CTC** (California Transportation Commission), and **Caltrain** (the Peninsula Corridor Joint Powers Board).

### **Other Passenger Rail Project Interests**

For Monterey and Santa Cruz, the possibility that an Around the Bay passenger rail service could be implemented subsequent to the initiation of an intercity passenger rail service is extremely attractive. Such Around the Bay service would provide interregional mobility and internal options to link the communities and direct passengers between the two major destination areas. This target of opportunity adds another level of urgency to the common interests of the two counties.

### **Potential Institutional Arrangements**

In considering institutional arrangements to carry out potential passenger rail programs in Monterey and Santa Cruz counties, the common interests and overlapping issues which characterize the approaches taken by the two counties are persuasive. In this case, the historic differentiation of County programs needs to yield to the crafting of a common and unified approach to assure success and to assure that a cost-effective approach is developed and implemented. By merging their interests the Counties can work together to deal with the important external issues which must be dealt with to implement initial intercity passenger rail service as well as the subsequent Around the Bay service.

Under a single banner, the Counties will be able to argue persuasively that they are focused on cost-efficiency to take advantage of all of the common elements in their projects. The joining of their interests will have a significant and positive effect on how the projects are viewed by State and federal funding agencies as well as any congressional appropriators.

The counties would be able to deal together with the complex internal questions that may still be obstacles to carrying out passenger rail plans. Merging their interests

also has the benefit of focusing more interest and excitement on the possibility of a more economical approach which can deliver an Around the Bay service on a shorter timetable than otherwise.

The most important element of a common interest definition is the substitution of one train for the possibility of two trains to serve the initial service goals of the counties. Expanding from this efficient service definition will strengthen the cost-effectiveness of the bi-county rail program and help to deliver passenger rail services for far less operating and capital investment.

The establishment of a common framework to undertake passenger rail projects may be the most effective way for the counties to organize. Developing such a framework must take into account the need to craft a policy-making organization that takes into account the importance of assuring each county that its concerns will be represented. In addition, an implementing device needs to be defined to carry out the program and administer the rail operations, which will be implemented. In each case care must be taken to use existing administrative and policy organizations so that new and separate organizations for the rail purpose are not necessary.

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### **7.3 ORGANIZATIONAL MODELS**

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Section 7.3 is a discussion of the existing institutional arrangements for passenger railroad operations in the State of California. Where more than one county is involved, in every case, the counties have come together to form a Joint Powers Authority. In most cases these organizations were voluntary decisions of the counties and not provided explicitly by State law. In the case of the intercity institutions enabled under State law to transfer responsibility from the State to new regional entities, the language of the statute, SB 457, did explicitly define the organizations.

In California there are also State authorized Rapid Transit Districts and, in the case of Los Angeles County's, a Metropolitan Transportation Authority. Of these (in Sacramento, San Jose and San Diego, only the San Francisco Bay Area Rapid Transit District (BART) is a multi-county jurisdiction.

### **Criteria**

The selection of an institutional alternative is driven by the decision to unify the two-county approach now being used. If a single entity makes sense to carry out the program, a Joint Powers Authority is the easiest institution to create. In developing it, however, a series of decisions must be made as to how it will operate and what form it will take. These decisions will themselves determine the Joint Powers Authority:

- Ability to be flexible as the program moves from design, to construction to operation,
- Acceptability to the public,
- Limits of authority,
- Ability to contract for and receive funds and which funds it will be permitted to seek,
- Ability to contract for services from private and public entities and which services it will provide itself,
- Ability to minimize costs and take maximum advantage of existing agency resources, and
- Ability to balance the need for local control with the need to run a public transport business and be able to react to changing conditions.

### **Joint Powers Authority**

The Counties can use State law to exercise their right to develop a **Joint Exercise of Powers Agreement** to create a Joint Powers Authority led by a policy-making Joint Powers Board with responsibility to develop and then operate a Monterey/Santa Cruz passenger rail program. This would set-up a clearly differentiated policy-body with the appropriate authority separate from the existing institutions in both counties. It would, however, be a principle of its development to draw from existing County institutions for the appointment of its members and to contract with existing institution to carry out its work.

There are several options with respect to the actual signatories of a Joint Exercise of Powers Agreement:

#### **1. TAMC and the SCCRTC**

Each of these organizations contains representation at several levels of local and county government and includes the transit operating agencies. Each has a current policy-level group dealing with rail matters.

### **2. SCMTD and MST**

Each of these operating organizations has the mission of operating county bus systems and improving service to the public in the most-cost efficient manner possible. Each is operations focused and deals with day-to-day operating and investment issues. Although both organizations could serve to provide service to a new Rail Authority, their current missions may not make them the best candidates on which to build a Joint Exercise of Powers Agreement for passenger rail.

### **3. Monterey and Santa Cruz Counties**

The Counties could sign the agreement and be the basis for the Authority. The precedents in both counties of delegating transportation planning and programming issues to representative organizations (TAMC and SCCRTC) and the fact that these organizations are currently working on and have been responsible for passenger rail matters seems to argue against using the Counties themselves.

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## **7.4 RECOMMENDATION**

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The agreement should be between the Transportation Agency for Monterey County (TAMC) and the Santa Cruz County Regional Transportation Commission (SCCRTC) assuming that they have legal authority sufficient to plan, develop, construct and operate passenger railroad services.

The two bodies now working on passenger rail programs would enter into a Joint Exercise of Powers Agreement forming a Joint Powers Authority for this purpose. The Santa Cruz County Regional Transportation Commission and the Transportation Agency for Monterey County have been the leaders in the efforts to secure a passenger rail program and each already has a policy level organization working on the rail program.

The Joint Powers Authority Board should be drawn from the existing TAMC and SCCRTC passenger rail policy committees. It could be up to each of the separate policy bodies to appoint the JPA members who would then act as independent JPA policy makers.

### **Voting and Methods to Assure Consideration of Views**

In order to balance the interests of the two Counties, membership should be an equal number of representatives from each County. For decisions affecting service,

performance and budget (the annual Business Plan adoption) a super majority would be required so that a decision would need to be agreed to by members from both counties. For discussion purposes, the JPA could have eight members with six members voting yes required to adopt the Annual Business Plan.

### **Rotating Leadership**

To guarantee that both Counties consider the new Joint Powers Authority an equitable distribution of power, the Chair could rotate between the Counties on a bi-annual or annual basis.

### **Coordinating Committee**

To assure proper consideration of issues and advanced preparation for formal meetings, the two Counties could develop an informal staff-level coordination mechanism, a staff coordinating committee from the SCCTC and TAMC that would meet to go over agendas and deal with issues. This mechanism has been used successfully by both the Capitol Corridor and Peninsula Corridor Joint Powers Boards.

### **Contracting for Operations**

The Joint Powers Authority should carry out its responsibilities through a small core staff supplemented by administrative support from an existing organization and contracts with third-parties for every other aspect of the operation. In the same manner as the Coaster organization in San Diego or the Altamont Commuter Express in San Joaquin County, the JPA should seek contractors to provide train crews, conduct train operations and maintain railroad rolling stock (cars and locomotives or self-propelled cars) on a turn-key basis. All pre-service activities should also be undertaken under contract including design, construction and construction oversight for non-railroad improvements and contracts with the owning railroad for improvements on the right-of-way. If, however, sections of the right-of-way are acquired, then work can be contracted out to private third parties.

### **Core Rail Staff Staffing Requirements**

After reviewing decisions on staffing made for the Capitol Corridor, the Peninsula Corridor and the Altamont Commuter Express services, a three person staff should be sufficient to oversee the operation of an initial Monterey/Santa Cruz intercity passenger rail system as well as the subsequent Around the Bay service. The staff would not be hired at once, but would be staged as the needs arise. A Rail Service Director would have overall responsibility, a Service Development Manager would

have scheduling, marketing, public relations and coordination responsibility and a Technical Manager would oversee right-of-way, rolling stock, and Safety issues.

The Authority itself would have no staff, but these individuals who would be housed in another agency.

### **Managing Agency**

Regardless of the choice for developing the Joint Powers Authority, an existing agency should be selected to house the core passenger rail staff and to provide administrative support (legal, accounting, payroll, procurements, insurances, etc.). Candidates to be “managing agency” for the JPA include its constituent organizations (TAMC and SCCRTC), and the two transit operating agencies (SCMTD and MST).

### **Responsibilities**

The Joint Powers Authority and its governing Board will be responsible for developing and implementing the Monterey/Santa Cruz passenger rail program and carrying out the operation of trains. The functions of the Authority include the following:

- Annual Business Plan development and adoption,
- Procurement and oversight of the development of final plans and design and equipment Specifications for Project Implementation,
- Procurement and oversight of Installation of all construction and equipment acquisition activities,
- Capital and Operating Budget development and adoption (within Business Plan),
- External Relations (other organizations, constituents, riders),
- Monitoring Customer Relations (customer satisfaction, complaints, etc.)
- Integration with Other Services (coordination of services, schedule coordination, service integration, fare integration),
- Administer Operating Contract (Turnkey),
- Marketing (public information, events, promotions, festival coordination),
- Fare Structure (fares, fare collection, proof of payment enforcement, cash management, etc.),
- Performance Measurement and Reporting (included in Business Plan), and
- Grants (securing program, project requests, etc.).

The Authority will carry out these responsibilities through its core staff and contracts with third parties.

### **Funding**

The Authority needs the ability to itself apply for and receive funds. Limits on the types of funds that the Authority could compete for would help differentiate its mission and financial resources from the bus operating entities. These limits could require the approval of the bus operating entities before the Authority requests funding from sources now exclusively used by them. For funds that can only be used for passenger railroad operations and capital investment, the Authority would be required to have the ability it needs to secure grants.

### **Next Steps**

The TAMC and SCCRTC could immediately initiate the development of a Joint Exercise of Powers Agreement through a series of discussions of key issues and the use of language developed by others (Capitol Corridor and Peninsula Corridor). In developing this language, the issues of voting, representation, membership, and financing would be dealt with and agreed to. Once an agreement was drafted it would go to the individual constituents for ratification and a Joint Powers Authority would be set up.

The initial work of the new Authority would be to negotiate agreements which would integrate the individual activities of the Counties focused on their respective intercity passenger rail plans and to reach agreement on how to continue these efforts through the Authority as a single effort. This would include discussions with the Union Pacific Railroad, the California Transportation Commission, Caltrain, the California Department of Transportation Rail Division, etc. During the period of securing these agreements, the new Authority would finalize all plans and specifications for the project including stations, right-of-way improvements, and equipment required for the service. As planning for the installation of required improvements takes place, the Authority could consider the use of a "DBOM" or other modified procurement strategy to procure the services required. Under these options, the Authority could issue requests for proposals and bids which could include maintenance and operations, acquisition of rolling stock, construction and installation of equipment, and construction and installation of stations and related amenities.

A “DBOM” approach could be used once the Authority is ready to begin the implementation of DMU services to both destinations and initiate Around the Bay services. This approach could reduce the number of procurements and the time it would take to complete them. This strategy could also be used to spread the financial risk of the project to a private sector group willing to make an investment in the potential success of the service under some terms provided by the Authority. In order to explore this concept, the Authority could develop a process, which would invite teams to form and to present their ideas for a “DBOM” procurement strategy to the Authority for consideration.

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## **7.5 IMPLEMENTATION PLAN**

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This section set forth a set of staged actions to implement the Monterey/Santa Cruz Intercity and Around the Bay passenger rail projects.

### **Key Issues**

1. Currently the Counties are pursuing separate projects.
2. Completion of current work is necessary before moving the project forward.
3. Federal requirements must be met in order to secure federal funds.
4. Requesting Proposition 116 funding must be accomplished in the next two years.
5. An intercity initial service project must be defined within the constraints of existing service providers and without additional rolling stock.
6. Around the Bay service with DMU vehicles could follow intercity service.

### **Recommendations**

1. Integrate the projects into one Monterey/Santa Cruz passenger rail project.
2. Carry out a single strategy to develop initial intercity service and subsequent Around the Bay service.
3. Using all of the prior work, negotiate an agreement with federal agencies to minimize additional project documentation and to define required environmental documents.
4. Develop a Program Management Plan.
5. Use as new Joint Powers Authority to direct the next steps.



6. Continue to maintain project momentum by carrying out design, operations, financial and other tasks.
7. Consider the use of the attached draft work program for carrying out a portion of the next required tasks.

### **Strategy**

The recommended strategy rests on the proposal that a single Monterey/Santa Cruz project should be defined and pursued. Maintaining two separate efforts could jeopardize funding and require so many parallel relationships that they must be perceived as competing. Given the enormous number of joint issues and interests, the Counties can develop a scheme to work in common mutual interest to secure the funding and recognition required to initiate service. In order to carry out this strategy, the counties must internalize issues that they now can ignore with respect to the specific operating plans that they believe are necessary. The Around the Bay study has attempted to define a common program with the substantial financial benefits of a single project.

Both counties have individual consulting efforts to define implementing strategies for their respective projects. These documents are important sources of information as the counties integrate their efforts.

There are important internal problems of local policy level agreement on even the fundamental question of whether a passenger rail program should be pursued. It is important to note that if both counties are not in agreement on this issue, this entire strategy falls apart. It may be possible, to use a joint approach to bring the local decision-makers together as a consensus builds to define a cost-effective program that can be defended (better than two programs).

### **Required Actions**

1. Complete current studies.
2. Agree to an integrated plan and implementation stages.
3. Work together to determine if an extension of the State's Intercity Rail program is feasible and approvable, determine if an intercity corridor could be operated on Caltrain right-of-way between San Francisco and Gilroy.
4. Discuss and negotiate with Caltrain on extensions of its trains for weekend intercity service.
5. Discuss and negotiate with the State and the Capitol Corridor Joint Powers Authority on extensions of its trains for weekend Intercity service.

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6. Discuss the use of Altamont Commuter Express rolling stock on weekends and holidays.
7. Integrate discussions with the Union Pacific Railroad (UP) on the right to access property required for initial weekend and eventual Around the Bay service. Negotiate the required agreements with the aid of a professional negotiating team with UP experience.
8. Negotiate access agreements with Caltrain for use of the San Francisco to Gilroy right-of-way, stopping at intermediate and terminal stations and possible layover of train sets at San Jose (depending on the nature of the finally determined use of Caltrain services and the service plan).
9. Consider the possibility of an early DMU acquisition for weekend service.
10. Reach agreement on the nature of weekend service and complete and finalize all negotiations.
11. Carry out a plan to secure federal earmarks and appropriations for the project from sources that can be implemented with the fewest possible federal documentation requirements.
12. Negotiate with the federal agencies to define all required federal project documentation and undertake the work to complete the federal requirements and include State and federal environmental documentation and permitting.
13. Complete conceptual design of all right-of-way improvements and contract with the Union Pacific Railroad to carry them out on its owned segments and to third parties through competitive procurement on non-railroad owned rights-of-way.
14. Develop and submit a request for Proposition 116 funds that meets California Transportation Commission requirements.
15. Complete bridge engineering studies and finalize replacement/ rehabilitation decisions, complete preliminary and final design, secure the required permits, and procure and carry out construction.
16. Complete location studies and decisions for stations, develop conceptual designs, negotiate final designs with local officials, secure preliminary and final engineering for all station projects, secure required permits, and procure and carry out construction.
17. Develop detailed intermodal coordination plan with all public transportation modes within the counties and assure that good connections are planned outside the Counties.
18. Select a Managing Agency, develop job descriptions for core staff, and hire a Director to lead all staff efforts.

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19. Develop a marketing/public relations conceptual campaign and initiate communications with all potential recreational and tourism outlets. Determine roles and responsibilities for marketing and initiate campaign.
20. Draft a Request for Proposals for turnkey operations and maintenance contractors (train operations, right-of-way maintenance, facility operations and maintenance, station maintenance, rolling stock maintenance) using the recent Altamont Commuter Express RFP as a base and using input from the recent SCRRA RFP for operations and rolling stock maintenance.
21. Develop justification packages for sales tax measures that integrate arguments across both counties and work with sponsors to assure properly coordinated campaigns.
22. Work with Congressman Farr's Office to develop and secure appropriations earmarkings for federal funds and relief from non-essential documentation requirements.
23. Finalize fare collection strategy and specify, acquire and install ticket vending machines (if appropriate).
24. Discuss the possibility of "piggybacking" on a DMU procurement already in progress (such as Pennsylvania DOT's), specify DMU equipment, develop other interested buyers and attempt to create a joint purchase, procure and accept DMU rolling stock.
25. Finalize maintenance of rolling stock requirements, develop a requirements and conceptual design study for rolling stock maintenance to size the facility and determine what functions will be required, develop alternative facility locations, make a final site decision, undertake preliminary engineering and either move to procure a facility using a design-build method, or complete design and procure construction traditionally.
26. Work with the American Public Transit Association Commuter Rail Committee and an experienced passenger railroad insurance broker to develop an insurance program and position on liability. Secure the required insurances in conjunction with existing risk management programs for public transportation.