Final Report

I-15 Commuter Rail Feasibility Study

Prepared for

Riverside County Transportation Commission

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

in association with

Cambridge Systematics, Inc.
Schiermeyer Consulting Services

June 29, 2007

Interstate 15 Commuter Rail Feasibility Study

Final Report

Prepared for

Riverside County Transportation Commission

Prepared by

Wilbur Smith Associates
In association with
Cambridge Systematics
Schiermeyer Consulting Services

June 29, 2007

Executive Summary

Background

In 2005, the Riverside County Transportation Commission (RCTC) completed an evaluation of five potential commuter rail routes within Riverside County. That study, the *RCTC Commuter Rail Feasibility Study*, recommended that two of those five routes be examined in greater detail as possible candidates for future public investment. Those two routes are 1) an extension of the Perris Valley Line from South Perris at I-215 eastbound through Hemet to San Jacinto, and 2) an extension Perris Valley Line from South Perris at I-215 southbound along the I-215 corridor to Temecula and Murrieta.

In order to perform a follow-up study, Wilbur Smith Associates was retained to evaluate the potential of conventional commuter rail services on two other I-15 corridors. These are:

- ***Temecula North:*** between Temecula and points west (via Corona), including Los Angeles and Orange County work centers; and between Temecula and points east (via La Sierra), including Riverside and San Bernardino
- ***Temecula South:*** between Temecula and San Diego.

The consultant also was asked to explore the potential of implementing a commuter rail level of service on the proposed California High-Speed Rail (HSR) system between Temecula and San Diego.

Currently, the Bay Area Metropolitan Transportation Commission (MTC) is studying the ridership potential of a statewide High Speed Rail (HSR). The MTC effort is pursuant to the *Program Environmental Impact Report / Environmental Impact Statement* (EIR/EIS) developed for the California High-Speed Rail Authority (HSRA) in 2004. That report assessed the potential capital costs for building the HSR system, inclusive of a Los Angeles-Riverside-San Diego segment. The current ridership estimate assumes 49 daily trains between Los Angeles, Riverside and San Diego, with 108,000 daily passenger trips, including peak commute period trips, within Southern California[1].

[1] A region defined here as the jurisdictions of the Southern California Association of Governments (SCAG) and the San Diego Association of Governments (SANDAG).

Purpose of the Study

The purpose of this study is to evaluate the potential of conventional commuter rail services on two corridors, one to the north of Temecula towards Corona along I-15 and the other to the south. Regarding the former, this study looks at various commuter rail alternatives operating between 1) Temecula and Los Angeles, 2) Temecula and Orange County work centers, and 3) Temecula and San Bernardino. Regarding the latter, the study explores the conventional commuter rail potential between Temecula and San Diego.

The study's purpose of exploring the use of the HSR system for commuter trips between Temecula and San Diego changed during the course of the study. This was a result of a change in previous HSR assumptions, which currently call for a higher level of service in the Los Angeles-Riverside-San Diego segment. In all, 36 trains are planned for the peak periods. This means there would be 18 in the morning peak period, of which 9 trains would be southbound. Such a high service level obviated the need to explore using of HSR as a commuter option, as clearly it would be one if HSR were implemented as envisioned. Accordingly, the study shifted to explore the intraregional ridership of six peak period "limited stop" HSR round trips and two mid-day round trips stopping at a conceptual Poway station at SR 56, in addition to the planned HSR stations. Regarding the Poway station, the study's presumption at the outset was that many Temecula area commuters would use the station as a destination.

The Wilbur Smith Associates team was supported by Cambridge Systematics and Schiermeyer Consulting Services. A Technical Advisory Committee (TAC) – consisting of city staff and transportation and planning agencies, Native American tribal representatives and private developers – provided input and feedback on study findings.

Service Options

The conventional commuter rail service options studied are identified in Figure 1.

<u>Temecula North</u>

At the outset, the study team considered three potential commuter rail options running north from Temecula. All options assumed 16 weekday trains: six AM peak northbound trains; six PM peak southbound trains; and four mid-day trains, two northbound and two southbound. Specific service cases included:

Figure 1


Study Routes
Los Angeles
San Bernardino
Fullerton
N. Main Corona
Riverside
La Sierra
BNSF Transcon
South Perris
San Jacinto
Santa Ana
Lake Elsinore
LOSSAN Rail Corridor
Laguna Niguel
Temecula
NORTH
NOT TO SCALE
Oceanside
Escondido
Mira Mesa
San Diego
LEGEND
NORTH
Temecula to Los Angeles
Temecula to Laguna Niguel
Temecula to San Bernardino
SOUTH
Temecula to San Diego: Commuter Rail and HSR
Existing Rail Lines

- Case 1: half of trains operate between Temecula and Los Angeles, and the other half operate between Temecula and Laguna Niguel; this is known as the Base Case. On the Corona-Temecula extension, new stations would be at Temecula, Bundy Canyon Road, Nichols Road and Temescal Canyon Road.
- Case 2: all trains operate between Temecula and Laguna Niguel. New stations would be the same as in Case 1.
- Case 3: all trains operate between Temecula and Los Angeles. New stations would be the same as in Case 1.

After subsequent consideration by the TAC and RCTC staff, five more service cases were added. These were:

- Case 4: half of trains operate between Temecula and Los Angeles, and the other half operate between Temecula and Laguna Niguel. One additional new station is assumed at the Dos Lagos development just south of Corona.
- Case 5: all trains operate between Temecula and Laguna Niguel. New stations would be the same as in Case 4, with Dos Lagos.
- Case 6: all trains operate between Temecula and Los Angeles. New stations would be the same as in Case 4, with Dos Lagos.
- Case 7: All trains operate between Temecula and San Bernardino. New stations would be the same as in Case 1, without Dos Lagos.
- Case 8: All trains operate between Temecula and San Bernardino. New stations would be the same as in Case 4, with Dos Lagos.

Temecula South

The team considered just one conventional commuter rail service case running south from Temecula with 16 trains weekdays between Temecula and downtown San Diego, with stops at Escondido, Poway at SR 56, Mira Mesa, Old Town and the San Diego Depot. Assumed were: six AM peak southbound trains, six PM peak northbound trains; and four mid-day trains, two southbound and two northbound.

The evaluation of the Poway HSR station also assumed 16 HSR trains stopping there in 2030: six AM peak southbound trains, six PM peak northbound trains; and four mid-day trains, two southbound and two northbound.

Train frequencies for the study routes are shown in Table 1.

Table 1 **Train Frequencies on Study Routes**		
	Northbound	Southbound
Temecula North Commuter Rail		
AM Peak	6	
PM Peak		6
Mid-day	2	2
Temecula South Commuter Rail		
AM Peak		6
PM Peak	6	
Mid-day	2	2
Temecula South Limited Stop HSR		
AM Peak		6
PM Peak	6	
Mid-day	2	2

Ridership Forecasts

The first step in the analysis was to forecast the Year 2030 ridership for the eight conventional commuter rail service cases running north from Temecula, the one conventional commuter rail service case running south from Temecula, and the HSR limited stop service case with a stop at Poway. The forecasts for the conventional commuter rail options north and south of Temecula and for the limited stop HSR service were done using different methodologies, as explained below.

Temecula North

The forecast of the first eight cases used the same methodology employed in the 2005 RCTC Commuter Rail Feasibility Study[2]. The intent was to develop ridership forecasts that can be compared apples-to-apples with the forecasts of the conventional commuter rail services evaluated in the 2005 study.

The forecasting methodology reflects the assumption that people are drawn to commuter rail if they must make longer trips, especially if there are frequent trains available to encourage and support convenient trip-making. In other words, the longer the trip and the more frequent the headways, the more riders find commuter rail an attractive option.

[2] The methodology used was developed originally to support the 2004 *Commuter Rail Strategic Assessment* commissioned by the Orange County Transportation Authority (OCTA) and refined during the subsequent 2007 *Metrolink Commuter Rail Strategic Assessment*. Commuter rail ridership forecasts in both studies were based on estimates of the commuter market share or mode split which commuter rail reasonably could be expected to achieve, assuming various levels of train frequency, travel distance and congestion on parallel road systems.

Table 2 shows the peak period and all-day forecasts of 2030 passenger trips generated at the proposed extension stations. The extension trains would generate additional ridership between existing Metrolink stations as a result of the additional frequencies they provide.

Table 2
Temecula North Commuter Rail Ridership Forecast in 2030

Case	Service	Temecula North Stations	A.M Peak	All-day
1	Split Service (Base Case)	4	899	989
2	All Temecula Trains to Los Angeles	4	957	1,052
3	All Temecula Trains to Laguna Niguel	4	999	1,099
4	Split service (Base Case)	5	942	1,037
5	All Temecula Trains to Los Angeles	5	1,003	1,104
6	All Temecula Trains to Laguna Niguel	5	1,047	1,152
7	All Temecula Trains to San Bernardino	4	1,003	1,104
8	All Temecula Trains to San Bernardino	5	1,059	1,165

Notes:

Split service assumes trains originating in Temecula are destined for both Los Angeles and Laguna Niguel.

Los Angeles trains carry riders transferring to IEOC Line trains at Corona.

Laguna Niguel trains carry riders transferring to 91 Line trains at Corona.

San Bernardino trains carry riders transferring to IEOC and 91 Line trains at La Sierra.

Cases 4-6 and 8 assume an additional station at Dos Lagos.

At this level of specificity, the differences in ridership among the service cases are small to the point of not being statistically significant.

Temecula South

For a forecast of 2030 weekday passenger trips generated by a conventional commuter rail service operating between Temecula and San Diego, the study team used a statewide ridership and revenue forecasting model developed for the California High-Speed Rail Authority and the Metropolitan Transportation Commission. This statewide model was developed to support evaluation of high-speed rail alternatives in the State of California. It is a fully multimodal model capable of forecasting air, commuter rail and highway alternatives as well as high-speed rail. Table 3 below shows the forecasts of weekday boardings by station in 2030.

Table 3 **Temecula-South Commuter Rail** **Weekday Boardings in 2030**	
Temecula at I-15/I-215	974
Escondido	220
Poway at SR 56	279
Mira Mesa	210
Old Town	548
San Diego	860
Total	3,090

High-Speed Rail and a Poway Station

The team also used the aforementioned HSR model to forecast the ridership of a limited stop HSR service between Temecula and San Diego. Just considering the ridership generated by the 16 limited stop HSR peak and mid-day trains at the study area stations, the forecast in Table 4 shows that the Poway station would have 242 average weekday boardings in 2030. The majority of these trips would be made by high-speed rail riders who would be using a different station, if the Poway station did not exist. Thus, there is no significant increase in total riders with the inclusion of the Poway station. This is likely because high-speed rail serves longer distance trips more effectively, so the system does not need to have as many stations to be effective in serving these longer distance trips.

Table 4 **Temecula-South HSR Weekday Boardings** **In 2030, with a Poway Station**	
Temecula	1,297
Escondido	411
Poway	242
University City	340
San Diego	1,515
Total	3,805

The forecast found that a Poway station would not be a major destination for Temecula area commuters. Only 127 Temecula boardings would alight weekdays at Poway in 2030.

It is important to note as well that a Poway station would serve a larger market than just trips to those stations cited in Table 4, as the limited stop trains would also stop at other HSR stations in Southern, Central and Northern California. Accordingly, it appears that a Poway station would generate about 4,000 boardings and alightings, or passenger trips, per weekday in 2030, most of which would have occurred at other stations if the Poway station was not built.

Capital Costs

Temecula North

With potential ridership ranges identified by service case in Table 2, the study team began its analysis of more specific alternative routes and conceptual capital costs for the purpose of a comparative evaluation to identify the most cost effective options. These included two alternatives to limit the southward Temecula extension to Lake Elsinore in order to shorten line construction and thus minimize costs. Also the capital cost alternatives explore the potential of connecting to the I-15 right-of-way at different locations. Furthermore, the alternatives oriented to the west assume Base Case operations: with half of trains operating to Los Angeles and the other half operating to Laguna Niguel. Thus, the alternatives discussed below represent a subset of the eight ridership service cases and explore different approaches to travel along the same general corridor, including various station options.

Capital costs at a conceptual level were developed for seven separate alternatives for commuter rail operations on Temecula-Corona Corridor. The costs are discussed below. The estimates reflect factors unique to each alternative. The alternatives considered are:

- *Alternative A* – From the junction with the BNSF Transcon at Porphyry Wye just east of the North Main Corona Metrolink Station, this alternative is 35.3 miles long and runs the length of the corridor to Temecula. From north to south, the route would make use of the right-of-way of the former Atchison Topeka and Santa Fe Railway (Santa Fe) branch line as far as the Alberhill residential development south of Lake Street in Lake Elsinore. It would then use a new right-of-way east of the development to reach Nichols Road, before entering the I-15 right-of-way for its southward run to Temecula. The four new stations for this alternative would be at Temescal Canyon Road just east of the I-15 overcrossing, Nichols Road, Bundy Canyon Road and Temecula/Murrieta. Corona would serve as a transfer station for riders not carried directly to destinations by trains from Temecula. The ridership service case associated with this alternative is Case 1.
- *Alternative B* - This alternative is much the same as Alternative A. The major difference is that the rail alignment would enter the I-15 right-of-way at Lake Street, about three miles north on I-15 from Nichols Road. The length of the alignment and the stations would be the same.
- *Alternative C* – At 15.7 miles, this is a short alternative, with a southern terminus at Lake Street. There would be just two stations – one at Temescal Canyon Road and the other at Lake Street; riders from points farther south in the I-15 corridor could board trains at Lake Street.

Alternative C would also be a less complicated alternative to build, since it would make use of what is left of the original Santa Fe right-of-way. This alternative would have much of the same ridership as Alternative A, except that the trips between the two southern most stations would be lost, as those stations would not be included in this shorter alternative. The ridership for this alternative was derived from Case 1.

- *Alternative C1* – This alternative is the same as Alternative C, with the addition of another new station at Dos Lagos. The additional station would result in a small increase in ridership versus to Alternative C. The ridership for this alternative was derived from Case 4.
- *Alternative D* – This alternative is the same as Alternative A, with the addition of another new station at Dos Lagos. The ridership service case associated with this alternative is Case 4.
- *Alternative E* – This alternative assumed that all six trains depart Temecula in the morning peak and terminate in San Bernardino, rather than in Los Angeles, Laguna Niguel, or both. Thus, it assumed the reestablishment of the east leg of the Porphyry Wye, connecting the existing BNSF branch line with the Transcon, and the relocation of railcar storage tracks which lie across where the east leg used to be. The alternative runs 35.3 miles. La Sierra would serve as a transfer station for riders not carried directly to destinations by trains from Temecula. The ridership service case associated with this alternative is Case 7.
- *Alternative F* – This alternative is like Alternative E, with another new station at Dos Lagos. The ridership service case associated with this alternative is Case 8.

A summary of the conceptual cost estimates for all seven alternatives appears in Table 5 on the following page. Most unit costs used to calculate total category costs were the same as assumed for the 2005 *RCTC Commuter Rail Feasibility Study*. Costs for items that were assumed here but were not part of the 2005 analysis were developed separately.

Cost Summaries and Short Listing the Alternatives

Total conceptual capital cost estimates, including such soft costs as engineering and construction management as well as contingencies, were in a wide range. The high side is represented by Alternative B, which assumed the greater use of the I-15 right-of-way, from Lake Street to I-15/I-215 in Temecula/Murrieta. The low side is represented by Alternative C, with a terminus near Lake Elsinore.

The five longer alternatives (A. B, D. E and F) essentially cover the same area. They differ from each other in minor ways. Of the five, ***Alternative A*** was selected for further evaluation in this study, as it showed to be potentially the least expensive to implement. ***Alternative C*** and ***Alternative C1*** also were retained, as these appeared to be the simplest and easiest to construct, while still providing a viable option to potential riders throughout the corridor.

Table 5
Temecula Extension Total Conceputal Capital Costs - $ in Millions
(includes engineering and contingencies)

	Alternative and Length from BNSF Transcon (miles)						
	A	**B**	**C**	**C1**	**D**	**E**	**F**
Cost Element	**(35.3)**	**(35.3)**	**(15.7)**	**(15.7)**	**(35.3)**	**(35.3)**	**(35.3)**
Track	34.0	34.0	16.0	16.0	34.0	34.6	34.6
Turnouts	1.9	1.9	1.9	1.9	1.9	2.3	2.3
At grade, highway rail crossings	0.7	0.6	0.5	0.5	0.7	0.7	0.7
Structures	181.7	214.7	22.1	22.1	181.7	181.7	181.7
Drainage	3.2	3.2	1.4	1.4	3.2	3.2	3.2
Stations	32.0	32.0	16.0	24.0	40.0	32.0	40.0
Signals	41.1	40.8	21.0	21.0	41.1	41.6	41.6
Earthwork	7.4	6.5	5.5	5.5	7.4	7.4	7.4
Right-of-way	24.7	21.3	19.5	19.5	25.6	24.7	25.6
Specialty tems	0.6	0.6	3.1	3.1	0.6	0.6	0.6
Estimated Construction Costs	327.3	355.7	107.1	115.1	336.2	328.7	337.6
EMDCM* (15% of Construction)	49.1	53.4	16.1	17.3	50.4	49.3	50.6
Subtotal	376.3	409.0	123.2	132.4	386.6	378.0	388.3
Contingenies (30% of Constr.)	98.2	106.7	32.1	34.5	100.8	98.6	101.3
Total Estimated Costs**	**474.5**	**515.7**	**155.3**	**166.9**	**487.4**	**476.6**	**489.5**
Equipment	94.8	94.8	94.8	94.8	94.8	94.8	94.8
Total Estimated Capital Costs	**569.3**	**610.5**	**250.1**	**261.7**	**582.2**	**571.4**	**584.3**

Alternative	Description
A	Corona-Temecula, entering I-15 at Nichols Road at Lake Elsinore
B	Corona-Temecula, entering I-15 at Lake Street at Lake Elsinore
C	Corona-Lake Street at Lake Elsinore
C1	Corona-Lake Street at Lake Elsinore with additional station at Dos Lagos
D	Same as A, with additional station at Dos Lagos
E	San Bernardino-Temecula, entering I-15 at Nichols Road at Lake Elsinore
F	Same as E, with additional station at Dos Lagos

Notes: * EMDCM = Engineering/Mobilization/Demobilization/Construction Management
** Includes EMDCM and Contingencies
Subtotals reflect rounding which may cause some variance

Temecula South

Alternative G assumes conventional commuter rail operations between Temecula and downtown San Diego. As with the other alternatives, this assumes 16 trains: six AM peak period southbound trains, the reverse in the evening peak, and two mid-day round trips. This alternative is 66 miles long.

As this alternative follows the proposed HSR alignment, the study team followed as closely as possible the costing methodology adopted for the *Capital and Operations and Maintenance Costs* report for the California High-Speed Rail Authority (June 2004). A summary of estimated capital costs for Alternative G appear in Table 6 below in a format which tracks the format used in the earlier HSR capital cost estimate.

Table 6 Temecula South HSR Total Conceptual Costs - $ in Millions (Includes engineering and contingencies)	
Alternative G (66 Miles)	
Cost Element	**Cost**
Track	49.5
Earthwork and Related Items	19.2
Structures/Tunnels/Walls	688.9
Grade Separations	27.5
Building Items (Stations)	44.0
Rail and Utility Relocation	18.1
Right-of-Way (ROW)	137.9
Environmental Mitigation	27.9
Signals and Communication	61.6
Vehicle Costs	94.8
Support Facility Costs	20.0
Program Implementation Costs (15% of Construction)	178.4
Contingencies (30% of Construction)	278.6
Total Construction Costs	**928.8**
Construction, ROW, Enviro. Mitigation, Vehicle Costs	**1,189.4**
Constr., ROW, Enviro, Vehicles, Prg. Impl., Contingencies	**1,646.5**

<u>High-Speed Rail and a Poway Station</u>

The only capital cost assumed for this option is the cost of an additional station at Poway. This is because such a station is not included in the current system plans of the HSRA. As noted, an initial presumption of this study was that many Temecula area commuters would use a Poway station as a destination.

The 2004 *Capital and Operations and Maintenance Costs* report cited a cost for a March Air Force Base (AFB) station at $27 million, plus another $2 million for surface parking. Including contingencies and "soft costs" for design and implementation, a total cost for the March AFB station would be about $43 million. Ample undeveloped land would facilitate construction of a HSR station there. As undeveloped land appears to exist in the vicinity of I-15 and SR 56, where a Poway station could be located, a similar cost figure would seem a reasonable amount to assume for a Poway station.

Although a Poway HSR station could generate about 4,000 boardings and alighting per day in 2030, the ridership forecast showed that the majority of trips generated by a Poway station would be made by HSR riders who would be using a different station, if the Poway station did not exist. Since this station would not address any major commuter demand from Temecula, further examination of a Poway HSR station does not appear merited at this time.

Evaluation

The 2005 commuter rail study utilized nine criteria to evaluate five commuter rail service options. The same evaluation criteria are used for this study, so as to produce an apples-to-apples comparison of the options.

Alternatives A, C, C1 and G are evaluated per the nine criteria, which are shown in Table 7 on the following page. In the table, the feasibility of an alternative per a specific criterion is summarily assessed with a “Harvey Ball”. That is, the fuller the Harvey Ball, the more feasible the performance. For comparison, the evaluation results of the 2005 commuter rail study are shown in Table 8, with Scenarios 3 and 7 being the two that were recommended for further study.

Eight of the evaluation criteria were quantitative, that is, a numerical result could be determined for each alternative per each criterion. One was qualitative, meaning that the evaluation of the alternatives per this criterion were subjective, this is, based on the professional judgment of the consulting team. The criteria are described below. For this evaluation, Alternatives A, C and C1 assume extension trains running to both Los Angeles and Laguna Niguel, as was assumed in the ridership Service Case 1 (the Base Case).

- ***Daily Passenger Trips in 2030:*** this is a measure of the ridership generated by the commuter rail services. The purpose of public transit is to attract riders. Therefore, options that generate more riders score better by this measure. Alternative G is clearly superior in this regard.
- ***Daily Passenger Trips per Train in 2030:*** this is a measure of capacity utilization. Options which put more riders on trains score better on this measure than those that put less. Again, Alternative G is clearly superior by this measure.

Table 7
Screening and Application of Evaluation Criteria-Commuter Service

Scenario		Corridor /Service Type/ End Point	Route Miles*	Passenger Trips In 2030 (Daily)	Passenger Trips Per Train (Daily)	Fare Box Recovery Ratio**	Right-of-Way Issues	Mobility Improvements-Daily Trip Time Savings	Access to Low Income Households (Percent)	Operating Costs per Passenger-Mile ($)	Capital Costs: Track, Stations & Equipment ($ millions)	Capital Costs Per Passenger ($)
A	Frequency-16 Trains Daily	Interstate 15 /Commuter/ Temecula	36.5	989 ◒	62 ◒	24% ◒	◒	456 hours ●	28.03% ○	$0.54 ◒	$569.3 ○	$575,632 ○
C	Frequency-16 Trains Daily	Interstate 15 /Commuter/ Lake Elsinore	17.0	874 ◒	55 ◒	43% ●	◒	409 hours ●	28.38% ○	$0.30 ●	$250.1 ◒	$286,156 ○
C1	Frequency-16 Trains Daily	Interstate 15 /Commuter/ Lake Elsinore w/ Dos Lagos Station	17.0	921 ◒	58 ◒	45% ●	◒	376 hours ●	28.20% ○	$0.30 ●	$261.7 ◒	$284,148 ○
G	Frequency-16 Trains Daily	Interstate 15 /Commuter/ San Diego	66.4	3,090 ●	193 ●	50% ●	◒	146 hours ○	42.05% ●	$0.34 ●	$1,646.5 ○	$532,834 ○

Table Key

Feasible ● Moderately Feasible ◒ Less Feasible ○

* Incremental route miles east or south of North Main Corona.

** Similar to a cost-benefit ratio, this criterion measures the percentage of estimated operating costs recoverd through estimated fare box revenues.

Source: Wilbur Smith Associates and WRCOG data and calculations.

Table 8
***RCTC Commuter Rail Feasibility Study* Screening and Application of Evaluation Criteria-Commuter Service**

Scenario		Corridor /Service Type/ End Point	Route Miles*	Passenger Trips In 2030 (Daily)	Passenger Trips Per Train (Daily)	Farebox Recovery Ratio**	Right-of-Way Issues	Mobility Improvements-Daily Trip Time Savings	Access to Low Income Households (Percent)	Operating Costs per Passenger-Mile ($)	Capital Costs: Track, Stations & Equipment ($ millions)	Capital Costs Per Passenger ($)
1.	Commuter Frequency-16 Trains Daily	Union Pacific Railroad /Commuter/ Banning-Beaumont	34.5	768 ○	48 ○	19% ◒	○	176 hours ◒	43.96% ●	$0.68 ◒	$299.9 ◒	$390,495 ○
2.		Union Pacific Railroad /Commuter/ Indio	76.5	2,174 ●	136 ●	22% ◒	○	124 hours ○	42.96% ●	$0.63 ◒	$544.4 ○	$250,414 ○
3.		Perris Valley Line /Commuter/ San Jacinto	16.5	1,338 ◒	84 ◒	61% ●	●	518 hours ●	44.32% ●	$0.24 ●	$111.5 ●	$83,333 ●
5.		Winchester Road /Commuter/ Temecula	20.5	1,292 ◒	81 ◒	53% ●	◒	486 hours ●	37.76% ◒	$0.25 ●	$203.6 ◒	$157,585 ◒
7.		I-215 /Commuter/ Temecula	16.5	2,166 ●	135 ●	109% ●	◒	932 hours ●	37.23% ◒	$0.12 ●	$249.4 ◒	$115,143 ◒

Table Key

Feasible ● Moderately Feasible ◒ Less Feasible ○

* Incremental route miles east or south of South Perris, assuming Metrolink's 91 Line service is extended to South Perris.

** Similar to a cost-benefit ratio, this criterion measures the percentage of estimated, incrememtal operating costs recoverd through estimated, incremental farebox revenues.

Source: RLBA, WSA and WRCOG data and calculations.

- ***Fare Box Recovery Ratio:*** this is a measure of the proportion of operating costs covered by fare revenue[3]. This is a traditional measure of cost effectiveness used by transit services. Just for the options that are part of the Metrolink system (A, C and C1), only the operating costs of running north to North Main Corona are counted for this calculation. The calculation for Alternative G is the traditional fare box recovery calculation: total revenues are divided by total operating costs. Even so, its performance is superior to those of Alternatives A, C and C1, which consider only partial operating costs. The result is due to more riders, who in sum generate more revenue and thus cover more operating costs.
- ***Right-of-Way Issue:*** this is the sole qualitative criterion, meant to capture the degree of difficulty for RCTC to implement passenger rail service in the study corridors or to gain access in existing rights-of-way. All four alternatives face major implementation and access issues. For example, A, C and C1 presuppose acquisition of the former Santa Fe right-of-way between Lake Elsinore and south Corona (inclusive of a portion now covered by a golf course) as well as access to the BNSF. Alternatives A and G assume access to the I-15 right-of-way for rail service. Thus, all alternatives appear equal by this measure.
- ***Mobility Improvements – Daily Trip Time Savings:*** this is the measure of time saved by traveling on trains versus driving on area highways, most of which will be plagued with peak period congestion in 2030. Travel time is calculated on a daily (weekday) basis. Minutes saved between points are multiplied by the ridership between the same points, generating total daily savings in 2030. In this regard, the Temecula North alternatives generate more than twice the hours saved as does the Temecula South alternative. Of the Temecula North options, Alternative A scores the best, a result of carrying more riders farther.
- ***Mobility Improvements – Access to Low Income Households:*** this is measured by reference to income levels of residents located in catchment areas within five miles of proposed stations. Here Alternative G, the Temecula South option, scores best.
- ***Operating Cost per Passenger-Mile:*** this criterion captures the estimated operating cost required to carry a passenger one mile. However, for the Temecula North options (Alternatives A, C and C1), operating costs only include the cost of operating north to Corona. On the other hand, passenger-miles for these options are calculated from origin to ultimate destination, which for the most part are west or east of Corona. This is a different calculation than for Alternative G, wherein total operating costs (a much bigger number) are divided by total

---

[3] Operating costs were estimated by multiplying train-miles by the $41.31 per train-mile figure used in the 2005 commuter rail study. The cost figure was developed by Metrolink. Revenues were estimate by multiplying Metrolink-like fares by passenger-miles, just as was done in the 2005 study. This study assumes that operating costs and revenues will grow at the same rate.

passenger-miles. Just comparing the Temecula North options, Alternatives C and C1 do better. This is because their operating costs are less than half that of Alternative A, while passenger-miles of all three alternative are nearly the same.

- ***Capital Costs:*** these are the absolute costs of implementing the alternatives. For this evaluation, Alternatives C and C1 are superior, a result of shorter line construction.
- ***Capital Costs per Passenger:*** this is total capital costs divided by daily (weekday) one-way passenger trips. Alternatives C and C1 are superior, a result of ridership nearly the same as Alternative A but with less than half the implementation cost.

Summary

<u>Conventional Commuter Rail Alternatives</u>

Alternative A, with service from Temecula north through Corona, has the best trip time savings. It also has the second highest price tag, the highest capital cost per passenger, and the lowest fare box recovery.

With a shorter extension from Lake Elsinore north, Alternative C has almost as much ridership and trip time savings, less than half the implementation costs and cost per passenger, and almost twice the fare box recovery compared to Alternative A.

Alternative C1, with service from Lake Elsinore and an additional station at Dos Lagos, has a few more passenger trips but scores essentially the same as Alternative C.

Alternative G, with commuter rail service from Temecula to San Diego, does the best in terms of passenger trips, passenger trips per train, fare box recovery, access for low income households, and operating costs per passenger-mile. However, its implementation cost is three times that of the next highest, Alternative A.

While Alternatives C and C1 score well on a number of criteria, these alternatives on balance are somewhat inferior to the two commuter rail routes recommended for further analysis in the 2005 *RCTC Commuter Rail Feasibility Study*. Accordingly, unless implementation costs could be reduced, this study recommends that these two alternatives do not progress toward further analysis. Also because of their high implementation costs, Alternatives A and G are not recommended for further analysis at this time. As demographics and population trends change for specific areas, the feasibility of these routes could be re-evaluated in the future.

Public Private Partnership

It is worth noting that RCTC has been approached by local developers to explore the potential of public private partnerships concerning new commuter rail services on the I-15 corridor. A concept to lower overall capital costs for Alternatives C and C1 (Lake Elsinore options) would be potential public-private partnerships, where private developers help fund or donate right-of-way and contribute to the overall capital costs. One such concept could reduce implementation costs for Alternative C1 by $113.2 million – assuming that developers provide or fund the right-of-way requirements, the stations, and contribute $50 million to rolling stock requirements. This approach would make the service more cost efficient and could increase the viability of the project.

Table of Contents

Appendix

Tables

Figures

Chapter 1: Study Purpose

Background

In 2005, the Riverside County Transportation Commission (RCTC) completed an evaluation of five potential commuter rail routes within Riverside County. That study, the *RCTC Commuter Rail Feasibility Study*, recommended that two of those five routes be examined in greater detail as possible candidates for future public investment. Those two routes are 1) an extension of the Perris Valley Line from South Perris at I-215 eastbound through Hemet to San Jacinto, and 2) an extension Perris Valley Line from South Perris at I-215 southbound along the I-215 corridor to Temecula and Murrieta.

In order to perform a follow-up study, Wilbur Smith Associates was retained to evaluate the potential of conventional commuter rail services on two other I-15 corridors. These are:

- ***Temecula North:*** between Temecula and points west (via Corona), including Los Angeles and Orange County work centers; and between Temecula and points east (via La Sierra), including Riverside and San Bernardino
- ***Temecula South:*** between Temecula and San Diego.

The consultant also was asked to explore the potential of implementing a commuter rail level of service on the proposed California High-Speed Rail (HSR) system between Temecula and San Diego.

Currently, the Bay Area Metropolitan Transportation Commission (MTC) is studying the ridership potential of a statewide High Speed Rail (HSR). The MTC effort is pursuant to the *Program Environmental Impact Report / Environmental Impact Statement* (EIR/EIS) developed for the California High-Speed Rail Authority (HSRA) in 2004. That report assessed the potential capital costs for building the HSR system, inclusive of a Los Angeles-Riverside-San Diego segment. The current ridership estimate assumes 49 daily trains between Los Angeles, Riverside and San Diego, with 108,000 daily passenger trips, including peak commute period trips, within Southern California[1].

[1] A region defined here as the jurisdictions of the Southern California Association of Governments (SCAG) and the San Diego Association of Governments (SANDAG).

Purpose of the Study

The purpose of this study is to evaluate the potential of conventional commuter rail services on two corridors, one to the north of Temecula towards Corona along I-15 and the other to the south. Regarding the former, this study looks at various commuter rail alternatives operating between 1) Temecula and Los Angeles, 2) Temecula and Orange County work centers, and 3) Temecula and San Bernardino. Regarding the latter, the study explores the conventional commuter rail potential between Temecula and San Diego.

The conventional commuter rail service options studied are identified on the following page in Figure 1-1. The underlying assumption of a southern conventional commuter rail option from Temecula to San Diego was that the HSR system, which would follow the same route, would not be constructed. In its stead, a conventional service, on the same alignment, would be implemented.

The study's purpose of exploring the use of the HSR system for commuter trips between Temecula and San Diego changed during the course of the study. This was a result of a change in previous HSR assumptions, which currently call for a higher level of service in the Los Angeles, Riverside, San Diego segment. In all, 36 trains are planned for the peak periods. This means there would be 18 in the morning peak period, of which 9 trains would be southbound. Such a high service level obviated the need to explore using of HSR as a commuter option, as clearly it would be one if HSR were implemented as envisioned. Accordingly, the study shifted to explore the intraregional ridership of six peak period "limited stop" HSR round trips and two mid-day round trips stopping at a conceptual Poway station at SR 56, in addition to the planned HSR stations. Regarding the Poway station, the study's presumption at the outset was that many Temecula area commuters would use the station as a destination.

The assumed train frequencies on the study routes appears in Table 1-1.

Table 1-1
Train Frequencies on Study Routes

	Northbound	Southbound
Temecula North Commuter Rail		
AM Peak	6	
PM Peak		6
Mid-day	2	2
Temecula South Commuter Rail		
AM Peak		6
PM Peak	6	
Mid-day	2	2
Temecula South Limited Stop HSR		
AM Peak		6
PM Peak	6	
Mid-day	2	2

Figure 1-1


Study Routes
Los Angeles
San Bernardino
N. Main
Corona
Fullerton
Riverside
La
Sierra
BNSF
Transcon
South
Perris
San Jacinto
Santa Ana
Lake Elsinore
LOSSAN Rail
Corridor
Laguna
Niguel
Temecula
Oceanside
Escondido
NORTH
NOT TO SCALE
Mira Mesa
San Diego
LEGEND
NORTH
Temecula to Los Angeles
Temecula to Laguna Niguel
Temecula to San Bernardino
SOUTH
Temecula to San Diego:
Commuter Rail and HSR
Existing Rail Lines

Methodology

The evaluation of commuter rail options required the development of forecasts of ridership, revenue and costs, as well as assessment of potential mobility improvements and institutional issues. The planning year for the study is 2030.

The five commuter rail route options in the 2005 RCTC study were analyzed with these same factors as prime elements. With the same methodologies employed for this current study, the results will be comparable in terms of setting priorities for further consideration of Riverside County commuter rail service.

Apart from the evaluation of conventional commuter rail options running north and south from Temecula, this study assumes HSR operations in 2030 between Los Angeles, Riverside and San Diego. In this regard, the study sought only to identify 1) the potential of a Poway / Rancho Bernardo station (at the confluence of I-15 and SR 56) added to the proposed HSR system between Temecula and San Diego, and 2) the cost of a Poway station. A Poway station is not included in the 2004 HSR Program EIS/EIR.

A forecast of HSR commuter ridership was performed using the MTC HSR travel demand model, developed for the California HSR Program. The Poway station cost estimate was based on capital cost estimates developed for the 2004 HSR Program EIR/EIS.

Evaluation

With the above inputs identified for the commuter rail options, the study team proceeded to evaluate the options in terms of the criteria established for the 2005 RCTC commuter rail study. These criteria, cited for each option, are:

- Weekday one-way passenger trips in 2030 (ridership)
- Passenger trips per train
- Fare box recovery (the percentage of operating costs covered by fare revenues)
- Freight and/or passenger rail right-of-way access issues
- Weekday trip time savings of traveling by train versus auto
- Access to low income households
- Operating costs per passenger-mile (one passenger riding one mile generates one passenger mile)
- Total capital costs (construction costs plus contingencies, design costs, and rolling stock)

- Capital costs per weekday one-way passenger

With these criteria identified, the commuter rail options in this study can be compared with the results of the commuter rail options studied in 2005.

Agencies and other Entities Consulted

A Technical Advisory Committee (TAC) oversaw the progress of the study and offered input in meetings held in Temecula in October of 2006, and in January and June of 2007. The study team also briefed staff of the City of Lake Elsinore on the study in March, 2007. TAC member agencies include:

- San Diego Association of Governments (SANDAG)
- Western Riverside Council of Governments (WRCOG)
- Riverside Transit Agency (RTA)
- Southern California Association of Governments (SCAG)
- Southern California Regional Rail Authority (SCRRA), operator of the Metrolink commuter rail system
- The City of Corona
- The City of Escondido
- The City of Temecula
- The City of Lake Elsinore
- Riverside County Transportation Commission (RCTC)
- SE Corporation
- The Pechanga Band of Luiseño Indians

Study Team and Term

The study team consisted of representatives of Wilbur Smith Associates, Cambridge Systematics, Schiermeyer Consulting Services, WRCOG and RCTC. The team members performed the assignment between the fall of 2006 and the summer of 2007.

Chapter 2: Ridership Forecast

The purpose of this chapter is two-fold. One is to explain the different ridership methodologies used in the rail corridors studied – Temecula-Corona and Temecula-San Diego. The other is to present the ridership forecasts associated with the services considered for each corridor.

All commuter rail forecasts assumed six peak-period trains in the peak direction in the morning and an identical volume and pattern of trains in the reverse direction in the afternoon, along with two mid-day trains in each direction, for a total of 16 weekday trips. Typical ridership includes office workers employed in work centers near destination stations accessible by walking, transit, employer shuttles and station cars.

This analysis considered two conventional commuter rail options. One is on the Temecula-Corona Corridor. This option assumes the following:

- The rebuilding of an existing BNSF spur line from the Porphyry Wye 1.3 miles east of North Main Corona Metrolink station about three miles, where it terminates in a quarry.
- The former Atchison Topeka and Santa Fe Railway (ATSF) branch line, which extended from the quarry another 15.5 miles to the vicinity of Nichols Road near Lake Elsinore.
- A new rail route on the I-15 right-of-way between Nichols Road and I-215 in the Temecula/Murrieta area.
- Stations at Temescal Canyon, Nichols Road, Bundy Canyon Road, and Temecula I-15 / I-215.
- Sixteen weekday one-way trips from and to Temecula, using conventional Metrolink train sets.

A variation of the above was evaluated with an additional station at or near the Dos Lagos development, south of Corona but north of the Temescal Canyon station.

The other corridor is between Temecula and San Diego. Typical riders would include office workers heading to work centers in or near downtown San Diego, including the University of California San Diego in University City. This option assumed:

- A new rail route between 1-15 / I-215 along the I-15 corridor between Temecula and Mira Mesa, generally following the alignment of the proposed HSR system.
- A new right-of-way through Carroll Canyon between Mira Mesa and the LOSSAN Corridor at Miramar Road.

- Stations at I-15 / 215, Escondido, Poway at SR 56, Mira Mesa (stop for UCSD), Old Town, and the historic San Diego Depot.
- Sixteen one-way trips each weekday, using conventional Metrolink (and Coaster) commuter train equipment.

The analysis also considered the impact on ridership of a Poway / Rancho Bernardo station stop along the proposed California High Speed Rail route between Temecula and San Diego.

Temecula-Corona Corridor Commuter Rail

Service Cases Tested

At the outset, the study team considered three potential commuter rail options running north from Temecula. All options assumed 16 weekday trains: six AM peak northbound trains; six PM peak southbound trains; and four mid-day trains, two northbound and two southbound. Specific service cases included:

- Case 1: half of trains operate between Temecula and Los Angeles, and the other half operate between Temecula and Laguna Niguel; this is known as the Base Case. On the Corona-Temecula extension, new stations would be at Temecula, Bundy Canyon Road, Nichols Road and Temescal Canyon Road.
- Case 2: all trains operate between Temecula and Laguna Niguel. New stations would be the same as in Case 1.
- Case 3: all trains operate between Temecula and Los Angeles. New stations would be the same as in Case 1.

After subsequent consideration by the TAC and RCTC staff, five more service cases were added. These were:

- Case 4: half of trains operate between Temecula and Los Angeles, and the other half operate between Temecula and Laguna Niguel. One additional new station is assumed at the Dos Lagos development just south of Corona.
- Case 5: all trains operate between Temecula and Laguna Niguel. New stations would be the same as in Case 4, with Dos Lagos.
- Case 6: all trains operate between Temecula and Los Angeles. New stations would be the same as in Case 4, with Dos Lagos.
- Case 7: All trains operate between Temecula and San Bernardino. New stations would be the same as in Case 1, without Dos Lagos.
- Case 8: All trains operate between Temecula and San Bernardino. New stations would be the same as in Case 4, with Dos Lagos.

Ridership Forecast Methodology

The commuter rail ridership forecast was performed using a methodology developed originally to support the 2004 *Commuter Rail Strategic Assessment* commissioned by the Orange County Transportation Authority (OCTA) and refined during the subsequent *Metrolink Commuter Rail Strategic Assessment*. Commuter rail ridership forecasts in both studies were based on estimates of the commuter market share or mode split which commuter rail reasonably could be expected to achieve, assuming various levels of train frequency, travel distance and congestion on parallel road systems. The methodology was subsequently used for the 2005 *RCTC Commuter Rail Feasibility Study*.

The forecasting methodology reflects the assumption that people are drawn to commuter rail if they must make longer trips, especially if there are frequent trains available to encourage and support convenient trip-making. In other words, the longer the trip and the more frequent the headways, the more riders find commuter rail an attractive option.

Those patterns were observed from the results of Metrolink's 2002 *On-board Passenger Survey*. Based on that survey, Metrolink predicted the number of commuters likely to use commuter rail between any two stations served by Metrolink, given: 1) a specific number of trains during the morning peak-period and 2) traveling specific distances. Metrolink validated those predictions against the Metrolink survey, making adjustments on a line and station basis as needed. Two additional key inputs are employed in the methodology to forecast potential ridership:

- Station catchment areas defining the origins and destinations of commuter rail trips were assumed.
- The number of peak-direction, A.M. peak period trains between stations was assumed.

The first input provides the universe of work trips for which commuter rail would be an eligible travel option. The Metrolink *On-board Passenger Survey* identified Southern California Association of Governments (SCAG) Travel Analysis Zones (TAZs) from which riders were arriving to board trains at each of its stations. The survey suggested as a general rule an origin catchment area with a five-mile radius, although TAZ catchment areas are larger at termini which tend to draw riders from farther distances. Please note that the commuter rail station TAZ catchment areas were determined with an eye toward identifying riders whose commuter rail trips typically are long distance. The way in which the TAZs were drawn may serve to overstate trips between adjacent stations at the end of the lines. Destination catchment areas generally are smaller but can be expanded if superior transit connections exist or if station cars are used. The universe of work trips can be identified by using forecasts of work trips between TAZs in five Southern California counties, including Riverside, maintained by SCAG. Those forecasts then can be associated with specified TAZ origin and destination catchment areas to yield the total potential market associated with each station.

The second input guides the forecast of the share or mode split of that universe of work trips between stations that commuter rail likely would capture in a given, future year. All commuter rail cases were assumed to include six peak-period and two off-peak round trips each weekday, consistent with the projected level of service associated with the extension of Metrolink service onto the Perris Valley Line between Riverside and South Perris by 2030, as set forth in RCTC's New Starts Application to the Federal Transit Administration, a related but completely separate effort undertaken by other consultants. Commuter rail mode splits, assuming six frequencies during the peak period and trips of varying distances, appear in the Table 2-1 below. The mode splits were derived from Metrolink's experience which has shown that, the longer the trip, the more people ride the train.

Table 2-1
Commuter Rail Work Trip Mode Splits
(Assuming Six Peak-Period Trains)

Miles	Mode Split (Percent)
5	0.7
15	4.0
25	11.0
35	14.0
45	16.0

Employing the above-described inputs, the methodology predicts a base number of likely passenger work trips. To anticipate total passenger trips and to refine the future forecasts, two other inputs are needed:

- Future travel time by automobile between stations.
- The likely contribution of off-peak service to total ridership.

The third input results in an upward adjustment of ridership forecasts in cases where congestion on parallel highway systems lengthens auto commutes. This forecasting effort included ridership adjustment factors that had the effect of boosting ridership based on assumed competing but worsening auto travel times. Those factors were then applied to station area work trips to reflect gains in ridership due to higher roadway congestion levels.

The last input triggers an adjustment to the calculation of total weekday ridership, reflecting the operation of off-peak trains in addition to peak-period trains. As an example, Metrolink's off-peak trains generate about 10 percent of total weekday ridership. Such a percent was used as a factor in forecasting total peak and off-peak train ridership for all the commuter rail cases.

This forecast followed the methodology outlined above to identify work trips between aggregations of several TAZs around stations, apply appropriate mode splits based on train frequency and travel distance, and adjust the results to reflect assumed, increased congestion on parallel highways in the future. It also considered the ridership impact of limited, off-peak service, and assumed connecting transit services at all stations. A complete list of all stations assumed in all eight cases appears in the Appendix A.

The forecast reflected the calculation of estimated AM peak-period and total weekday commuter rail ridership from Temecula westward to both Los Angeles and Laguna Niguel via the 91 and IEOC Lines in the year 2030 in connection with each of the eight aforementioned commuter rail cases. The ridership forecasts projected in connection with the assumed extensions of commuter rail service south of Corona were incremental to the ridership forecasts associated with potential service enhancements on the 91 and IEOC Lines, which were identified in the *Metrolink Commuter Rail Strategic Assessment*. So, the forecasts in this study measured the incremental ridership associated with each of the extensions studied, over and above that which will result from the expansion of Metrolink's 91 and IEOC Line services through Corona.

With any of the eight cases, there are potentials for transfers. For example, through travel would be possible in all cases to destinations east of Corona – La Sierra, Riverside and San Bernardino. However, ridership through Corona to these three destinations was adjusted downward to reflect the necessity of a transfer to/from connecting trains at Corona. Transfer ridership in all cases was treated in the same way.

Forecast Results

Table 2-2 shows the results of the forecasting effort. The cases show a range in 2030 weekday ridership (one-way passenger trips) of roughly between about 1,000 and 1,170. Cases including an additional station at the Dos Lagos development have slightly more riders.

Services with trains going to Laguna Niguel have more riders than trains going to both Laguna Niguel and Los Angeles and trains just going to Los Angeles. Services with trains going to San Bernardino have about the same number of riders as services to Laguna Niguel. All noted, however, the differences between cases are small to the point of not being statistically significant.

The extension trains would generate additional ridership between existing Metrolink stations as a result of the additional frequencies they provide.

Table 2-2
Passenger Rail Ridership Forecast in 2030

Case	Service	Temecula North Stations	A.M Peak	All-day
1	Split Service (Base Case)	4	899	989
2	All Trains to Los Angeles	4	957	1,052
3	All Trains to Laguna Niguel	4	999	1,099
4	Split service (Base Case)	5	942	1,037
5	All Trains to Los Angeles	5	1,003	1,104
6	All Trains to Laguna Niguel	5	1,047	1,152
7	All Trains to San Bernardino	4	1,003	1,104
8	All Trains to San Bernardino	5	1,059	1,165

Notes:

Split service assumes trains for both Los Angeles and Laguna Niguel.

Los Angeles trains carry riders transferring to IEOC Line trains at Corona.

Laguna Niguel trains carry riders transferring to 91 Line trains at Corona.

San Bernardino trains carry riders transferring to IEOC and 91 Line trains at La Sierra.

Cases 4-6 and 8 assume an additional station at Dos Lagos.

Appendix A includes origin and destination ridership forecast for all eight cases. The specific service alternatives evaluated in Chapter 4 include the Base Case, shown as Alternative A; a shortened version of the Base Case, with a southern terminus near Lake Elsinore, shown as Alternative C; and another shortened version of the Base Case, similar to Alternative C, including an additional new station at Dos Lagos and shown as Alternative C1. Alternative C has an all-day ridership estimate of 847, and Alternative C1 has an all-day ridership estimate of 921.

Temecula-San Diego Corridor Commuter Rail

Service Case Tested

Only one conventional commuter rail case was tested for service between Temecula and San Diego. Like the other cases, this one assumed six round trip peak period trains, and two round trip mid-day trains. As noted, stations included Temecula/Murrieta at I-15/I215, Escondido, Poway SR 56, Mira Mesa, Old Town and the historic San Diego Depot. In all, the route is 66 miles long. A conventional commuter one-way trip would take approximately 82 minutes from start to finish.

This service case for commuter rail was coded within the statewide interregional ridership forecasting model between Temecula and San Diego in place of high-speed rail in this corridor to determine the ridership potential.

Ridership Forecast Methodology

This commuter rail service alternative was tested using a statewide ridership and revenue forecasting model developed for the California High-Speed Rail Authority and the Metropolitan Transportation Commission. This statewide model was developed to support evaluation of high-speed rail alternatives in the State of California. It is a fully multimodal model capable of forecasting air, commuter rail and highway alternatives as well as high-speed rail. The approach to this statewide model explicitly recognizes the unique characteristics of intraregional travel demand and interregional travel demand. As a result, interregional travel models capture behavior important to longer distance travel, such as induced trips, business and commute decisions, recreational travel, attributes of destinations, reliability of travel, party size, and access and egress modal options. Intraregional travel models rely on local highway and transit characteristics and behavior associated with shorter distance trips (such as commuting and shopping).

These models are applied to both peak and off-peak conditions for an average weekday. Weekend travel demand and annual ridership estimates are developed using annualization factors developed from observed data on high-speed rail systems around the world. There are four trip purposes for the interregional models (business, commute, recreation, and other) and each trip purpose is modeled separately for two distance classes (trips greater than or less than 100 miles) and by five trip types (trips made by residents of the four largest cities in California versus other trips). The interregional trip frequency models allow estimate induced travel based on improved accessibilities due to high-speed rail options. The interregional models were estimated based on travel survey data collected for these purposes.

The interregional models are comprised of four sets of models: trip frequency, destination choice, main mode choice, and access/egress mode choice. The trip frequency model component predicts the number of interregional trips that individuals in a household will make based on the household’s characteristics and location. The destination choice model component predicts the destinations of the trips generated in the trip frequency component based on zonal characteristics and travel impedances. The mode choice components predict the modes that the travelers would choose based on the mode service levels and characteristics of the travelers and trips. The mode choice models include a main mode choice, where the primary interregional mode is selected, and access/egress components, where the modes of access and egress for the air and rail trips are selected. The details of these models are documented in the

Bay Area/California High-Speed Rail Ridership and Revenue Forecasting Study Interregional Model System Development Report[1].

There were three types of data compiled for the original model development: travel surveys, networks, and socioeconomic data. Some of the travel surveys were collected specifically for this study, three were available from Metropolitan Planning Organizations (MPOs) around the state (the Southern California Association of Governments, the Metropolitan Transportation Commission, and the Sacramento Area Council of Governments), and there was a Caltrans statewide survey available. The interregional models were based on revealed and stated preference surveys, collected specifically for this study, of air and rail travelers, as well as additional households in the state to capture auto travelers. These new data were collected in fourteen regions in California. These were combined with revealed preference surveys of households across the state collected by Caltrans and interregional travel extracted from the MPO regional travel surveys (San Francisco, Sacramento, and Los Angeles). The San Diego regional travel survey was reviewed for this purpose but did not contain the necessary data for these interregional trips to include it. By combining the various available data sources, the model developers were able to provide more robust data sets for model estimation than was otherwise possible. There are highway, air, rail, and local transit networks to support both the urban area and interregional travel models. The socioeconomic data includes household data in four classifications (household size, income groups, number of workers, and vehicle ownership) and employment data by type.

The levels-of-service (LOS) assumptions and future alternatives for the *Bay Area/California High-Speed Rail (HSR) Ridership and Revenue Forecasting Study* were developed for costs (i.e., operating costs and fare prices), service frequencies, travel and access/egress times, terminal times, and reliability measures for each of the interregional travel modes under consideration – auto, air, conventional rail, and high-speed rail. Data comes from a variety of sources. Assumptions about the future background highway and transit networks generally come from existing regional and metropolitan transportation plans. All costs and incomes were reported in year 2005 dollars. The HSR forecasting study also included an extensive new data collection effort of interregional revealed- and stated-preference travel patterns. New data collection comprised 3,172 revealed and stated-preference surveys of California interregional air, auto, and rail passengers, which were used to develop data for access/egress times and costs, and airport terminal times. The details of these LOS assumptions are documented in the *Bay Area/California High-Speed Rail Ridership and Revenue*

---

[1] Developed by Cambridge Systematics for the Metropolitan Transportation Commission and the California High-Speed Rail Authority, August 2006, http://www.cahighspeedrail.ca.gov/ridership/pdf/IMSD.pdf

Forecasting Study Level of Service Assumptions and Forecast Alternatives Report[2].

Forecast Results

Table 2-4 presents the commuter rail average weekday boardings by station from Temecula to San Diego. The I-15/I-215 station has the highest boardings, probably because of the fact that the Los Angeles region can access this station to travel to San Diego, so it has a very large travel shed to draw from. The downtown San Diego station (Depot) has the next highest boardings, as expected. Overall there are over 3,000 average weekday riders on this commuter rail line. Detailed ridership forecasts are contained in Appendix A.

Table 2-3
Temecula-San Diego Commuter Rail
Weekday Boardings

I-15/I-215	974
Escondido	220
SR 56/Poway	279
Mira Mesa	210
Old Town	548
Depot	860
Total	3,090

Temecula-San Diego Corridor High-Speed Rail

The California High Speed Rail Authority developed a high-speed rail plan that includes train service between Los Angeles and San Diego. This would be a high-speed and frequent service between these two cities, offering a competitive alternative to driving. Travel time between Temecula and San Diego would be 38 minutes. There would be 36 trains per day in the peak period (3 hours in the AM and 3 hours in the PM) for an average frequency of 10 minutes in the peak period. There would be 12 trains per day in the off-peak period (remaining 12 hours in the service period) for an average frequency of 60 minutes in the off-peak period.

The purpose of the high-speed rail service case was to determine the ridership impact of including the Poway station. Accordingly, this case was tested with and without the Poway station. The service case without the Poway station was the existing high-speed rail base alternative developed for the California High Speed Rail Authority and the Metropolitan Transportation Commission[3].

[2] Developed by Cambridge Systematics for the Metropolitan Transportation Commission and the California High-Speed Rail Authority, August 2006, http://www.cahighspeedrail.ca.gov/ridership/pdf/R6b_LOS_Assumptions.pdf
[3] http://www.cahighspeedrail.ca.gov/ridership/pdf/PT1_CSHRA Board Meeting_Feb07.pdf

Ridership Case Tested

This case assumed that six peak period round trip high-speed trains and two mid-day round trip high-speed trains operating between Los Angeles and San Diego would stop at a Poway station in 2030. More than this amount of trains are planned to operate during the peaks and mid-day on this route. This case, therefore, quantifies the impact of adding a Poway station to the high-speed rail system.

Ridership Forecast Methodology

The ridership forecast methodology for this service case is the same as it was for the commuter rail from Temecula to San Diego, except that high-speed rail was tested as an alternative instead of commuter rail. This methodology is described in the previous section.

Forecast Results

Table 2-5 presents the Year 2030 high-speed rail boardings for the 16 weekday trains (6 AM peak trains, six PM peak trains and two mid-day trains) that stop at Poway. These boardings represent a small portion of the high-speed rail system, which carries travelers from San Diego to Sacramento, Los Angeles, and San Francisco. In this portion of the system, the high-speed rail was tested with and without the Poway station, to determine the overall impact of this new station.

The forecast shows that the Poway station would have 242 average weekday boardings in 2030 for trips to the four other stations in the study area. The majority of these trips would be made by high-speed rail riders who would be using a different station, if the Poway station did not exist. Thus, there is no significant increase in total riders with the inclusion of the Poway station. This is likely because high-speed rail serves longer distance trips more effectively, so the system does not need to have as many stations to be effective in serving these longer distance trips. Detailed ridership forecasts are contained in Appendix A.

Table 2-4
Temecula-San Diego High-Speed Rail
Weekday Boardings with a Poway Station

Temecula	1,297
Escondido	411
Poway	242
University City	340
San Diego	1,515
Total	3,805

By way of perspective, recent forecasts for the HSRA have shown that HSR stations in the San Diego area would see boardings in a range of 5,000 to 18,000 per day in 2030. Stations in the six-county SCAG region would see boardings in a range of 400 to 15,000 per day in 2030.

The forecast for this study found that a Poway station would not be a major destination for Temecula area commuters. Only 127 Temecula boardings would alight weekdays at Poway in 2030.

As noted, the figures above are the boardings generated only by the 16 trains that stop at Poway. Total boardings at the other stations, which are planned HSR system stations, would be larger.

A Poway station would serve a larger market than just trips to those stations cited above. Indeed, the study team estimates *total* boardings at Poway in 2030 of 1,990 per weekday. Of these, 225 would be destined for Northern California stations. The remaining would be destined for Southern California stations, including the 242 noted above for study area stations and 1,523 for stations north and west of Temecula. It is reasonable to assume that Poway would see a number of alightings similar to the number of boardings. Accordingly, it appears that a Poway station would generate about 4,000 boardings and alightings, or passenger trips, per weekday in 2030.

As noted earlier, majority of these trips would be made by high-speed rail riders who would be using a different station, if the Poway station did not exist. Thus, there is no significant increase in total riders with the inclusion of the Poway station.

Chapter 3: Capital and Operating Costs

With potential operating options and ridership ranges identified, this chapter defines more specific conventional commuter rail operating patterns and consequent conceptual capital and operating costs for evaluation. All alternatives assume 16 weekday trains. The chapter also looks at the capital costs for constructing a HSR station at Poway.

Temecula-Corona Corridor Commuter Rail

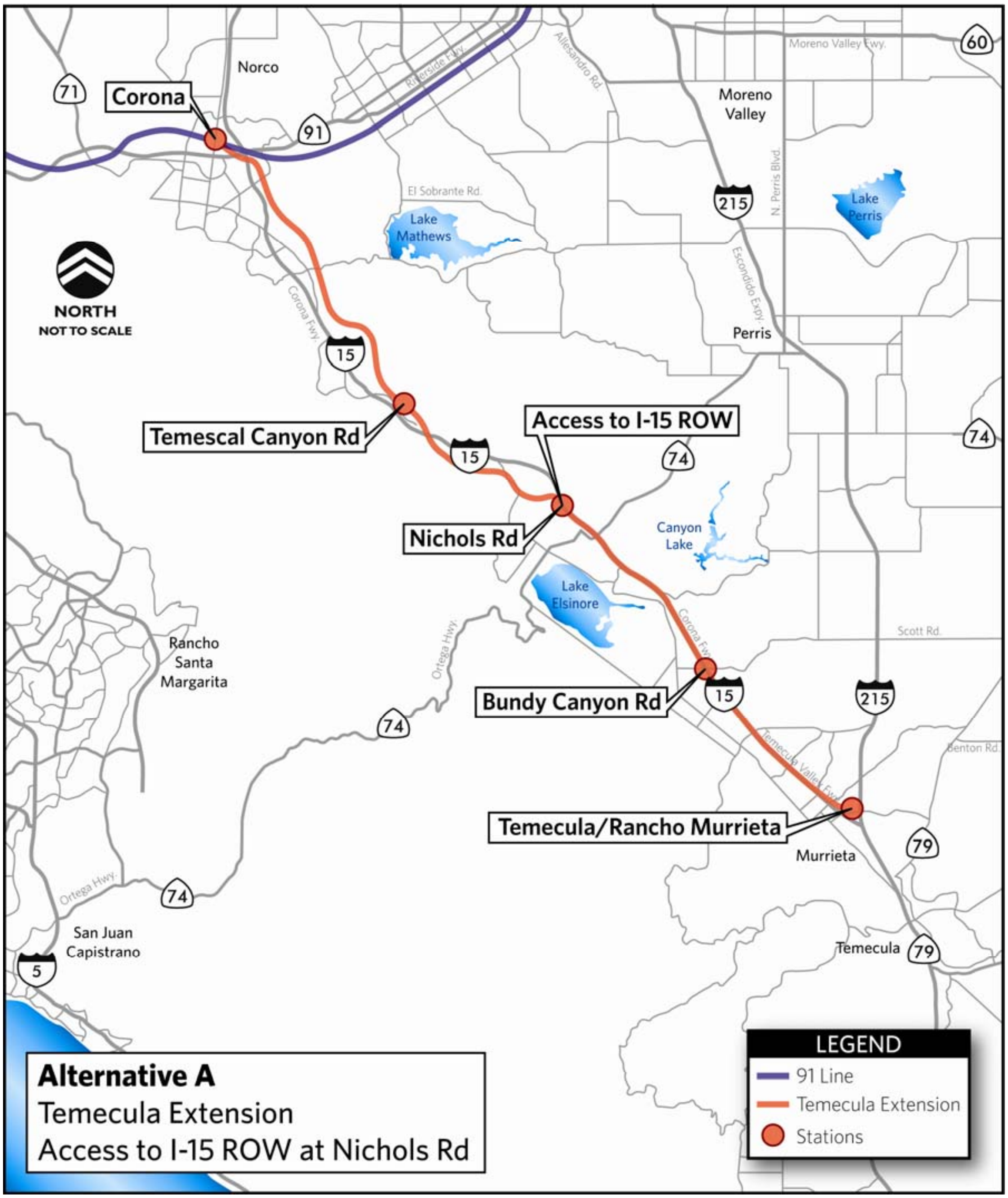
Conceptual Capital Costs

With potential ridership ranges identified for various service cases in Table 2-2, the study team began its analysis of more specific alternative routes and conceptual capital costs for the purpose of a comparative evaluation to identify the most cost effective options. These included two alternatives to limit the southward Temecula extension to Lake Elsinore in order to shorten line construction and thus minimize costs. Also the capital cost alternatives explore the potential of connecting to the I-15 right-of-way at different locations. Furthermore, the alternatives oriented to the west assume Base Case operations: with half of trains operating to Los Angeles and the other half operating to Laguna Niguel. Thus, the alternatives discussed below represent a subset of the eight ridership service cases and explore different approaches to travel along the same general corridor, including various station options.

Capital costs at a conceptual level were developed for seven separate alternatives for commuter rail operations on Temecula-Corona Corridor. The costs are discussed below. The estimates reflect factors unique to each alternative. The alternatives considered are:

- *Alternative A* – From the junction with the BNSF Transcon at Porphyry Wye just east of the North Main Corona Metrolink Station, this alternative is 35.3 miles long and runs the length of the corridor to Temecula. From north to south, the route would make use of the right-of-way of the former Atchison Topeka and Santa Fe Railway (Santa Fe) branch line as far as the Alberhill residential development south of Lake Street in Lake Elsinore. It would then use a new right-of-way east of the development to reach Nichols Road, before entering the I-15 right-of-way for its southward run to Temecula. The four new stations for this alternative would be at Temescal Canyon Road just east of the I-15 overcrossing, Nichols Road, Bundy Canyon Road and Temecula/Murrieta. This alternative is shown as Figure 3-1, running south from the existing Corona station, which would serve as a transfer station for riders not carried directly to destinations by trains from Temecula. The ridership service case associated with this alternative is Case 1.

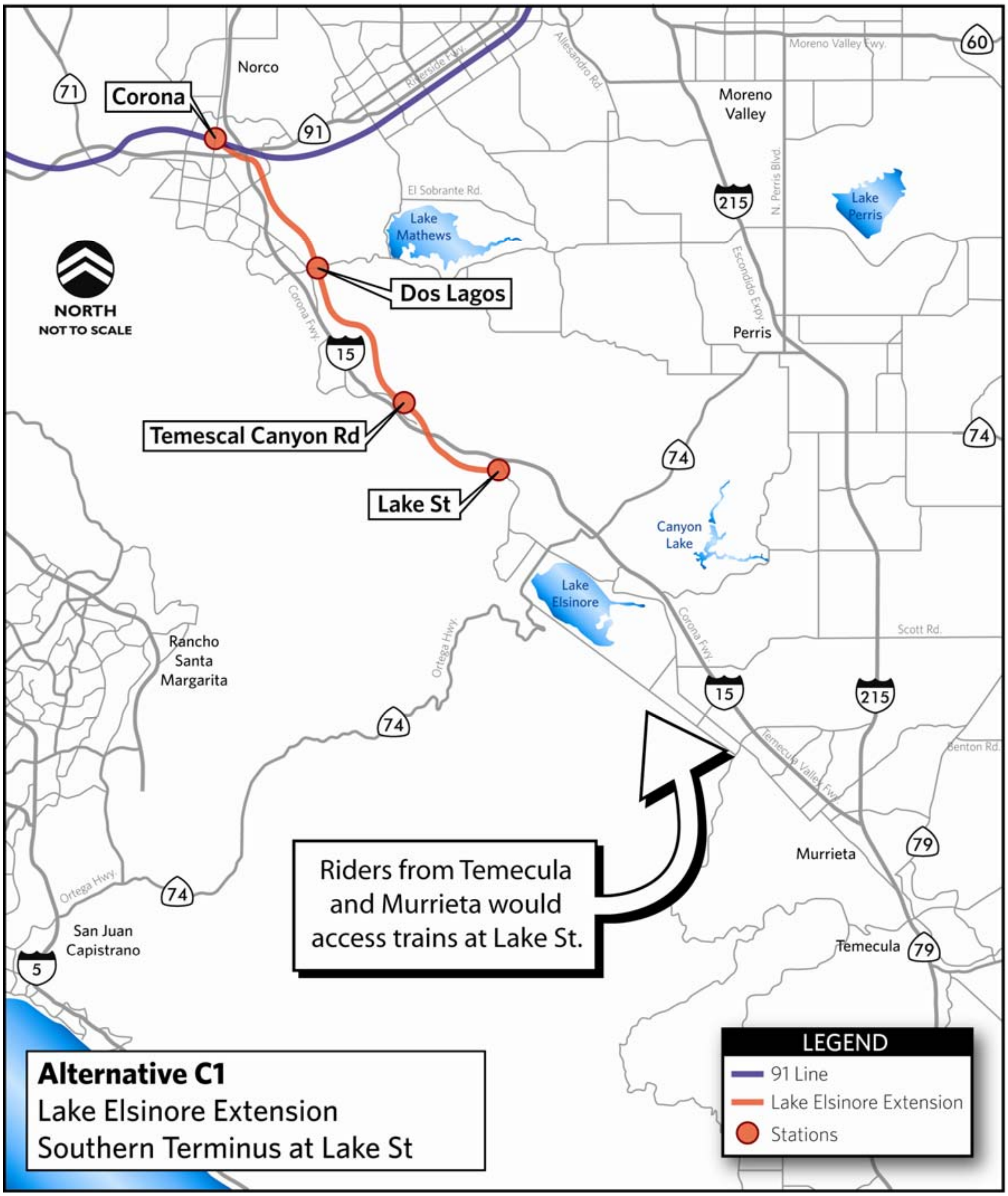
Figure 3-1



- *Alternative B* - This alternative is much the same as Alternative A. The major difference is that the rail alignment would enter the I-15 right-of-way at Lake Street, about three miles north on I-15 from Nichols Road. The length of the alignment and the stations would be the same.
- *Alternative C* – At 15.7 miles, this is a short alternative, with a southern terminus at Lake Street. There would be just two stations – one at Temescal Canyon Road and the other at Lake Street; riders from points farther south in the I-15 corridor could board trains at Lake Street. Alternative C would also be a less complicated alternative to build, since it would make use of what is left of the original Santa Fe right-of-way. This alternative would have much of the same ridership as Alternative A, except that the trips between the two southern most stations would be lost, as those stations would not be included in this shorter alternative. The ridership for this alternative was derived from Case 1.
- *Alternative C1* – This alternative is the same as Alternative C, with the addition of another new station at Dos Lagos, as shown in Figure 3-2. The additional station would result in a small increase in ridership versus Alternative C. The ridership for this alternative was derived from Case 4.
- *Alternative D* – This alternative is the same as Alternative A, with the addition of another new station at Dos Lagos. The ridership service case associated with this alternative is Case 4.
- *Alternative E* – This alternative assumed that all six trains depart Temecula in the morning peak and terminate in San Bernardino, rather than in Los Angeles, Laguna Niguel, or both. Thus, it assumed the reestablishment of the east leg of the Porphyry Wye, connecting the existing BNSF branch line with the Transcon, and the relocation of railcar storage tracks which lie across where the east leg used to be. The alternative runs 35.3 miles, as shown in Figure 3-3. The alternative is shown running south from the existing La Sierra station, which would serve as a transfer station for riders not carried directly to destinations by trains from Temecula. The ridership service case associated with this alternative is Case 7.
- *Alternative F* – This alternative is like Alternative E, with another new station at Dos Lagos. The ridership service case associated with this alternative is Case 8.

A summary of the conceptual cost estimates for all seven alternatives appears in Table 3-1. Individual cost element discussions also appear below. Most unit costs are the same as assumed for the 2005 *RCTC Commuter Rail Feasibility Study*. Detailed estimates for the alternatives appear in Appendix B. Costs are in current year dollars.

Figure 3-2



Corona
Dos Lagos
Temescal Canyon Rd
Lake St
NORTH
NOT TO SCALE
Norco
Moreno Valley
Perris
Lake Mathews
Lake Perris
Canyon Lake
Lake Elsinore
Rancho Santa Margarita
San Juan Capistrano
Murrieta
Temecula
Riders from Temecula and Murrieta would access trains at Lake St.
Alternative C1
Lake Elsinore Extension
Southern Terminus at Lake St
LEGEND
91 Line
Lake Elsinore Extension
Stations

Figure 3-3

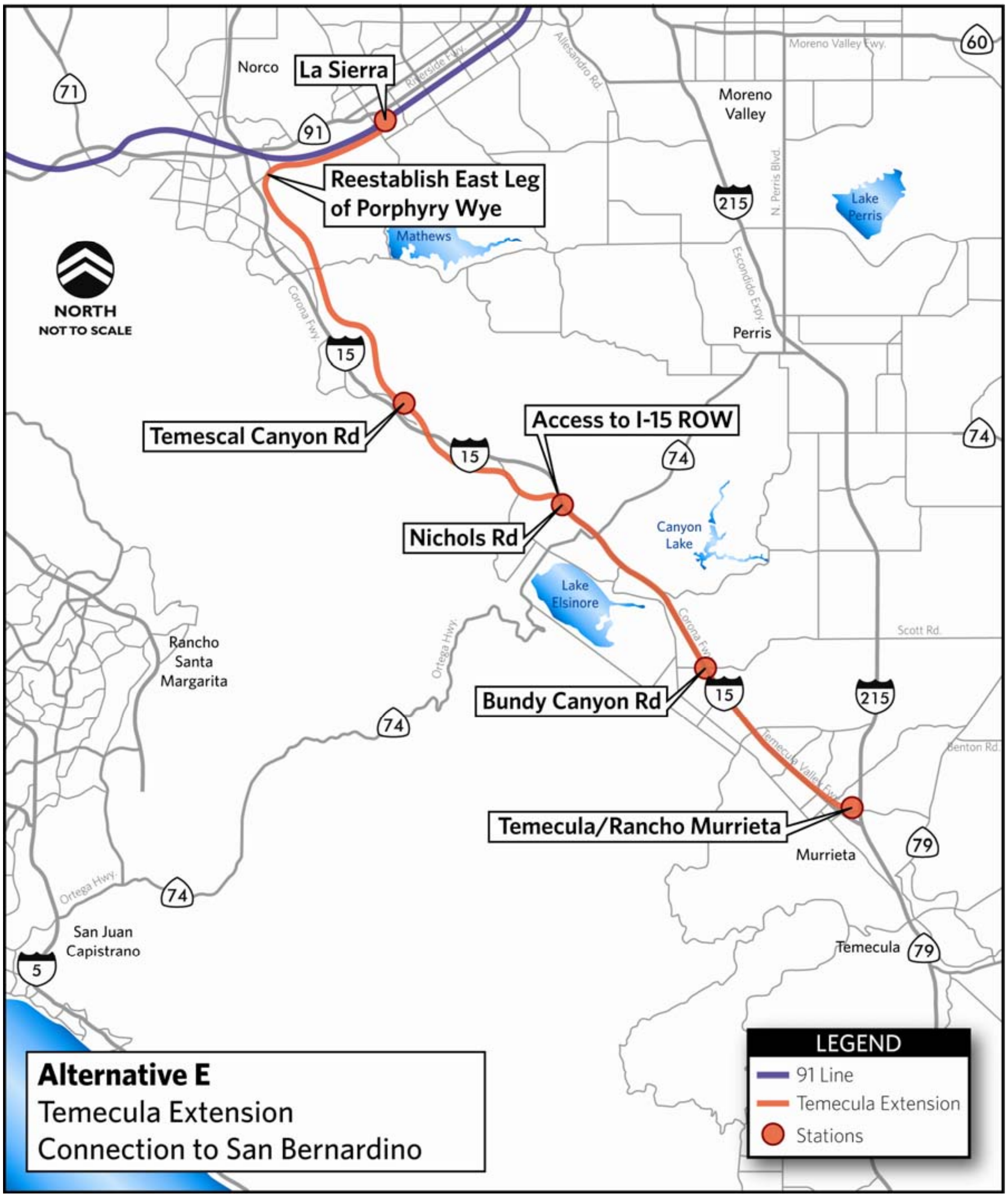

La Sierra
Reestablish East Leg of Porphyry Wye
NORTH
NOT TO SCALE
Temescal Canyon Rd
Access to I-15 ROW
Nichols Rd
Bundy Canyon Rd
Temecula/Rancho Murrieta
Norco
Moreno Valley
Perris
Mathews
Lake Perris
Canyon Lake
Lake Elsinore
Rancho Santa Margarita
San Juan Capistrano
Murrieta
Temecula
Riverside Fwy.
Corona Fwy.
Ortega Hwy.
Moreno Valley Fwy.
Escondido Expy.
N. Perris Blvd.
Alessandro Rd.
Scott Rd.
Temecula Valley Fwy.
Benton Rd.
71
91
60
215
15
74
79
5
LEGEND
91 Line
Temecula Extension
Stations
Alternative E
Temecula Extension
Connection to San Bernardino

Table 3-1
Temecula Extension Total Conceputal Capital Costs - $ in Millions
(includes engineering and contingencies)

	Alternative and Length from BNSF Transcon (miles)						
	A	**B**	**C**	**C1**	**D**	**E**	**F**
Cost Element	**(35.3)**	**(35.3)**	**(15.7)**	**(15.7)**	**(35.3)**	**(35.3)**	**(35.3)**
Track	34.0	34.0	16.0	16.0	34.0	34.6	34.6
Turnouts	1.9	1.9	1.9	1.9	1.9	2.3	2.3
At grade, highway rail crossings	0.7	0.6	0.5	0.5	0.7	0.7	0.7
Structures	181.7	214.7	22.1	22.1	181.7	181.7	181.7
Drainage	3.2	3.2	1.4	1.4	3.2	3.2	3.2
Stations	32.0	32.0	16.0	24.0	40.0	32.0	40.0
Signals	41.1	40.8	21.0	21.0	41.1	41.6	41.6
Earthwork	7.4	6.5	5.5	5.5	7.4	7.4	7.4
Right-of-way	24.7	21.3	19.5	19.5	25.6	24.7	25.6
Specialty tems	0.6	0.6	3.1	3.1	0.6	0.6	0.6
Estimated Construction Costs	327.3	355.7	107.1	115.1	336.2	328.7	337.6
EMDCM* (15% of Construction)	49.1	53.4	16.1	17.3	50.4	49.3	50.6
Subtotal	376.3	409.0	123.2	132.4	386.6	378.0	388.3
Contingenies (30% of Constr.)	98.2	106.7	32.1	34.5	100.8	98.6	101.3
Total Estimated Costs**	**474.5**	**515.7**	**155.3**	**166.9**	**487.4**	**476.6**	**489.5**
Equipment	94.8	94.8	94.8	94.8	94.8	94.8	94.8
Total Estimated Capital Costs	**569.3**	**610.5**	**250.1**	**261.7**	**582.2**	**571.4**	**584.3**

Alternative	Description
A	Corona-Temecula, entering I-15 at Nichols Road at Lake Elsinore
B	Corona-Temecula, entering I-15 at Lake Street at Lake Elsinore
C	Corona-Lake Street at Lake Elsinore
C1	Corona-Lake Street at Lake Elsinore with additional station at Dos Lagos
D	Same as A, with additional station at Dos Lagos
E	San Bernardino-Temecula, entering I-15 at Nichols Road at Lake Elsinore
F	Same as E, with additional station at Dos Lagos

Notes: * EMDCM = Engineering/Mobilization/Demobilization/Construction Management
** Includes EMDCM and Contingencies
Subtotals reflect rounding which may cause some variance

New and Upgrade Track Construction

New main track is likely to be constructed of 141 pound rail, concrete ties, new rail anchorage, sufficient ballast and other materials to achieve the desired Federal Railroad Administration (FRA) Class track class (likely FRA Class 4, allowing for maximum passenger train speeds of 79 miles per hour).

Turnouts

Turnouts are switches allowing trains to move between parallel tracks or into layover facilities. There are three types of turnouts considered in this analysis: #20 high speed turnouts and #10 lower speed turnouts for mainline operations, and #10 yard turnouts. Mainline switches are electronically controlled by dispatchers in a remote location. Yard turnouts are hand-operated.

At-grade Highway-Rail Crossings

Capital cost estimates reflect the replacement or new installation of all new ties, freshly surfaced track, and full-depth concrete panels.

Structures

Major structures include access and egress to and from the I-15 right-of-way for Alternatives A, B, D, E and F. This can be accomplished either by a flyover or a tunnel. Estimates assume 3,400 track feet of major railroad bridge installations in Alternatives A, B, D, E and F and half that in Alternatives C and C1. By far, the largest cost item for the five longer alternatives is for retaining walls. A retaining wall would be required along the Alberhill development, to prevent earthen embankments there from eroding onto the tracks. Retaining walls would also be needed inside the I-15 right-of-way as a safety precaution.

Drainage

A new drainage system will be required along the route. The estimate for the new system is a flat 10 percent of the track cost.

Stations

Station cost estimates reflect the cost of construction. The cost of land acquisition is included in right-of-way costs discussed below. Station parking for a minimum of 500 vehicles is included in the standard station cost, with additional required spaces addressed later as a specialty item.

Signals

Cost estimates are included for a Centralized Traffic Control (CTC) system, allowing a dispatcher in a remote location to control trains. The estimates also include costs for grade crossing protective devices – gates and flashing lights.

Earthwork

Major earthwork is assumed for rebuilding the former Santa Fe right-of-way and the alignment east of the Alberhill residential development. Minor earthwork is assumed in the I-15 right-of-way.

Right-of-Way

The cost estimates assume purchase of land for the new commuter rail alignment, stations, and a layover facility. The cost per acre for purchase of property was confirmed by RCTC. All alternatives assume purchase of portions of the Dos Lagos Golf Club, which was built on top of the former Santa Fe right-of-way. The analysis assumes that the golf club would replace the reclaimed property with the proceeds of the right-of-way acquisition. At the time of this writing, land available for purchase appeared to exist south of the golf club. No cost is assumed for use of the I-15 right-of-way. Alternatives E and F assume the reestablishment of the east leg of the Porphyry Wye and the relocation of storage tracks used by a processing plant adjacent to the BNSF mainline.

Specialty Items

These consist of two items. One is any parking required beyond the 500 spaces per station. Only Alternatives C and C1 have such a cost, as it assumes 500 additional spaces built at the Lake Street Station, to accommodate riders from points farther south along I-15 driving to the station to board commuter trains. The other item is for layover yard improvements, beyond the property acquisition. Such improvements are the same as assumed for the 2005 RCTC commuter rail study and include:

- 480-volt standby power (required to maintain train heat and cooling and operate lights and doors without running the train's locomotive)
- A crew and maintenance building
- Fencing and security
- Lighting
- A lead track long enough to enable changing consists without entering the main track
- Level storage tracks with locomotive drip pans
- Roadway vehicle access to all tracks

A schematic of the layover facility appeared in the 2005 study. Heavy maintenance of rolling stock would take place at Metrolink facilities either in Los Angeles or San Bernardino. Accordingly no cost for such a facility is included in the cost estimates.

Equipment

As in the 2005 study, the rolling stock assumed is typical Metrolink equipment. Each train set would consist of a locomotive, one cab car, and five bi-level coaches. The previous study assumed the contribution of just one train set for each of the five commuter rail scenarios studied. This was because these services were envisioned to be extensions of either the Riverside Line (to/from Banning and Coachella Valley via Riverside) or the 91 Line (to/from San Jacinto and Temecula via South Perris). This study's underlying assumption was that service on the Temecula Extension would generate totally new trains, additive to whatever is running on the 91 or IEOC Lines in 2030. Accordingly, this study assumed that there would be six train sets in all, the number required to support the six peak period round trips and the two mid-day round trips, for all six alternatives[1]. This requirement generates a total equipment cost of $94.8 million, with each train set estimated to cost $15.8 million. Total equipment costs in the previous study for each of the five commuter rail scenarios was just $15.8 million, the cost of a single six-car train set, or $79 million less than the equipment requirement assumed in this study.

<u>Cost Summaries and Short Listing the Alternatives</u>

Total conceptual capital cost estimates, including such soft costs as engineering and construction management as well as contingencies, were in a range of $250.1 million to $610.5 million. The higher figure, for Alternative B, assumed the greater use of the I-15 right-of-way, from Lake Street to I-15/I-215 in Temecula/Murrieta. The lower figure, Alternative C, assumed terminating the rail line at Lake Street.

The five longer alternatives (A, B, D, E and F) essentially cover the same area. They differ from each other in minor ways. Of the five, ***Alternative A*** was selected for further evaluation in this study, as it showed to be potentially the least expensive to implement. ***Alternative C*** and ***Alternative C1*** also were retained, as these appeared to be the simplest and easiest to construct, while still providing a viable option to potential riders throughout the corridor.

[1] This equipment would be pooled with Metrolink equipment, so no specific assumption is made here for spares.

Operating and Maintenance Costs

Annual operating costs were estimated in connection with Alternatives A, C and C1. Estimated operating costs were calculated by multiplying estimated train-miles operated in each alternative by cost per train-mile figure used in the 2005 RCTC commuter rail study (this figure was originally provided by SCRRA). The cost calculation appears in Table 3-3, and assumes Base Case operations, i.e. half of trains run between Temecula and Los Angeles and the other half between Temecula and Laguna Niguel.

The operating costs are incremental, as only the costs of running on the Temecula-Corona corridor are counted. This calculation approach is the same used in the 2005 RCTC commuter rail study.

Operating and maintenance costs are those costs related to running the service. They include costs for crews, dispatching, fuel, equipment maintenance, right-of-way maintenance, insurance, administration, etc.

For this calculation, the total mileage from the North Main Corona Station to the alternative endpoints in Temecula (I-15/I-215) and Lake Elsinore (Lake Street) were used, rather than the route mileage shown in Table 3-1 (counted from the junction of the corridor extension with the BNSF Transcon).

The service level comprised six peak period round trips and two mid-day round trips, totaling 16 weekday trains for each alternative. Only weekday train service and 255 weekdays per year were assumed.

Alternative A's annual train-miles (36.5 route miles times 16 trains times 255 weekdays) is more than twice that of Alternatives C and C1, as A is more than twice as long as C and C1. The same is true for A's estimated operating and maintenance costs.

Table 3-3
Temecula-Corona Estimated Annual O&M Costs

Alternative	A	C	C1
Endpoint	Temecula	Lake Elsinore	Lake Elsinore
Service type	Commuter	Commuter	Commuter
Route-miles from N. Main Corona	36.5	17.0	17.0
Days operated per week	5	5	5
Daily trains (inbound and outbound)	16	16	16
Daily train-miles	584	272	272
Annual train-miles*	148,920	69,360	69,360
Estimated annual operating cost**	$6,151,885	$2,865,262	$2,865,262

Notes:
* Annual operating costs are incremental
** 255 operational days used in determining annual train-miles
Metrolink operating cost/train-mile of $41.31 used in calculation

Temecula-San Diego Corridor Commuter Rail

Conceptual Capital Costs

This study considers one additional commuter rail service alternative: between Temecula and downtown San Diego. As with the other alternatives, this assumes 16 trains: six AM peak period southbound trains, the reverse in the evening peak, and two mid-day round trips. This alternative is 66 miles long, as shown in Figures 3-4 and 3-5. It is referred to hereafter as Alternative G.

As this alternative follows the proposed HSR alignment, the study team followed the costing methodology adopted for the *Capital and Operations and Maintenance Costs* report for the California High-Speed Rail Authority (June 2004). Certain modifications were required, however.

The earlier report calculated costs in segments (namely Segments 2A and 3B in the report), which did not fit precisely the commuter rail route assumed for this study. The combined length of these segments was greater than the 66-mile commuter rail route between Temecula and downtown San Diego. Accordingly, underlying assumptions as to the amount of structures and right-of-way required had to be scaled back. Furthermore, the requirements for track and earthwork had to be reduced to reflect the needs of a single track commuter alignment versus a double track HSR alignment.

Figure 3-4

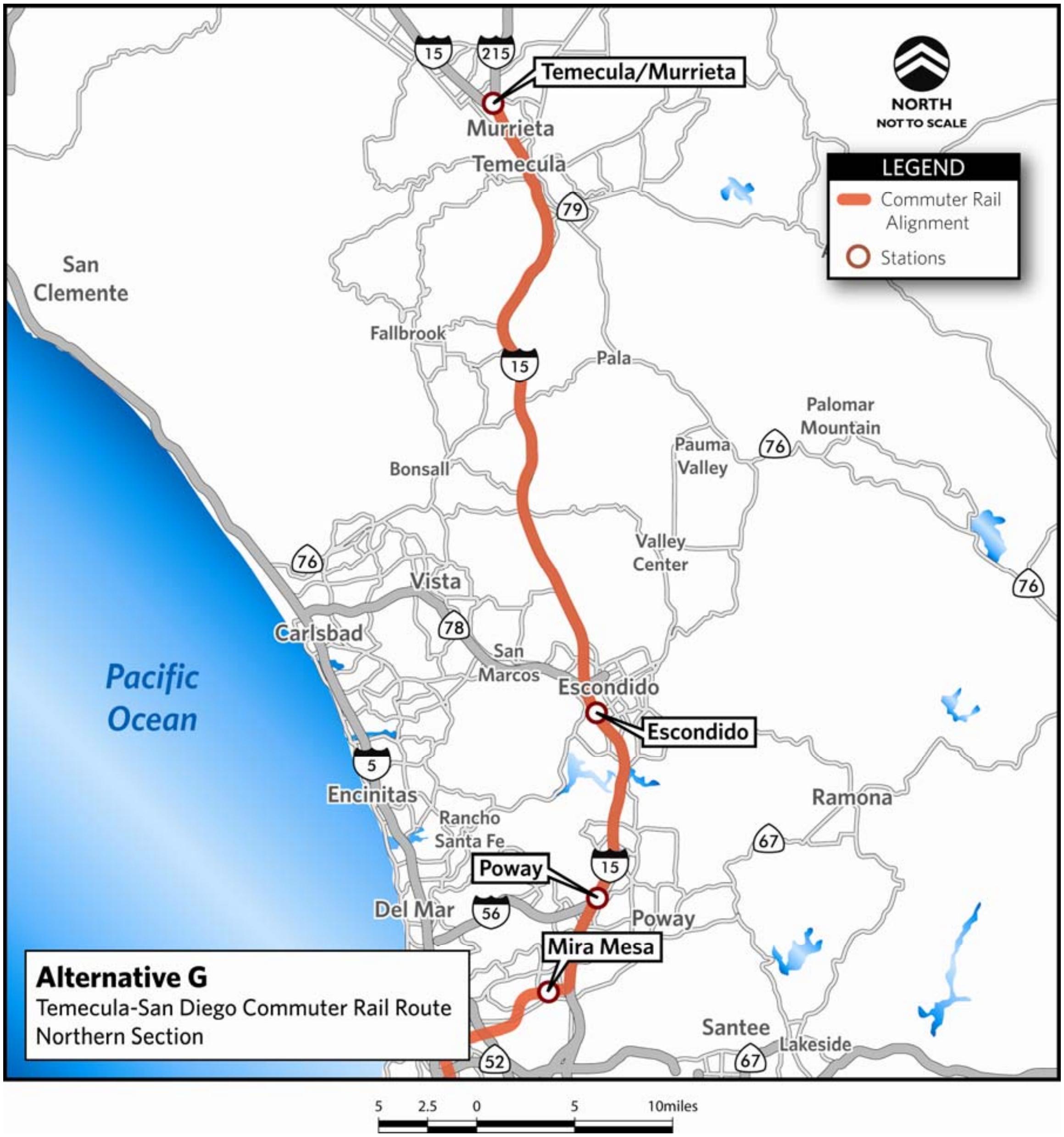
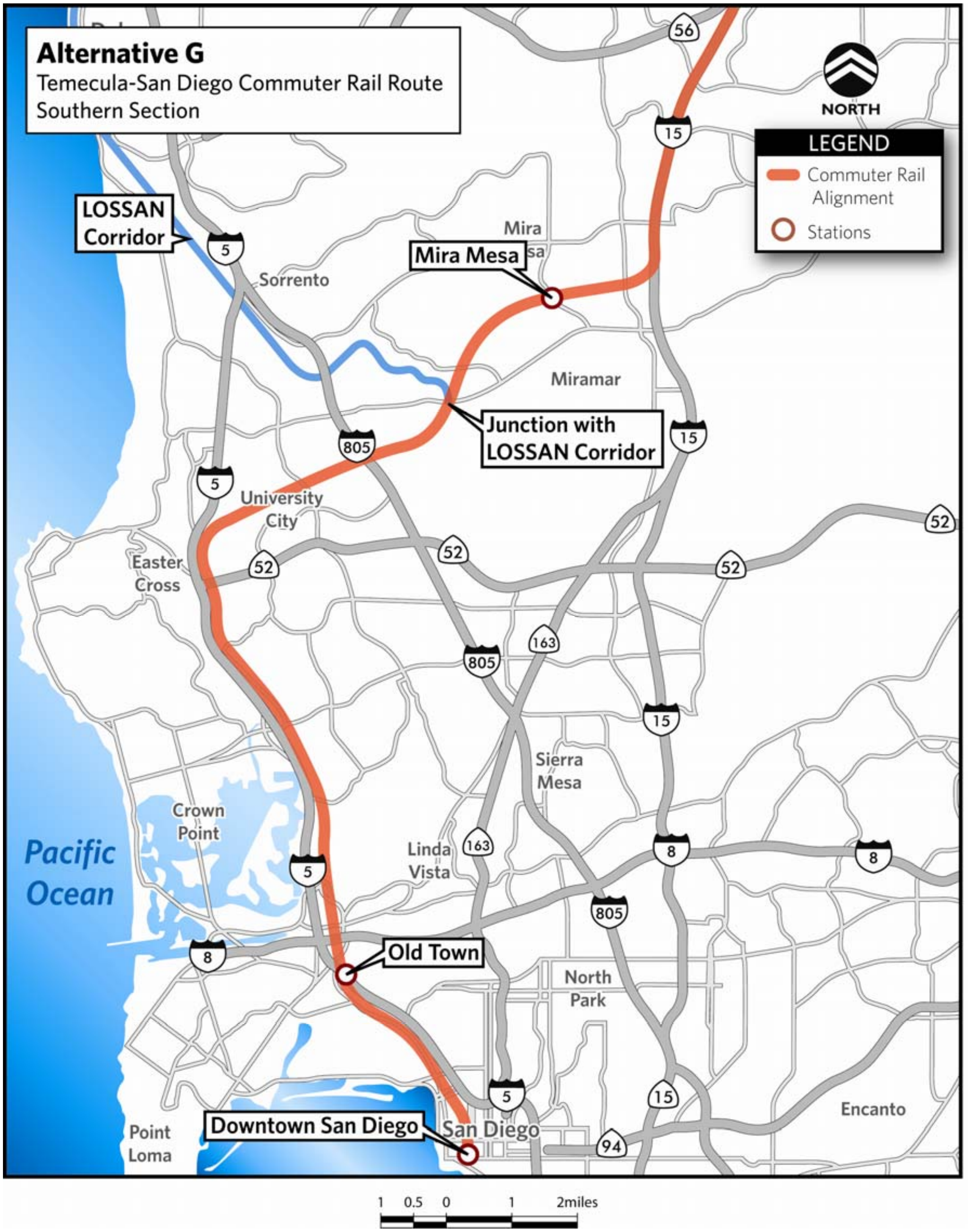


Figure 3-5


Alternative G
Temecula-San Diego Commuter Rail Route
Southern Section
NORTH
LEGEND
Commuter Rail Alignment
Stations
LOSSAN Corridor
Mira Mesa
Junction with LOSSAN Corridor
Sorrento
Miramar
University City
Easter Cross
Sierra Mesa
Crown Point
Linda Vista
Pacific Ocean
Old Town
North Park
Downtown San Diego
San Diego
Point Loma
Encanto
56
15
5
805
52
163
8
94
1 0.5 0 1 2miles

Costs for at-grade stations at Temecula and Poway and for a daytime layover facility in San Diego were the same as like items in the other commuter rail alternatives discussed above. The cost for an Escondido station was assumed to be $20 million, as this station would likely be elevated. The cost for a maintenance facility at Temecula was also estimated at $20 million. As with the other alternatives, six train sets would be needed to run the service[2].

A summary of estimated capital costs for Alternative G appear in Table 3-4 below in a format which tracks the format used in the 2004 HSR capital cost estimate. A detailed estimate for Alternative G appears in Appendix B. Costs are in current year dollars.

Table 3-4
Temecula-San Diego Total Conceptual Costs - $ in Millions
(includes engineering and contingencies)

Alternative G (66 Miles)	
Cost Element	**Cost**
Track	49.5
Earthwork and Related Items	19.2
Structures/Tunnels/Walls	688.9
Grade Separations	27.5
Building Items (Stations)	44.0
Rail and Utility Relocation	18.1
Right-of-Way (ROW)	137.9
Environmental Mitigation	27.9
Signals and Communication	61.6
Vehicle Costs	94.8
Support Facility Costs	20.0
Program Implementation Costs (15% of Construction)	178.4
Contingencies (30% of Construction)	278.6
Total Construction Costs	**928.8**
Construction, ROW, Enviro. Mitigation, Vehicle Costs	**1,189.4**
Constr., ROW, Enviro, Vehicles, Prg. Impl., Contingencies	**1,646.5**

[2] This equipment conceptually could be pooled with The Coaster commuter rail service, run by the North County Transit District (NCTD), which uses the same bi-level locomotive hauled train sets as Metrolink. Accordingly, no specific assumption is made here for spares. A review of HSR alignment profiles showed at least one segment of the route between Temecula and Mira Mesa with a 4 percent grade, which would be challenging for this equipment type. However, the alignment segment with this steep grade segment is only about two miles long, a distance which should be manageable even with this equipment. An alternative technology called Diesel Multiple Units (DMUs), where several cars in a train set are self-propelled), can handle such a grade. Accordingly, DMUs might be considered for deployment in this corridor. The study team did not discuss equipment pooling concepts with NCTD.

Most of the cost elements cited above are much the same as for Alternatives A through F. For example, the same sort of track and rolling stock were assumed. However, some cost elements are new to this calculation. These are:

Grade Separations

A feature of HSR operations are that they are for the most part grade separated from street and highway crossings. As Alternative G assumes the HSR alignment, it also assumes the grade separations.

Rail and Utility Relocation

As they ran along former and existing transportation corridors, Alternatives A through F did not displace any rail lines or utilities. However, the HSR alignment makes the assumption that there will be some relocation required. Accordingly, this commuter rail route cost estimate also includes assumption of utility relocation cost.

Environmental Mitigation

In Alternatives A through F, this cost was not specifically identified, as the rail routes would utilize either a former rail or existing highway rights-of-way or both, and the potential for major environmental impacts were deemed minimal. In Alternative G, however, with the assumption of a grade separated, in some cases elevated alignment, the potential for environmental impacts is greater. A new right-of-way would be needed through Carroll Canyon, for example. Accordingly, costs for mitigation of potential impacts was included in Table 3-4, as 3 percent of total construction costs.

Program Implementation Costs

These are really the same as the engineering design and construction management (EMDCM) costs identified in Table 3-1, only with a different name.

Operating and Maintenance Costs

These costs were calculated in the same way as for Alternative A and C. The results appear in Table 3-5 below. Operating costs were calculated in the same way as for Alternative A through F.

Table 3-5
Tenecula-San Diego Estimated Annual O&M Costs

Alternative	G
Endpoint	San Diego
Service type	Commuter
Route-miles	66.4
Days operated per week	5
Daily trains	16
Daily train-miles	1,062
Annual train-miles	270,912
Estimated annual operating cost*	$11,191,375

Note:
* 255 operational days used in determining annual train-miiles
Metrolink operating cost/train-mile of $41.31 used in calculation

Temecula-San Diego Corridor High Speed Rail

The only capital cost assumed for this option is the cost of an additional station at Poway. This is because such a station is not included in the current system plans of the HSRA. As noted, an initial presumption of this study was that many Temecula area commuters would use a Poway station as a destination.

The 2004 Capital and Operations and Maintenance Costs report cited a cost for a March Air Force Base (AFB) station at $27 million, plus another $2 million for surface parking. Including contingencies and “soft costs” for design and implementation, a total cost for the March AFB station would be about $43 million. Ample undeveloped land would facilitate construction of a HSR station there. As undeveloped land appears to exist in the vicinity of I-15 and SR 56, where a Poway station could be located, a similar cost figure would seem a reasonable amount to assume for a Poway station.

Chapter 4: Evaluation of Commuter Rail Scenarios

Evaluation

As recommended in Chapter 3, four alternatives progress to their evaluation in this chapter. They are:

- ***Alternative A:*** commuter rail service between Temecula and both Los Angeles and Laguna Niguel.
- ***Alternative C:*** commuter rail service between Lake Elsinore and both Los Angeles and Laguna Niguel.
- ***Alternative C1:*** a variant of Alternative C, assume both a Dos Lagos station and a Public Private Partnership partially covering public costs of implementing commuter rail service.
- ***Alternative G:*** commuter rail service between Temecula and downtown San Diego, along the alignment identified for the proposed for the California High-Speed Rail Service.

This analysis utilized the same evaluation criteria developed for the 2005 RCTC commuter rail study. The RCTC's full Board and the Policy Committee of the Board established these criteria to evaluate and screen the eight service alternatives under study at that time. Nine evaluation criteria ultimately were selected. Of these, eight were quantitative, and one was qualitative.

Alternatives A, C, C1 and G are evaluated per the nine criteria, which are shown in Table 4-1 on the following page. In the table, the feasibility of an alternative per a specific criterion is summarily assessed with a "Harvey Ball". That is, the fuller the Harvey Ball, the more feasible the performance. On the following page, Table 4-1 shows the evaluation of the four commuter rail alternatives evaluated in this study. For comparison, the evaluation results from the 2005 commuter rail study are shown in Table 4-2, with Scenarios 3 and 7 being the two that were recommended for further study.

Table 4-1
Screening and Application of Evaluation Criteria-Commuter Service

Scenario		Corridor /Service Type/ End Point	Route Miles*	Passenger Trips In 2030 (Daily)	Passenger Trips Per Train (Daily)	Fare Box Recovery Ratio**	Right-of-Way Issues	Mobility Improvements-Daily Trip Time Savings	Access to Low Income Households (Percent)	Operating Costs per Passenger-Mile ($)	Capital Costs: Track, Stations & Equipment ($ millions)	Capital Costs Per Passenger ($)
A	Frequency-16 Trains Daily	Interstate 15 /Commuter/ Temecula	36.5	989 ◒	62 ◒	24% ◒	◒	456 hours ●	28.03% ○	$0.54 ◒	$569.3 ○	$575,632 ○
C		Interstate 15 /Commuter/ Lake Elsinore	17.0	874 ◒	55 ◒	43% ●	◒	409 hours ●	28.38% ○	$0.30 ●	$250.1 ◒	$286,156 ○
C1		Interstate 15 /Commuter/ Lake Elsinore w/ Dos Lagos Station	17.0	921 ◒	58 ◒	45% ●	◒	376 hours ●	28.20% ○	$0.30 ●	$261.7 ◒	$284,148 ○
G		Interstate 15 /Commuter/ San Diego	66.4	3,090 ●	193 ●	50% ●	◒	146 hours ○	42.05% ●	$0.34 ●	$1,646.5 ○	$532,834 ○

Table Key

Feasible ● Moderately Feasible ◒ Less Feasible ○

* Incremental route miles east or south of North Main Corona.

** Similar to a cost-benefit ratio, this criterion measures the percentage of estimated operating costs recoverd through estimated fare box revenues.

Source: Wilbur Smith Associates and WRCOG data and calculations.

Table 4-2
RCTC Commuter Rail Feasibility Study **Screening and Application of Evaluation Criteria-Commuter Service**

Scenario		Corridor /Service Type/ End Point	Route Miles*	Passenger Trips In 2030 (Daily)	Passenger Trips Per Train (Daily)	Farebox Recovery Ratio**	Right-of-Way Issues	Mobility Improvements-Daily Trip Time Savings	Access to Low Income Households (Percent)	Operating Costs per Passenger-Mile ($)	Capital Costs: Track, Stations & Equipment ($ millions)	Capital Costs Per Passenger ($)
1.	Commuter Frequency-16 Trains Daily	Union Pacific Railroad /Commuter/ Banning-Beaumont	34.5	768 ○	48 ○	19% ◒	○	176 hours ◒	43.96% ●	$0.68 ◒	$299.9 ◒	$390,495 ○
2.		Union Pacific Railroad /Commuter/ Indio	76.5	2,174 ●	136 ●	22% ◒	○	124 hours ○	42.96% ●	$0.63 ◒	$544.4 ○	$250,414 ○
3.		Perris Valley Line /Commuter/ San Jacinto	16.5	1,338 ◒	84 ◒	61% ●	●	518 hours ●	44.32% ●	$0.24 ●	$111.5 ●	$83,333 ●
5.		Winchester Road /Commuter/ Temecula	20.5	1,292 ◒	81 ◒	53% ●	◒	486 hours ●	37.76% ◒	$0.25 ●	$203.6 ◒	$157,585 ◒
7.		I-215 /Commuter/ Temecula	16.5	2,166 ●	135 ●	109% ●	◒	932 hours ●	37.23% ◒	$0.12 ●	$249.4 ◒	$115,143 ◒

Table Key

Feasible ● Moderately Feasible ◒ Less Feasible ○

* Incremental route miles east or south of South Perris, assuming Metrolink's 91 Line service is extended to South Perris.

** Similar to a cost-benefit ratio, this criterion measures the percentage of estimated, incrememtal operating costs recoverd through estimated, incremental farebox revenues.

Source: RLBA, WSA and WRCOG data and calculations.

Passenger Trips in 2030 (Weekday, or "Daily")

The purpose of public transit is to carry people. The criterion measuring which alternative carries more people is weekday or "daily" passenger trips. A passenger who boards a train at Temescal Canyon Station weekday in the morning, rides northbound to Corona or another station on the Metrolink system, and then returns in the evening generates two passenger trips per day. The figures shown for Alternatives A, C, C1, and G were developed in the 2030 ridership forecast described in Chapter 2.

The table above shows that Alternative G, which is oriented to San Diego, has the potential to attract more riders and thus to generate more passenger trips than A, C, and C1, which are oriented to destinations on the Metrolink system. It is important to note that the methodology used to forecast 2030 riders for A, C and C1 was different from that used for G, as noted in Chapter 2. Nevertheless, the results reflect the common perception that Temecula area residents commuting longer distances to work seem to be more oriented to San Diego than to destinations Los Angeles, Orange, Riverside, and San Bernardino Counties.

Passenger Trips per Train (Daily)

This criterion measures total daily (weekday) passenger trips divided by the number of trains each day. This is a measure of capacity utilization: the number of riders relative to the number of available seats. Because the alternatives assume the same number trains and the same cars per train, the number of available seats is a fixed number. Thus, the comparison between alternatives on this criterion is apples to apples. By this measure, Alternative G performs better than A, C and C1 – a result of G attracting more riders.

Fare Box Recovery Ratio

This criterion measures the percentage of operating expenses recovered by fare revenue[1]. It is derived by dividing annual revenue by annual operating expenses. Revenue was calculated by multiplying the all-day ridership by distanced-based fares (the longer the trip, the higher the fare), and then multiplying the result by a discount factor of 74.5 percent to account for the impact of riders purchasing discounted fare instruments, e.g. monthly passes, 10-ride tickets, etc. The result was annualized by multiplying it by 255 weekdays per year. The annualized revenue then was divided by annual operating and maintenance expenses, shown in Tables 3-3 and 3-5 in the preceding chapter.

[1] Operating costs were estimated by multiplying train-miles by the $41.31 per train-mile figure used in the 2005 commuter rail study. The cost figure was developed by Metrolink. Revenues were estimate by multiplying Metrolink-like fares by passenger-miles, just as was done in the 2005 study. This study assumes that operating costs and revenues will grow at the same rate.

For Alternatives A, C and C1, the operating costs determined in Chapter 3 were simply the operating costs generated by operations on the line extensions south of Corona. In this sense, then, the fare box recovery ratios are different from the traditional fare box recovery calculation. That calculation divides total fare revenue by total operating costs. Here, total revenue is divided by the incremental costs of operating on the extensions. The operating costs determined in Chapter 3 do not include the costs of operating through to Los Angeles and Laguna Niguel. Revenue, however, for trips to these destinations off of the extensions and back are counted. This was the same methodology followed in the 2005 commuter rail study.

The calculation for Alternative G is the traditional fare box recovery calculation: total revenues are divided by total operating costs. Even so, its performance is superior to those of Alternatives A, C and C1, which consider only partial operating costs. The result, again, is due to more riders, who in sum generate more revenue.

Considering only the alternatives running south from Corona, Table 4-1 shows that C and C1 do better than A on fare box recovery. This is the result of their lower operating costs: C and C1 operating costs are less than half of A's cost, as they operates over a far shorter route. At the same time, ridership and thus revenue for all three alternatives remains comparatively close.

Right-of-Way Issues

This is the sole qualitative criterion, meant to capture the degree of difficulty for RCTC to implement passenger rail service in the study corridors or to gain access in existing rights-of-way. As all alternatives have major right-of-way, all appear equal by this measure. The major right-of-way issue for Alternatives A, C and C1 are:

- The potential reclamation of the abandoned former Santa Fe rail alignment between the quarry south of Corona and Lake Street in Lake Elsinore. This would include the purchase of old right-of-way, over which part of the Dos Lagos Golf Club course has been built.
- Access to the BNSF Porphyry Branch and the BNSF Transcon main line between Porphyry and either Atwood or Los Angeles.
- For A only, access to the I-15 right-of-way between Nichols Road and I-15/I-215 in Temecula.
- Also for A only, purchase of a new right-of-way east of the Alberhill residential development between Lake Street and Nichols Road.

The three major right-of-way issues for Alternative G would be:

- Access to the I-15 right-of-way between I-15/I-215 and Mira Mesa.

- Access to the comparatively short distance (less than four miles) through Carroll Canyon. The route would require acquisition of a quarry that sits astride the potential alignment where the tracks and a Mira Mesa station would be.
- Access to the LOSSAN Corridor between Miramar Road and the San Diego Depot. This rail line is used by The Coaster commuter rail service and the Pacific Surfliner intercity service, and is owned by the North County Transit District, operator of The Coaster.

Mobility Improvements – Daily Trip Time Savings

This is the measure of time saved by traveling on trains versus driving on area highways, most of which will be plagued with peak period congestion in 2030. Travel time is calculated on a daily (weekday) basis. Minutes saved between points are multiplied by the ridership between the same points, generating total daily savings in 2030. Results for A, C, and C1 are close, a result of the comparatively close passenger trip figures and a common set of destinations. Of the three alternatives overall, A does best.

The results for Alternative G, however, are significantly less. The rail trip between Temecula and San Diego will just be a few minutes shorter than the same trip by car in 2030[2]. Greater time savings, however, would be realized between Temecula and Escondido, where the average train speeds are assumed to be 50 percent higher than on other portions of the route.

Mobility Improvements – Access to Low Income Households

This is measured by reference to income levels of residents located in catchment areas within five miles of proposed stations. All four alternatives are compared in Table 4-3 on the following page. Alternative G offers access to the greatest percentage of “very low” and “low” income homes. Figures showing the catchment areas by income level for the four Alternative A, C, C1 and G appear in Appendix C.

Operating Cost per Passenger-Mile

This criterion captures the estimated operating cost required to carry a passenger one mile. Services carrying more riders longer distances have lower operating costs per passenger-mile.

[2] Despite the minimal terminus to terminus travel time savings of commuter rail, the ridership forecast predicts over 3,000 one-way passenger trips. Reasons include the following assumptions: high income business travelers prefer commuter rail to a long car trip; reliability of commuter rail is better than reliability of auto travel; all-in auto costs are higher than commuter rail fares; and if traveling alone, riders tend to prefer commuter rail to driving, among other things.

Table 4-3
Low Income Household Analysis

Scenario	Total Population by Census Block Groups	Total Households	Household Income Characteristics: VERY LOW <50% (Less than $21,443)	LOW 50 to 80% ($21,444 to $34,310)	MODERATE 80 to 120% ($34,311 to $51,464)	HIGH >120% (Greater than $51,465)
Corona to Temecula Alt. A	419,668	129,411	17,238	19,031	33,264	59,878
		100.00%	13.32%	14.71%	25.70%	46.27%
Corona to L. Elsinore Alt. C	262,852	78,582	10,645	11,657	19,752	36,528
		100.00%	13.55%	14.83%	25.14%	46.48%
Corona to L. Elsinore Alt. C1	267,179	79,995	10,757	11,789	19,971	37,478
		100.00%	13.45%	14.74%	24.97%	46.85%
Temecula to San Diego Alt. G	Income Range for Riverside County		(Less than $21,443)	($21,444 to $34,310)	($34,311 to $51,464)	(Greater than $51,465)
	Income Range for San Diego County		(Less than $23,534)	($23,535 to $37,654)	($37,655 to $56,480)	(Greater than $56,481)
	Total Population by Census Block Groups	Total Households				
	1,220,079	447,840	110,782	77,499	84,593	174,966
		100.00%	24.74%	17.31%	18.89%	39.07%

Median Household Income for:

Riverside County	$42,887
San Diego County	$47,067

Alternatives A & C do not include a Dos Lagos Station

Note: Only Census Blocks within 5 miles of proposed stations were selected.

Median Household Income for San Diego Co. is used to calculate only the Temecula to Sand Diego Line.

Source: U.S. Bureau of the Census - 2000 Census Data

Because Alternatives C and C1 have less than half the route-miles of Alternative A, their operating expenses are less than half. At the same time, their passenger-miles are nearly the same as A's (the only passenger trips assumed to be lost in C and C1 versus A would be short trips – trips between Temecula, Bundy Canyon, and Nichols Road). Accordingly, C and C1 have a little more than half the operating cost per passenger-mile as A.

Passenger-miles for Alternative A, C and C1 are calculated from origin to ultimate destination, which for the most part are west or east of North Main Corona. As a result, the operating costs generated by trains on the extensions south of Corona are divided by passenger-miles generated by trips of much greater distances. This is a different calculation than for Alternative G. For that alternative, total operating costs (a much bigger number) are divided by total passenger-miles. Even so, the cost per passenger-mile for Alternative G is low compared to A and on a par with C and C1 – again a result of more G attracting more riders.

Capital Costs (Track, Stations and Equipment)

These are the absolute costs of implementing the alternatives. For this evaluation, Alternatives C and C1 are superior, a result of shorter line construction.

Capital Costs per Passenger

This is total capital costs divided by daily (weekday) one-way passenger trips. With less than half the implementation costs and almost the same ridership as A, C and C1 have costs per rider less than half that of A.

While Alternative G has the highest capital costs, it also has the most riders. As a result, its cost per passenger is similar to that of A.

Summary of Conventional Commuter Rail Alternatives

Alternative A, with service from Temecula north through Corona, has the best trip time savings. It also has the second highest price tag, the highest capital cost per passenger, and the lowest fare box recovery.

With a shorter extension from Lake Elsinore north, Alternative C has almost as much ridership and trip time savings, less than half the implementation costs and cost per passenger, and almost twice the fare box recovery compared to Alternative A.

Alternative C1, with service from Lake Elsinore and an additional station at Dos Lagos, has a few more passenger trips but scores essentially the same as Alternative C.

Alternative G, with commuter rail service from Temecula to San Diego, does the best in terms of passenger trips, passenger trips per train, fare box recovery, access for low income households, and operating costs per passenger-mile. However, its implementation cost is three times that of the next highest, Alternative A.

While Alternatives C and C1 score well on a number of criteria, these alternatives on balance are somewhat inferior to the two commuter rail routes recommended for further analysis in the 2005 *RCTC Commuter Rail Feasibility Study*. Accordingly, unless implementation costs could be reduced, this study recommends that these two alternatives do not progress toward further analysis. Also because of their high implementation costs, Alternatives A and G are not recommended for further analysis at this time. As demographics and population trends change for specific areas, the feasibility of these routes could be re-evaluated in the future.

Public Private Partnership

It is worth noting that RCTC has been approached by local developers to explore the potential of public private partnerships concerning new commuter rail services on the I-15 corridor.

A concept to lower overall capital costs for Alternatives C and C1 (Lake Elsinore options) would be potential public-private partnerships, where private developers help fund or donate right of way and contribute to the overall capital costs. As shown in Table 4-4, one such concept could reduce implementation costs for Alternative C1 by $113.2 million – assuming that developers provide or fund the right-of-way requirements, the stations, and contribute $50 million to rolling stock requirements. This approach would make the service more cost efficient and could increase the viability of the project.

Table 4-4
Alternative C1 Costs
Assuming Public Private Partnership (PPP) Contributions

Total Estimated Costs for Alternative C1 per Table 3-1	$261.7 million
PPP Concept: Total Estimated Costs Less Station and ROW Cost, Plus a $50 Million Contribution toward Rolling Stock Requirements	$148.5 million
Total Cost from Table 3-1 Estimated Costs	*$113.2 million*

High-Speed Rail and a Poway Station

This study considered one last scenario: HSR with a stop at a Poway station south of Rancho Bernardo at SR 56. This station would generate 1,990 boardings per weekday, as reported in Chapter 2; this boarding figure is for destinations in Northern, Central, and Southern California. It would have a similar number of alightings daily as well.

Although a Poway HSR station could generate about 4,000 boardings and alighting per day in 2030, the ridership forecast showed that the majority of trips generated by a Poway station would be made by HSR riders who would be using a different station, if the Poway station did not exist. Since this station would not address any major commuter demand from Temecula, further examination of a Poway HSR station does not appear merited at this time.

Interstate -15
Commuter Rail
Feasibility Study

Appendix A:
Ridership Forecasts

Table A-1
2030 PATRONAGE FORECASTS
Metrolink Temecula Extension -- Trains to Both LAUS and IEOC -- Peak Period Ridership

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	TOTAL HOME ENDS
Temescal Cyn Rd.	10	1	10	1	2	1	2	2	1	3	1	0	1	0	0	1	3	0	0	0	**40**
Nichols Rd.	61	7	55	26	30	9	32	20	9	22	5	6	21	11	6	15	24	5	0	0	**365**
Bundy Cyn Rd.	66	8	53	4	11	4	19	11	6	13	4	2	13	13	7	8	16	9	20	0	**286**
Temecula/Murieta	0	0	0	2	10	4	16	9	5	11	2	2	11	13	7	7	17	6	62	24	**208**
TOTAL WORK ENDS	**137**	**17**	**118**	**33**	**53**	**18**	**69**	**42**	**21**	**49**	**12**	**11**	**46**	**38**	**20**	**31**	**61**	**20**	**82**	**24**	**899**

Metrolink Temecula Extension -- Trains to Both LAUS and IEOC -- All Day Ridership

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	TOTAL HOME ENDS
Temescal Cyn Rd.	11	1	11	1	2	1	3	2	1	3	1	1	1	1	0	2	3	0	0	0	**44**
Nichols Rd.	67	8	60	29	33	10	35	22	10	24	6	6	23	12	7	17	27	6	0	0	**401**
Bundy Cyn Rd.	73	9	58	4	12	4	21	12	7	14	4	3	14	15	8	8	17	10	22	0	**315**
Temecula/Murieta	0	0	0	3	11	4	18	10	6	12	2	2	12	14	7	8	19	7	68	26	**229**
TOTAL WORK ENDS	**151**	**18**	**129**	**36**	**58**	**19**	**76**	**47**	**23**	**54**	**13**	**12**	**50**	**41**	**22**	**34**	**67**	**22**	**90**	**26**	**989**

Table A-2
2030 PATRONAGE FORECASTS
Metrolink Temecula Extension -- Trains Through-routed to LAUS -- Peak Period

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Temescal Cyn Rd.	10	1	10	1	2	1	2	2	2	4	1	1	1	0	0	1	4	0	0	0	**44**
Nichols Rd.	61	7	55	26	30	9	32	20	15	31	8	8	21	11	6	15	32	5	0	0	**392**
Bundy Cyn Rd.	66	8	53	4	11	4	19	11	8	18	5	3	13	13	7	8	21	9	20	0	**300**
Temecula/Murieta				2	10	4	16	9	7	15	3	3	11	13	7	7	23	6	62	24	**221**
TOTAL WORK ENDS	**137**	**17**	**118**	**33**	**53**	**18**	**69**	**42**	**32**	**67**	**16**	**14**	**46**	**38**	**20**	**31**	**81**	**20**	**82**	**24**	**957**

Metrolink Temecula Extension -- Trains Through-routed to LAUS -- All Day

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Temescal Cyn Rd.	11	1	11	1	2	1	3	2	2	4	1	1	1	1	0	2	5	0	0	0	**48**
Nichols Rd.	67	8	60	29	33	10	35	22	17	34	8	8	23	12	7	17	36	6	0	0	**431**
Bundy Cyn Rd.	73	9	58	4	12	4	21	12	9	19	5	4	14	15	8	8	23	10	22	0	**330**
Temecula/Murieta	0	0	0	3	11	4	18	10	8	17	3	3	12	14	7	8	25	7	68	26	**243**
TOTAL WORK ENDS	**151**	**18**	**129**	**36**	**58**	**19**	**76**	**47**	**35**	**74**	**17**	**16**	**50**	**41**	**22**	**34**	**89**	**22**	**90**	**26**	**1052**

Table A-3
2030 PATRONAGE FORECASTS
Metrolink Temecula Extension -- Trains Through-routed to IEOC -- Peak Period

HOME STA / WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Temescal Cyn Rd.	10	1	10	1	3	1	4	3	2	3	1	0	1	0	0	2	3	0	0	0	**46**
Nichols Rd.	61	7	55	35	40	12	45	28	15	22	5	6	21	11	6	21	24	5	0	0	**420**
Bundy Cyn Rd.	66	8	53	5	14	5	25	14	8	13	4	2	13	13	7	11	16	9	20	0	**307**
Temecula/Murieta				3	13	5	22	12	7	11	2	2	11	13	7	9	17	6	62	24	**226**
TOTAL WORK ENDS	**137**	**17**	**118**	**44**	**70**	**23**	**95**	**58**	**32**	**49**	**12**	**11**	**46**	**38**	**20**	**44**	**61**	**20**	**82**	**24**	**999**

Metrolink Temecula Extension -- Trains Through-routed to IEOC -- All Day

HOME STA / WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Temescal Cyn Rd.	11	1	11	1	3	1	4	4	2	3	1	1	1	1	0	2	3	0	0	0	**50**
Nichols Rd.	67	8	60	38	44	13	49	31	17	24	6	6	23	12	7	24	27	6	0	0	**461**
Bundy Cyn Rd.	73	9	58	6	16	6	28	16	9	14	4	3	14	15	8	12	17	10	22	0	**338**
Temecula/Murieta	0	0	0	3	14	6	24	14	8	12	2	2	12	14	7	10	19	7	68	26	**249**
TOTAL WORK ENDS	**151**	**18**	**129**	**48**	**77**	**26**	**105**	**64**	**35**	**54**	**13**	**12**	**50**	**41**	**22**	**48**	**67**	**22**	**90**	**26**	**1099**

Table A-4
2030 PATRONAGE FORECASTS
Metrolink Temecula Extension with Dos Lagos Station -- Trains to Both IEOC and LAUS -- Peak Period

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	4	1	3	1	2	1	2	2	1	3	1	1	0	34	0	0	3	0	0	0	0	**59**
Temescal Cyn Rd.	3	0	4	0	2	1	2	1	0	2	0	0	0	0	0	1	2	0	0	0	0	**20**
Nichols Rd.	61	7	55	26	30	9	32	20	9	22	5	6	21	11	6	15	24	2	4	0	0	**366**
Bundy Cyn Rd.	66	8	53	4	11	4	19	11	6	13	4	2	13	13	7	8	16	4	7	20	0	**288**
Temecula/Murieta				2	10	4	16	9	5	11	2	2	11	13	7	7	17	3	4	62	24	**209**
TOTAL WORK ENDS	**134**	**18**	**114**	**33**	**54**	**18**	**71**	**44**	**22**	**51**	**12**	**11**	**46**	**72**	**21**	**31**	**63**	**10**	**15**	**82**	**24**	**942**

Metrolink Temecula Extension with Dos Lagos Station -- Trains to Both IEOC and LAUS -- All Day

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	4	2	3	1	3	1	3	2	1	3	1	1	0	38	0	0	3	0	0	0	0	**65**
Temescal Cyn Rd.	3	0	5	0	2	1	2	2	1	2	1	0	0	0	0	1	2	0	0	0	0	**22**
Nichols Rd.	67	8	60	29	33	10	35	22	10	24	6	6	23	12	7	17	27	3	4	0	0	**402**
Bundy Cyn Rd.	73	9	58	4	12	4	21	12	7	14	4	3	14	15	8	8	17	5	7	22	0	**317**
Temecula/Murieta	0	0	0	3	11	4	18	10	6	12	2	2	12	14	7	8	19	3	5	68	26	**230**
TOTAL WORK ENDS	**147**	**19**	**125**	**37**	**60**	**20**	**78**	**48**	**24**	**56**	**13**	**13**	**50**	**79**	**23**	**34**	**69**	**10**	**16**	**90**	**26**	**1037**

Table A-5
2030 PATRONAGE FORECASTS
Metrolink Temecula Extension with Dos Lagos Station -- Trains Through-routed to LAUS -- Peak Period

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	4	1	3	1	2	1	2	2	2	4	1	1	0	34	0	0	5	0	0	0	0	**64**
Temescal Cyn Rd.	3	0	4	0	2	1	2	1	1	3	1	0	0	0	0	1	3	0	0	0	0	**23**
Nichols Rd.	61	7	55	26	30	9	32	20	15	31	8	8	21	11	6	15	32	2	4	0	0	**393**
Bundy Cyn Rd.	66	8	53	4	11	4	19	11	8	18	5	3	13	13	7	8	21	4	7	20	0	**302**
Temecula/Murieta				2	10	4	16	9	7	15	3	3	11	13	7	7	23	3	4	62	24	**222**
TOTAL WORK ENDS	**134**	**18**	**114**	**33**	**54**	**18**	**71**	**44**	**33**	**70**	**17**	**15**	**46**	**72**	**21**	**31**	**84**	**10**	**15**	**82**	**24**	**1003**

Metrolink Temecula Extension with Dos Lagos Station -- Trains Through-routed to LAUS -- All Day

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	4	2	3	1	3	1	3	2	2	4	1	1	0	38	0	0	5	0	0	0	0	**70**
Temescal Cyn Rd.	3	0	5	0	2	1	2	2	1	3	1	0	0	0	0	1	3	0	0	0	0	**25**
Nichols Rd.	67	8	60	29	33	10	35	22	17	34	8	8	23	12	7	17	36	3	4	0	0	**432**
Bundy Cyn Rd.	73	9	58	4	12	4	21	12	9	19	5	4	14	15	8	8	23	5	7	22	0	**332**
Temecula/Murieta	0	0	0	3	11	4	18	10	8	17	3	3	12	14	7	8	25	3	5	68	26	**244**
TOTAL WORK ENDS	**147**	**19**	**125**	**37**	**60**	**20**	**78**	**48**	**37**	**77**	**18**	**17**	**50**	**79**	**23**	**34**	**93**	**10**	**16**	**90**	**26**	**1104**

Table A-6
2030 PATRONAGE FORECASTS
Metrolink Temecula Extension with Dos Lagos Station -- Trains Through-routed to IEOC -- Peak Period

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	4	1	3	1	3	1	4	4	2	3	1	1	0	34	0	1	3	0	0	0	0	**65**
Temescal Cyn Rd.	3	0	4	1	2	1	3	2	1	2	0	0	0	0	0	2	2	0	1	0	0	**25**
Nichols Rd.	61	7	55	35	40	12	45	28	15	22	5	6	21	11	6	21	24	2	4	0	0	**420**
Bundy Cyn Rd.	66	8	53	5	14	5	25	14	8	13	4	2	13	13	7	11	16	4	7	20	0	**309**
Temecula/Murieta				3	13	5	22	12	7	11	2	2	11	13	7	9	17	3	4	62	24	**227**
TOTAL WORK ENDS	**134**	**18**	**114**	**44**	**73**	**24**	**98**	**61**	**33**	**51**	**12**	**11**	**46**	**72**	**21**	**44**	**63**	**10**	**16**	**82**	**24**	**1047**

Metrolink Temecula Extension with Dos Lagos Station -- Trains Through-routed to IEOC -- All Day

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	4	2	3	1	4	1	4	4	2	3	1	1	0	38	0	1	3	0	0	0	0	**72**
Temescal Cyn Rd.	3	0	5	1	2	1	3	2	1	2	1	0	0	0	0	2	2	0	1	0	0	**28**
Nichols Rd.	67	8	60	38	44	13	49	31	17	24	6	6	23	12	7	24	27	3	4	0	0	**462**
Bundy Cyn Rd.	73	9	58	6	16	6	28	16	9	14	4	3	14	15	8	12	17	5	7	22	0	**340**
Temecula/Murieta	0	0	0	3	14	6	24	14	8	12	2	2	12	14	7	10	19	3	5	68	26	**250**
TOTAL WORK ENDS	**147**	**19**	**125**	**49**	**80**	**26**	**107**	**67**	**37**	**56**	**13**	**13**	**50**	**79**	**23**	**48**	**69**	**10**	**17**	**90**	**26**	**1152**

Table A-7
2030 PATRONAGE FORECASTS
Metrolink Temecula Extension -- Trains to San Bernardino -- Peak Period

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Temescal Cyn Rd.	14	1	6	1	2	1	2	2	0	3	1	0	3	0	0	1	3	0	0	0	**40**
Nichols Rd.	106	7	86	26	30	9	32	20	0	22	5	6	33	3	2	15	24	5	0	0	**432**
Bundy Cyn Rd.	101	8	74	4	11	4	19	11	0	13	4	2	14	8	5	8	16	9	20	0	**330**
Temecula/Murrietta	0	0	0	2	10	4	16	9	0	11	2	2	15	9	5	7	17	6	62	24	**202**
TOTAL WORK ENDS	**221**	**17**	**166**	**33**	**53**	**18**	**69**	**42**	**0**	**49**	**12**	**11**	**66**	**20**	**11**	**31**	**61**	**20**	**82**	**24**	**1003**

Metrolink Temecula Extension -- Trains to San Bernardino -- All Day Ridership

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Temescal Cyn Rd.	15	1	6	1	2	1	3	2	0	3	1	1	3	0	0	2	3	0	0	0	**44**
Nichols Rd.	117	8	94	29	33	10	35	22	0	24	6	6	37	3	2	17	27	6	0	0	**475**
Bundy Cyn Rd.	111	9	81	4	12	4	21	12	0	14	4	3	16	9	5	8	17	10	22	0	**362**
Temecula/Murrietta	0	0	0	3	11	4	18	10	0	12	2	2	17	10	5	8	19	7	68	26	**222**
TOTAL WORK ENDS	**243**	**18**	**182**	**36**	**58**	**19**	**76**	**47**	**0**	**54**	**13**	**12**	**72**	**22**	**12**	**34**	**67**	**22**	**90**	**26**	**1104**

Table A-8
PRELIMINARY 2030 PATRONAGE FORECASTS
Metrolink Temecula Extension -- Trains Through routed to Riverside and Beyond with Dos Lagos Station

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	17	2	14	1	3	1	3	2	0	3	0	0	2	1	0	2	3	0	1	5	1	**61**
Temescal Cyn Rd.	8	0	3	0	1	1	1	1	0	2	0	0	2	0	0	1	2	1	0	0	0	**24**
Nichols Rd.	106	7	86	26	30	9	32	20	0	22	5	6	33	3	2	15	24	3	5	0	0	**435**
Bundy Cyn Rd.	101	8	74	4	11	4	19	11	0	13	4	2	14	8	5	8	16	4	9	20	0	**333**
Temecula/Murrietta	0	0	0	2	10	4	16	9	0	11	2	2	15	9	5	7	17	4	6	62	24	**206**
TOTAL WORK ENDS	**232**	**18**	**177**	**34**	**55**	**18**	**71**	**43**	**0**	**51**	**12**	**11**	**66**	**21**	**11**	**33**	**62**	**12**	**21**	**87**	**24**	**1059**

PRELIMINARY 2030 PATRONAGE FORECASTS
Metrolink Temecula Extension -- Trains Through routed to Riverside and Beyond with Dos Lagos Station

HOME STA \ WORK STA.	SanBernardino	SpruceUCR	RiversideDowntown	LagunaNiguel/MissionViejo	Irvine	Tustin	SantaAna	Orange	Anaheim	Fullerton	BuenaPark	Norwalk	LaSierra	NorthMainCorona	WestCorona	AnaheimCanyon	LAUS	Dos Lagos	Temescal Cyn Rd.	Nichols Rd.	Bundy Cyn Rd.	**TOTAL HOME ENDS**
Dos Lagos	19	2	15	1	3	1	3	2	0	3	0	0	2	1	0	2	3	0	1	6	1	**67**
Temescal Cyn Rd.	9	1	4	0	1	1	2	1	0	2	0	0	2	0	0	1	2	1	0	0	0	**27**
Nichols Rd.	117	8	94	29	33	10	35	22	0	24	6	6	37	3	2	17	27	4	6	0	0	**479**
Bundy Cyn Rd.	111	9	81	4	12	4	21	12	0	14	4	3	16	9	5	8	17	4	10	22	0	**367**
Temecula/Murrietta	0	0	0	3	11	4	18	10	0	12	2	2	17	10	5	8	19	4	7	68	26	**226**
TOTAL WORK ENDS	**255**	**20**	**195**	**37**	**60**	**19**	**78**	**48**	**0**	**56**	**13**	**12**	**73**	**23**	**12**	**36**	**69**	**13**	**23**	**95**	**27**	**1165**

Table A-9
Temecula-San Deigo Corridor

Commuter Rail Daily Boardings

	I-15/I-215	Escondido	SR 56/Poway	Miramar	Old Town	Depot	Total
I-15/I-215	-	87	131	102	240	414	974
Escondido	89	-	16	12	33	70	220
SR 56/Poway	109	16	-	16	47	91	279
Miramar	75	12	16	-	34	73	210
Old Town	231	33	47	34	-	203	548
Depot	423	70	91	73	203	-	860
Total	927	218	301	237	557	851	3,090

Commuter Rail Annual Boardings

	I-15/I-215	Escondido	SR 56/Poway	Miramar	Old Town	Depot	Total
I-15/I-215	-	26,100	39,300	30,600	72,000	124,200	292,200
Escondido	26,700	-	4,756	3,455	10,034	20,913	65,858
SR 56/Poway	32,700	4,756	-	4,768	14,089	27,394	83,708
Miramar	22,500	3,455	4,768	-	10,284	21,966	62,973
Old Town	69,300	10,034	14,089	10,284	-	60,753	164,460
Depot	126,900	20,913	27,394	21,966	60,753	-	257,925
Total	278,100	65,258	90,308	71,073	167,160	255,225	927,124

High-Speed Rail Daily Boardings

	Temecula	Escondido	Poway	University City	San Diego	Total
Temecula	-	90	127	125	954	1,297
Escondido	75	-	20	32	285	411
Poway	112	20	-	11	100	242
University City	135	32	11	-	161	340
San Diego	970	285	100	161	-	1,515
Total	1,292	427	257	329	1,500	3,805

High-Speed Rail Annual Boardings

	Temecula	Escondido	Poway	University City	San Diego	Total
Temecula	-	26,967	38,100	37,572	286,335	388,974
Escondido	22,422	-	5,903	9,698	85,410	123,432
Poway	33,600	5,903	-	3,244	29,976	72,723
University City	40,602	9,698	3,244	-	48,328	101,871
San Diego	290,880	85,410	29,976	48,328	-	454,593
Total	387,504	127,977	77,223	98,841	450,048	1,141,593

Interstate -15
Commuter Rail
Feasibility Study

Appendix B:
Capital Cost Estimates

Table B - 1
Conceptual Capital Costs
Commuter Rail Service between Corona and Temecula, Alternative A
Using Rail Right of Way between Corona and Nichols Road and I-15 Right of Way between Nichols Road and Temecula

				Alternative A	
				Corona-Temecula	
				35.3	Miles
				186,384	Feet
Category	**Item**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Track work	Construct main track	TF	$174	186,384	$32,431,000
(note 1)	Construct side track	TF	174	9,280	1,615,000
	Upgrade existing track	TF	139		0
	Total track				34,046,000
Turnouts	Construct # 20 turnout	EA	406,000	3	1,218,000
(note 2)	Construct # 10 turnout	EA	158,000	3	474,000
	Construct # 10 turnout (yard)	EA	53,000	3	159,000
	Total turnouts				1,851,000
At-grade, highway-rail crossings	Concrete panel crossing members	TF	359	1,840	661,000
(note 3)	**Total at-grade, highway-rail crossings**				661,000
Structures	Construct overhead bridge/tunnel	TF	106,000	500	53,000,000
(note 4)	Construct railroad bridge (major)	TF	13,000	3,400	44,200,000
	Construct railroad bridge (minor)	TF	3,500		0
(note 5)	Retaining Wall	SF	50	1,690,000	84,500,000
	Total structures				181,700,000
Drainage	Install culverts	EA	7,500		0
	Extend culverts	EA	3,500		
(note 6)	New drainage system	TF	17	186,384	3,244,000
	Total drainage				3,244,000
Stations	Construct new station (Commuter style)	EA	8,000,000	4	32,000,000
(note 7)	Construct new station (Intracounty style)	EA	4,000,000		0
	Renew existing station	EA	100,000		0
	Total stations				32,000,000
Signal work	Signal track	Mile	1,000,000	35.3	35,300,000
(note 8)	Control point signaling	EA	422,000	4	1,688,000
	Electric-lock for switch	EA	100,000	3	300,000
	At-grade, highway-rail crossing w/ gates and cantilevers	EA	325,000	2	650,000
	At-grade, highway-rail crossing signaling	EA	240,000	13	3,120,000
	Total signal				41,058,000
Earthwork	Embankment/foundation work (new)	LS/Mile	350,000	18.8	6,580,000
(note 9)	Embankment/foundation work (existing)	LS/Mile	50,000	16.5	825,000
	Total earthwork				7,405,000
Right-of-way	Purchase	Acre	179,000	138	24,692,000
(note 10)	Easements	Acre	143,000		0
	Relocation	LS	100,000		0
	Total right-of-way				24,692,000
Specialty Items	Parking areas at stations (greater than 500 spaces)	EA	5,000		0
(note 11)	Layover Yard facilities and Improvements	LS	600,000	1	600,000
	Total specialty items				600,000
Estimated Construction Costs					327,257,000
Engineering/Mobilization/Demobilization/Construction Management (% of Construction)		15%			49,089,000
	Total Construction				376,346,000
Contingencies (% of Construction)		30%			98,177,000
Total Estimated Construction Costs (Including Engineering, Construction Management and Contingencies)					474,523,000

Note 1: Assume a new main track is built over the entire length of the route, as well as a layover facility with four tracks south of Temecula Station. Assume one 5,000' passing siding mid route.

Note 2: Assume one high speed turnout at entrance switch east of Prophyry Yard east of North Main Corona Station, and one high speed turnout at either end of passing siding mid route. Assume three low speed turnouts at layover yard. Assume three new industrial lead turnouts.

Note 3: Rebuild/upgrade all crossings between east end of Porphyry Yard and Temecula. Assume new crossing panels.

Note 4: Construct access (viaduct or tunnel) into I-15 right of way south of Nichols Road Station, and egress to layover facility in Temecula. Replace bridges on old rail right of way, and viaducts on I-15 right of way.

Note 5: Assume a retaining wall-crash wall in the I-15 right of way between Nichols Road and Temecula; average height 6' including excavation and structural backfill. Assume a retaining wall between Lake Street and access point to I-15 at Nichols Road; same average height.

Note 6: Assume cost of a drainage system is 10% of track work cost.

Note 7: Build four new commuter-style stations. Each station to have 500 parking spaces.

Note 8: Assume new signal system over entire 35.3 miles. Assume new crossing signals/upgrades at each public crossing, and electric locks for industry turnouts.

Note 9: Assume major earthwork for former rail right of way, and minor earthwork in the I-15 right of way.

Note 10: Assume purchase of former rail right of way. Assume five acres purchased per station and four acres at the layover yard.

Note 11: Assume one lump sum amount for layover yard facilities and improvements.

Table B - 2 Conceptual Capital Costs, Alternative B Using Rail Right of Way between Corona and Lake Street, and I-15 Right of Way between Lake Street and Temecula				Alternative B Corona-Temecula	
				35.3	Miles
				186,384	Feet
Category	**Item**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Track work	Construct main track	TF	$174	186,384	$32,431,000
(note 1)	Construct side track	TF	174	9,280	1,615,000
	Upgrade existing track	TF	139		0
	Total track				34,046,000
Turnouts	Construct # 20 turnout	EA	406,000	3	1,218,000
(note 2)	Construct # 10 turnout	EA	158,000	3	474,000
	Construct # 10 turnout (yard)	EA	53,000	3	159,000
	Total turnouts				1,851,000
At-grade, highway-rail crossings	Concrete panel crossing members	TF	359	1,730	622,000
(note 3)	**Total at-grade, highway-rail crossings**				622,000
Structures	Construct overhead bridge at	TF	106,000	500	53,000,000
(note 4)	Construct railroad bridge (major)	TF	13,000	3,400	44,200,000
	Construct railroad bridge (minor)	TF	3,500		0
(note 6)	Retaining Wall	SF	50	2,350,000	117,500,000
	Total structures				214,700,000
Drainage	Install culverts	EA	7,500		0
(note 6)	Drainage/Underdrain	LS	17	186,384	3,244,000
	Total drainage				3,244,000
Stations	Construct new station (Commuter style)	EA	8,000,000	4	32,000,000
(note 7)	Construct new station (Intracounty style)	EA	4,000,000		0
	Renew existing station	EA	100,000		0
	Total stations				32,000,000
Signal work	Signal track	Mile	1,000,000	35.3	35,300,000
(note 8)	Control point signaling	EA	422,000	4	1,688,000
	Electric-lock for switch	EA	100,000	3	300,000
	At grade, highway-rail crossing w/ gates and cantilevers	EA	325,000	2	650,000
	At-grade, highway-rail crossing signaling	EA	240,000	12	2,880,000
	Total signal				40,818,000
Earthwork	Embankment/foundation work (new)	LS/Mile	350,000	15.7	5,495,000
(note 9)	Embankment/foundation work (existing)	LS/Mile	50,000	19.6	980,000
	Total earthwork				6,475,000
Right-of-way	Purchase	Acre	179,000	119	21,329,000
(note 10)	Easements	Acre	143,000		0
	Relocation	LS	100,000		0
	Total right-of-way				21,329,000
Specialty Items	Parking areas at stations (greater than 500 spaces)	EA	5,000		0
(note 11)	Layover Yard facilities and Improvements	LS	600,000	1	600,000
	Total specialty items				600,000
Estimated Construction Costs					355,685,000
Engineering/Mobilization/Demobilization/Construction Management (% of Construction)		15%			53,353,000
	Total Construction				409,038,000
Contingencies (% of Construction)		30%			106,706,000
Total Estimated Construction Costs (Including Engineering, Construction Management and Contingencies)					515,744,000

Note 1: Assume a new main track is built over the entire length of the route, as well as a layover facility with four tracks south of Temecula Station. Assume one 5,000' passing siding mid route.

Note 2: Assume one high speed turnout at entrance switch east of Prophyry Yard east of North Main Corona Station, and one high speed turnout at either end of passing siding mid route. Assume three low speed turnouts at layover yard. Assume three new industrial lead turnouts.

Note 3: Rebuild/upgrade all crossings between east end of Porphyry Yard and Temecula. Assume new crossing panels.

Note 4: Construct access (viaduct or tunnel) into I-15 right of way south of Nichols Road Station, and egress to layover facility in Temecula. Replace bridges on old rail right of way, and viaducts on I-15 right of way.

Note 5: Assume a retaining wall-crash wall in the I-15 right of way between Lake Street and Temecula; average height 6' including excavation and structural backfill.

Note 6: Assume cost of a drainage system is 10% of track work cost.

Note 7: Build four new commuter-style stations. Each station to have 500 parking spaces.

Note 8: Assume new signal system over entire 15.7 miles. Assume new crossing signals/upgrades at each public crossing, and electric locks for industry turnouts.

Note 9: Assume major earthwork for former rail right of way, and minor earthwork between in the I-15 right of way.

Note 10: Assume purchase of former rail right of way. Assume five acres purchased per station and four acres at the layover yard.

Note 11: Assume one lump sum amount for layover yard facilities and improvements.

Table B - 3 Conceptual Capital Costs, Alternative C Using Rail Right of Way between Corona and Lake Street near Lake Elsinore				Alternative C Corona-Lake Elsinore	
				15.7	Miles
				82,896	Feet
Category	**Item**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Track work	Construct main track	TF	$174	82,896	$14,424,000
(note 1)	Construct side track	TF	174	9,280	1,615,000
	Upgrade existing track	TF	139		0
	Total track				16,039,000
Turnouts	Construct # 20 turnout	EA	406,000	3	1,218,000
(note 2)	Construct # 10 turnout	EA	158,000	3	474,000
	Construct # 10 turnout (yard)	EA	53,000	3	159,000
	Total turnouts				1,851,000
At-grade, highway-rail crossings	Concrete panel crossing members	TF	359	1,510	543,000
(note 3)	**Total at-grade, highway-rail crossings**				543,000
Structures	Construct overhead bridge at	TF	106,000		0
(note 4)	Construct railroad bridge (major)	TF	13,000	1,700	22,100,000
	Construct railroad bridge (minor)	TF	3,500		0
(note 6)	Retaining Wall	SF	50		0
	Total structures				22,100,000
Drainage	Install culverts	EA	7,500		0
(note 6)	Drainage/Underdrain	LS	17	82,896	1,443,000
	Total drainage				1,443,000
Stations	Construct new station (Commuter style)	EA	8,000,000	2	16,000,000
(note 7)	Construct new station (Intracounty style)	EA	4,000,000		0
	Renew existing station	EA	100,000		0
	Total stations				16,000,000
Signal work	Signal track	Mile	1,000,000	15.7	15,700,000
(note 8)	Control point signaling	EA	422,000	4	1,688,000
	Electric-lock for switch	EA	100,000	3	300,000
	At grade, highway-rail crossing w/ gates and cantilevers	EA	325,000	2	650,000
	At-grade, highway-rail crossing signaling	EA	240,000	11	2,640,000
	Total signal				20,978,000
Earthwork	Embankment/foundation work (new)	LS/Mile	350,000	15.7	5,495,000
(note 9)	Embankment/foundation work (existing)	LS/Mile	50,000		0
	Total earthwork				5,495,000
Right-of-way	Purchase	Acre	179,000	109	19,539,000
(note 10)	Easements	Acre	143,000		0
	Relocation	LS	100,000		0
	Total right-of-way				19,539,000
Specialty Items	Parking areas at stations (greater than 500 spaces)	EA	5,000	500	2,500,000
(note 11)	Layover Yard facilities and Improvements	LS	600,000	1	600,000
	Total specialty items				3,100,000
Estimated Construction Costs					107,088,000
Engineering/Mobilization/Demobilization/Construction Management (% of Construction)		15%			16,063,000
	Total Construction				123,151,000
Contingencies (% of Construction)		30%			32,126,000
Total Estimated Construction Costs (Including Engineering, Construction Management and Contingencies)					155,277,000

Note 1: Assume a new main track is built over the entire length of the route, as well as a layover facility with four tracks south of Lake Street Station. Assume one 5,000' passing siding mid route.

Note 2: Assume one high speed turnout at entrance switch east of Prophyry Yard east of North Main Corona Station, and one high speed turnout at either end of passing siding mid route. Assume three low speed turnouts at layover yard. Assume three new industrial lead turnouts.

Note 3: Rebuild/upgrade all crossings between east end of Porphyry Yard and Temecula. Assume new crossing panels.

Note 4: Construct access (viaduct or tunnel) into I-15 right of way south of Nichols Road Station, and egress to layover facility in Temecula. Replace bridges on old rail right of way, and viaducts on I-15 right of way.

Note 5: Assume a retaining wall-crash wall in the I-15 right of way between Lake Street and Temecula; average height 6' including excavation and structural backfill.

Note 6: Assume cost of a drainage system is 10% of track work cost.

Note 7: Build two new commuter-style stations. Each station to have 500 parking spaces.

Note 8: Assume new signal system over entire 35.7 miles. Assume new crossing signals/upgrades at each public crossing, and electric locks for industry turnouts.

Note 9: Assume major earthwork for former rail right of way, and minor earthwork between in the I-15 right of way.

Note 10: Assume purchase of former rail right of way. Assume five acres purchased per station and four acres at the layover yard.

Note 11: Additional parking spaces assumed for southern-mnost station at Lake Street. Assume one lump sum amount for layover yard facilities and improvements.

Table B - 3a Conceptual Capital Costs, Alternative C1 Using Rail Right of Way between Corona and Lake Street near Lake Elsinore				Alternative C1 Corona-Lake Elsinore	
				15.7	Miles
				82,896	Feet
Category	**Item**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Track work	Construct main track	TF	$174	82,896	$14,424,000
(note 1)	Construct side track	TF	174	9,280	1,615,000
	Upgrade existing track	TF	139		0
	Total track				16,039,000
Turnouts	Construct # 20 turnout	EA	406,000	3	1,218,000
(note 2)	Construct # 10 turnout	EA	158,000	3	474,000
	Construct # 10 turnout (yard)	EA	53,000	3	159,000
	Total turnouts				1,851,000
At-grade, highway-rail crossings	Concrete panel crossing members	TF	359	1,510	543,000
(note 3)	**Total at-grade, highway-rail crossings**				543,000
Structures	Construct overhead bridge at	TF	106,000		0
(note 4)	Construct railroad bridge (major)	TF	13,000	1,700	22,100,000
	Construct railroad bridge (minor)	TF	3,500		0
(note 6)	Retaining Wall	SF	50		0
	Total structures				22,100,000
Drainage	Install culverts	EA	7,500		0
(note 6)	Drainage/Underdrain	LS	17	82,896	1,443,000
	Total drainage				1,443,000
Stations	Construct new station (Commuter style)	EA	8,000,000	3	24,000,000
(note 7)	Construct new station (Intracounty style)	EA	4,000,000		0
	Renew existing station	EA	100,000		0
	Total stations				24,000,000
Signal work	Signal track	Mile	1,000,000	15.7	15,700,000
(note 8)	Control point signaling	EA	422,000	4	1,688,000
	Electric-lock for switch	EA	100,000	3	300,000
	At grade, highway-rail crossing w/ gates and cantilevers	EA	325,000	2	650,000
	At-grade, highway-rail crossing signaling	EA	240,000	11	2,640,000
	Total signal				20,978,000
Earthwork	Embankment/foundation work (new)	LS/Mile	350,000	15.7	5,495,000
(note 9)	Embankment/foundation work (existing)	LS/Mile	50,000		0
	Total earthwork				5,495,000
Right-of-way	Purchase	Acre	179,000	109	19,539,000
(note 10)	Easements	Acre	143,000		0
	Relocation	LS	100,000		0
	Total right-of-way				19,539,000
Specialty Items	Parking areas at stations (greater than 500 spaces)	EA	5,000	500	2,500,000
(note 11)	Layover Yard facilities and Improvements	LS	600,000	1	600,000
	Total specialty items				3,100,000
Estimated Construction Costs					115,088,000
Engineering/Mobilization/Demobilization/Construction Management (% of Construction)		15%			17,263,000
	Total Construction				132,351,000
Contingencies (% of Construction)		30%			34,526,000
Total Estimated Construction Costs (Including Engineering, Construction Management and Contingencies)					166,877,000

Note 1: Assume a new main track is built over the entire length of the route, as well as a layover facility with four tracks south of Lake Street Station. Assume one 5,000' passing siding mid route.

Note 2: Assume one high speed turnout at entrance switch east of Prophyry Yard east of North Main Corona Station, and one high speed turnout at either end of passing siding mid route. Assume three low speed turnouts at layover yard. Assume three new industrial lead turnouts.

Note 3: Rebuild/upgrade all crossings between east end of Porphyry Yard and Temecula. Assume new crossing panels.

Note 4: Construct access (viaduct or tunnel) into I-15 right of way south of Nichols Road Station, and egress to layover facility in Temecula. Replace bridges on old rail right of way, and viaducts on I-15 right of way.

Note 5: Assume a retaining wall-crash wall in the I-15 right of way between Lake Street and Temecula; average height 6' including excavation and structural backfill.

Note 6: Assume cost of a drainage system is 10% of track work cost.

Note 7: Build two new commuter-style stations. Each station to have 500 parking spaces.

Note 8: Assume new signal system over entire 35.7 miles. Assume new crossing signals/upgrades at each public crossing, and electric locks for industry turnouts.

Note 9: Assume major earthwork for former rail right of way, and minor earthwork between in the I-15 right of way.

Note 10: Assume purchase of former rail right of way. Assume five acres purchased per station and four acres at the layover yard.

Note 11: Additional parking spaces assumed for southern-mnost station at Lake Street. Assume one lump sum amount for layover yard facilities and improvements.

Table B - 4
Conceptual Capital Costs
Commuter Rail Service between Corona and Temecula, Alternative D
Using Rail Right of Way between Corona and Nichols Road and I-15 Right of Way between Nichols Road and Temecula
Includes Dos Lagos Station

				Alternative D	
				Corona-Temecula	
				35.3	Miles
				186,384	Feet
Category	**Item**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Track work	Construct main track	TF	$174	186,384	$32,431,000
(note 1)	Construct side track	TF	174	9,280	1,615,000
	Upgrade existing track	TF	139		0
	Total track				34,046,000
Turnouts	Construct # 20 turnout	EA	406,000	3	1,218,000
(note 2)	Construct # 10 turnout	EA	158,000	3	474,000
	Construct # 10 turnout (yard)	EA	53,000	3	159,000
	Total turnouts				1,851,000
At-grade, highway-rail crossings	Concrete panel crossing members	TF	359	1,840	661,000
(note 3)	**Total at-grade, highway-rail crossings**				661,000
Structures	Construct overhead bridge/tunnel	TF	106,000	500	53,000,000
(note 4)	Construct railroad bridge (major)	TF	13,000	3,400	44,200,000
	Construct railroad bridge (minor)	TF	3,500		0
(note 5)	Retaining Wall	SF	50	1,690,000	84,500,000
	Total structures				181,700,000
Drainage	Install culverts	EA	7,500		0
	Extend culverts	EA	3,500		
(note 6)	New drainage system	TF	17	186,384	3,244,000
	Total drainage				3,244,000
Stations	Construct new station (Commuter style)	EA	8,000,000	5	40,000,000
(note 7)	Construct new station (Intracounty style)	EA	4,000,000		0
	Renew existing station	EA	100,000		0
	Total stations				40,000,000
Signal work	Signal track	Mile	1,000,000	35.3	35,300,000
(note 8)	Control point signaling	EA	422,000	4	1,688,000
	Electric-lock for switch	EA	100,000	3	300,000
	At-grade, highway-rail crossing w/ gates and cantilevers	EA	325,000	2	650,000
	At-grade, highway-rail crossing signaling	EA	240,000	13	3,120,000
	Total signal				41,058,000
Earthwork	Embankment/foundation work (new)	LS/Mile	350,000	18.8	6,580,000
(note 9)	Embankment/foundation work (existing)	LS/Mile	50,000	16.5	825,000
	Total earthwork				7,405,000
Right-of-way	Purchase	Acre	179,000	143	25,587,000
(note 10)	Easements	Acre	143,000		0
	Relocation	LS	100,000		0
	Total right-of-way				25,587,000
Specialty Items	Parking areas at stations (greater than 500 spaces)	EA	5,000		0
(note 11)	Layover Yard facilities and Improvements	LS	600,000	1	600,000
	Total specialty items				600,000
Estimated Construction Costs					336,152,000
Engineering/Mobilization/Demobilization/Construction Management (% of Construction)		15%			50,423,000
	Total Construction				386,575,000
Contingencies (% of Construction)		30%			100,846,000
Total Estimated Construction Costs (Including Engineering, Construction Management and Contingencies)					487,421,000

Note 1: Assume a new main track is built over the entire length of the route, as well as a layover facility with four tracks south of Temecula Station. Assume one 5,000' passing siding mid route.
Note 2: Assume one high speed turnout at entrance switch east of Prophyry Yard east of North Main Corona Station, and one high speed turnout at either end of passing siding mid route. Assume three low speed turnouts at layover yard. Assume three new industrial lead turnouts.
Note 3: Rebuild/upgrade all crossings between east end of Porphyry Yard and Temecula. Assume new crossing panels.
Note 4: Construct access (viaduct or tunnel) into I-15 right of way south of Nichols Road Station, and egress to layover facility in Temecula. Replace bridges on old rail right of way, and viaducts on I-15 right of way.
Note 5: Assume a retaining wall-crash wall in the I-15 right of way between Nichols Road and Temecula; average height 6' including excavation and structural backfill. Assume a retaining wall between Lake Street and access point to I-15 at Nichols Road; same average height.
Note 6: Assume cost of a drainage system is 10% of track work cost.
Note 7: Build five new commuter-style stations. Each station to have 500 parking spaces.
Note 8: Assume new signal system over entire 35.3 miles. Assume new crossing signals/upgrades at each public crossing, and electric locks for industry turnouts.
Note 9: Assume major earthwork for former rail right of way, and minor earthwork in the I-15 right of way.
Note 10: Assume purchase of former rail right of way. Assume five acres purchased per station and four acres at the layover yard.
Note 11: Assume one lump sum amount for layover yard facilities and improvements.

Table B - 5
Conceptual Capital Costs
Commuter Rail Service between Corona and Temecula, Alternative E
Using Rail Right of Way between Corona and Nichols Road and I-15 Right of Way between Nichols Road and Temecula
Assumes Northern Terminus of Trains is San Bernardino

				Alternative E	
				Corona-Temecula	
				35.3	Miles
				187,984	Feet
Category	**Item**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Track work	Construct main track	TF	$174	187,984	$32,710,000
(note 1)	Construct side track	TF	174	10,520	1,831,000
	Upgrade existing track	TF	139		0
	Demolition track	TF	20	1,250	25,000
	Total track				34,566,000
Turnouts	Construct # 20 turnout	EA	406,000	3	1,218,000
(note 2)	Construct # 10 turnout	EA	158,000	5	790,000
	Construct # 10 turnout (yard)	EA	53,000	5	265,000
	Total turnouts				2,273,000
At-grade, highway-rail crossings	Concrete panel crossing members	TF	359	1,840	661,000
(note 3)	**Total at-grade, highway-rail crossings**				661,000
Structures	Construct overhead bridge/tunnel	TF	106,000	500	53,000,000
(note 4)	Construct railroad bridge (major)	TF	13,000	3,400	44,200,000
	Construct railroad bridge (minor)	TF	3,500		0
(note 5)	Retaining Wall	SF	50	1,690,000	84,500,000
	Total structures				181,700,000
Drainage	Install culverts	EA	7,500		0
	Extend culverts	EA	3,500		
(note 6)	New drainage system	TF	17	186,384	3,244,000
	Total drainage				3,244,000
Stations	Construct new station (Commuter style)	EA	8,000,000	4	32,000,000
(note 7)	Construct new station (Intracounty style)	EA	4,000,000		0
	Renew existing station	EA	100,000		0
	Total stations				32,000,000
Signal work	Signal track	Mile	1,000,000	35.3	35,300,000
(note 8)	Control point signaling	EA	422,000	5	2,110,000
	Electric-lock for switch	EA	100,000	4	400,000
	At-grade, highway-rail crossing w/ gates and cantilevers	EA	325,000	2	650,000
	At-grade, highway-rail crossing signaling	EA	240,000	13	3,120,000
	Total signal				41,580,000
Earthwork	Embankment/foundation work (new)	LS/Mile	350,000	18.8	6,580,000
(note 9)	Embankment/foundation work (existing)	LS/Mile	50,000	16.5	825,000
	Total earthwork				7,405,000
Right-of-way	Purchase	Acre	179,000	138	24,692,000
(note 10)	Easements	Acre	143,000		0
	Relocation	LS	100,000		0
	Total right-of-way				24,692,000
Specialty Items	Parking areas at stations (greater than 500 spaces)	EA	5,000		0
(note 11)	Layover Yard facilities and Improvements	LS	600,000	1	600,000
	Total specialty items				600,000
Estimated Construction Costs					328,721,000
Engineering/Mobilization/Demobilization/Construction Management (% of Construction)		15%			49,308,000
	Total Construction				378,029,000
Contingencies (% of Construction)		30%			98,616,000
Total Estimated Construction Costs (Including Engineering, Construction Management and Contingencies)					476,645,000

Note 1: Assume a new main track is built over the entire length of the route, as well as a layover facility with four tracks south of Temecula Station. Assume one 5,000' passing siding mid route.

Note 2: Assume one high speed turnout at entrance switch east of Prophyry Yard east of North Main Corona Station, and one high speed turnout at either end of passing siding mid route. Assume three low speed turnouts at layover yard. Assume three new industrial lead turnouts.

Note 3: Rebuild/upgrade all crossings between east end of Porphyry Yard and Temecula. Assume new crossing panels.

Note 4: Construct access (viaduct or tunnel) into I-15 right of way south of Nichols Road Station, and egress to layover facility in Temecula. Replace bridges on old rail right of way, and viaducts on I-15 right of way.

Note 5: Assume a retaining wall-crash wall in the I-15 right of way between Nichols Road and Temecula; average height 6' including excavation and structural backfill. Assume a retaining wall between Lake Street and access point to I-15 at Nichols Road; same average height.

Note 6: Assume cost of a drainage system is 10% of track work cost.

Note 7: Build four new commuter-style stations. Each station to have 500 parking spaces.

Note 8: Assume new signal system over entire 35.3 miles. Assume new crossing signals/upgrades at each public crossing, and electric locks for industry turnouts.

Note 9: Assume major earthwork for former rail right of way, and minor earthwork in the I-15 right of way.

Note 10: Assume purchase of former rail right of way. Assume five acres purchased per station and four acres at the layover yard.

Note 11: Assume one lump sum amount for layover yard facilities and improvements.

Table B - 6 Conceptual Capital Costs Commuter Rail Service between Corona and Temecula, Alternative F Using Rail Right of Way between Corona and Nichols Road and I-15 Right of Way between Nichols Road and Temecula Asumes Northern Terminus of Trains is San Bernardino and Includes Dos Lagos Station				Alternative F Corona-Temecula	
				35.3	Miles
				187,984	Feet
Category	**Item**	**Unit**	**Unit Price**	**Quantity**	**Cost**
Track work	Construct main track	TF	$174	187,984	$32,710,000
(note 1)	Construct side track	TF	174	10,520	1,831,000
	Upgrade existing track	TF	139		0
	Demolition track	TF	20	1,250	25,000
	Total track				34,566,000
Turnouts	Construct # 20 turnout	EA	406,000	3	1,218,000
(note 2)	Construct # 10 turnout	EA	158,000	5	790,000
	Construct # 10 turnout (yard)	EA	53,000	5	265,000
	Total turnouts				2,273,000
At-grade, highway-rail crossings	Concrete panel crossing members	TF	359	1,840	661,000
(note 3)	**Total at-grade, highway-rail crossings**				661,000
Structures	Construct overhead bridge/tunnel	TF	106,000	500	53,000,000
(note 4)	Construct railroad bridge (major)	TF	13,000	3,400	44,200,000
	Construct railroad bridge (minor)	TF	3,500		0
(note 5)	Retaining Wall	SF	50	1,690,000	84,500,000
	Total structures				181,700,000
Drainage	Install culverts	EA	7,500		0
	Extend culverts	EA	3,500		
(note 6)	New drainage system	TF	17	186,384	3,244,000
	Total drainage				3,244,000
Stations	Construct new station (Commuter style)	EA	8,000,000	5	40,000,000
(note 7)	Construct new station (Intracounty style)	EA	4,000,000		0
	Renew existing station	EA	100,000		0
	Total stations				40,000,000
Signal work	Signal track	Mile	1,000,000	35.3	35,300,000
(note 8)	Control point signaling	EA	422,000	5	2,110,000
	Electric-lock for switch	EA	100,000	4	400,000
	At-grade, highway-rail crossing w/ gates and cantilevers	EA	325,000	2	650,000
	At-grade, highway-rail crossing signaling	EA	240,000	13	3,120,000
	Total signal				41,580,000
Earthwork	Embankment/foundation work (new)	LS/Mile	350,000	18.8	6,580,000
(note 9)	Embankment/foundation work (existing)	LS/Mile	50,000	16.5	825,000
	Total earthwork				7,405,000
Right-of-way	Purchase	Acre	179,000	143	25,587,000
(note 10)	Easements	Acre	143,000		0
	Relocation	LS	100,000		0
	Total right-of-way				25,587,000
Specialty Items	Parking areas at stations (greater than 500 spaces)	EA	5,000		0
(note 11)	Layover Yard facilities and Improvements	LS	600,000	1	600,000
	Total specialty items				600,000
Estimated Construction Costs					337,616,000
Engineering/Mobilization/Demobilization/Construction Management (% of Construction)		15%			50,642,000
	Total Construction				388,258,000
Contingencies (% of Construction)		30%			101,285,000
Total Estimated Construction Costs (Including Engineering, Construction Management and Contingencies)					489,543,000

Note 1: Assume a new main track is built over the entire length of the route, as well as a layover facility with four tracks south of Temecula Station. Assume one 5,000' passing siding mid route.

Note 2: Assume one high speed turnout at entrance switch east of Prophyry Yard east of North Main Corona Station, and one high speed turnout at either end of passing siding mid route. Assume three low speed turnouts at layover yard. Assume three new industrial lead turnouts.

Note 3: Rebuild/upgrade all crossings between east end of Porphyry Yard and Temecula. Assume new crossing panels.

Note 4: Construct access (viaduct or tunnel) into I-15 right of way south of Nichols Road Station, and egress to layover facility in Temecula. Replace bridges on old rail right of way, and viaducts on I-15 right of way.

Note 5: Assume a retaining wall-crash wall in the I-15 right of way between Nichols Road and Temecula; average height 6' including excavation and structural backfill. Assume a retaining wall between Lake Street and access point to I-15 at Nichols Road; same average height.

Note 6: Assume cost of a drainage system is 10% of track work cost.

Note 7: Build four new commuter-style stations. Each station to have 500 parking spaces.

Note 8: Assume new signal system over entire 35.3 miles. Assume new crossing signals/upgrades at each public crossing, and electric locks for industry turnouts.

Note 9: Assume major earthwork for former rail right of way, and minor earthwork in the I-15 right of way.

Note 10: Assume purchase of former rail right of way. Assume five acres purchased per station and four acres at the layover yard.

Note 11: Assume one lump sum amount for layover yard facilities and improvements.

Table B 7
Capital Cost Estimate
Commuter Rail
Temacula/Murrieta - Lossan Coridor San Diego Segment

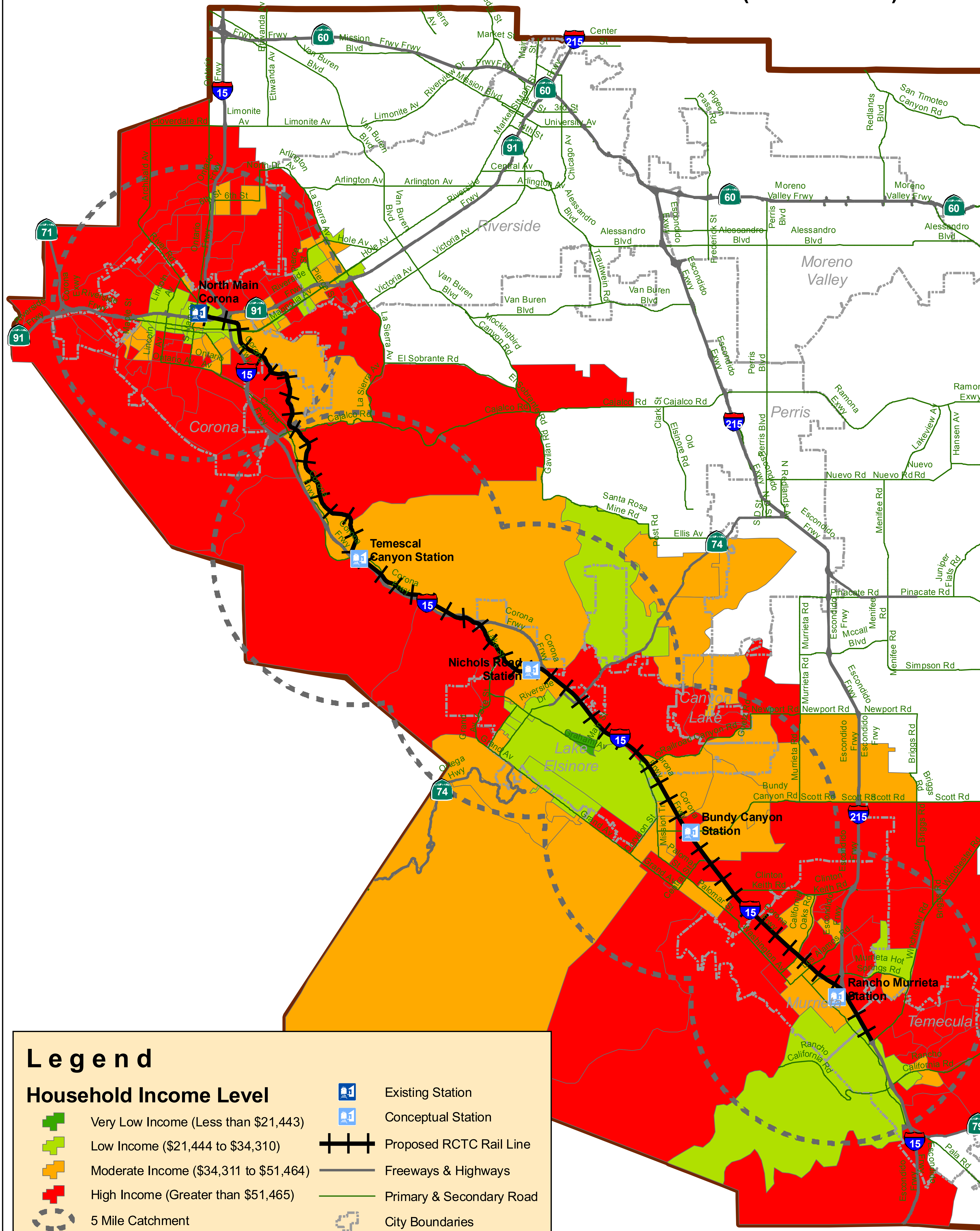
	Cost Elements	Unit	Unit Price	QUANTITIES	
Alignment Cost				Quantities	Item Cost
Track					
1	Single Track Section - Total	mi		54.56	
2	Single Track Section - At-Grade	mi	646,930	29.92	19,357,434
3	Single Track Section - On-Structure	mi	1,223,452	18.57	22,725,578
4	Single Track - In Tunnel or Subway	mi	1,223,452	6.07	7,422,781
5	Single Track Section - In Trench	mi	1,223,452	0.00	-
	Single Track Sections - In Tunnel or Subway	mi	764,658	0.00	-
6	Freight Single Track	mi	646,930	0.00	-
7	Freight Single Track	mi	323,465	0.00	-
8	Four track construction or reconstruction	mi	1,293,861	0.00	-
	Total Track				49,505,792.54
Earthwork and Related Items					
1	Site Preparation - Undeveloped	Acre	4,148	2000.00	8,295,280
2	Total Cut	CY	5.80	206806.67	1,200,093
3	Total Fill	CY	5.80	289529.34	1,680,131
4	Landscape/Erosion Control	Acre	2,785	2000.00	5,569,307
5	Security Fencing (Both Sides of R/W)	mi	139,509	11.84	1,651,387
6	Special Drainage Facilities	5% of Earthwork Cost			837,241
	Total Earthwork and Related Items				19,233,439
Structures/Tunnels/Walls					
1	Standard Structure	mi	18,833,749	18.57	349,836,132
2	High Structure	mi	22,600,499	0	
3	Long Span Structure	mi	51,531,229	0	
4	Waterway Crossing - Primary	mi	39,599,518	0	
	Waterway Crossing - Secondary (Irrigation/Canal Crossing)	mi	31,704,077	0	
5	Single Track Drill & Blast (< 6 Miles)	mi	72,033,441	0	
6	Single Track Drill & TBM (< 6 Miles)	mi	53,242,108	6.07	323,024,041
7	Twin Single Track TBM w/3rd Tube (>6 Miles)	mi	108,124,729	0	
8	Double Tack Drill & Blast	mi	114,835,921	0	
9	Double Track Mined (Soft Soil)	mi	131,986,740	0	
10	Seismic Chamber (Drill & Blast/Mined)	ea	80,782,844	0	
11	Crossovers	ea	80,782,844	0	
12	Cut & Cover Single Track Tunnel	mi	46,195,359	0	
13	Trench Short	mi	69,721,345	0	
14	Trench Long	mi	53,856,000	0	
15	Mechanical & Electrical for Tunnels	mi	2,648,534	6.07	16,068,866
16	Retaining walls	mi	6,033,775	0	
17	Containment Walls	mi	2,057,762	0	
18	Single Track Cut and Cover Subway	mi	41,245,856	0	
	Total Structures/Tunnels/Walls				688,929,038
Grade Separations					
1	Street Overcrossing Comuter Rail - (Urban)	ea	14,628,436	0	-
2	Street Overcrossing Comuter Rail - (Suburban)	ea	5,526,298	0	-
3	Street Overcrossing Comuter Rail - (Undeveloped)	ea	931,886	0	-
4	Street Undercrossing Comuter Rail - (Urban)	ea	9,931,083	1	9,931,083
5	Street Undercrossing Comuter Rail - (Suburban)	ea	3,803,393	3	11,410,179
6	Street Undercrossing Comuter Rail (Undeveloped)	ea	640,942	9	5,768,480
7	Street Bridging Comuter Rail Trench	ea			-
8	Minor crossing closures	ea	98,606	4	394,425
	Total Grade Separations				27,504,168
Building Items					
1	Intermediated Passenger Stations (Commuter style)				
	Temecula/Murrieta	ea	8,000,000	1	8,000,000
	Escondido	ea	20,000,000	1	20,000,000
	Poway	ea	8,000,000	1	8,000,000
	Mira Mesa	ea	8,000,000	1	8,000,000
2	Terminal Passenger Stations	ea	115,000,000	0	-
3	Parking Requirements				-
	Temecula//Murrieta (surface parking)	space	2,042	0	-
	Escondido (surface parking)	space	2,042	0	-
	Poway (surface parking)	space	2,042	0	-
	Mira Mesa (surface parking)	space	2,042	0	-
	Total Building Items				44,000,000
Rail and Utility Relocation					
1	Single Track Relocation (Temporary)	mi	1,743,866	0	-
2	Single Track Relocation (Permanent)	mi	1,743,866	0	-
3	Single Track Removal	mi	86,905	0	-
4	Major Utility Relocations - Dense Urban	mi	1,220,705	4.36	5,324,747
5	Major Utility Relocations - Urban	mi	932,967	3.92	3,655,128
6	Major Utility Relocations - Dense Suburban	mi	653,949	12.16	7,950,140
7	Major Utility Relocations - Suburban	mi	374,930	1.70	636,011
8	Major Utility Relocations - Undeveloped	mi	19,182	25.69	492,731
	Total Rail and Utility Relocation				18,058,758
Right-of-Way					
1	Right-of-Way Required for Each Segment				
	Dense Urban	Acre	1,416,038	26.42	37,414,057
	Urban	Acre	944,026	23.80	22,471,181
	Dense Suburban	Acre	472,013	73.71	34,790,893
	Suburban	Acre	165,204	20.86	3,446,865
	Undeveloped	Acre	118,003	311.4380305	36,750,676
2	Right-of-Way Required for Passenger Station & Parking Facilities				-
	Dense Urban	Acre	1,416,038	0	-
	Urban	Acre	944,026	0	-
	Dense Suburban	Acre	472,013	0	-
	Suburban (Temecula, Escondido,Poway)	Acre	165,204	15	2,478,064
	Undeveloped (Mira Mesa)	Acre	118,003	5	590,016
	Total Right-of-Way				137,941,752
Environmental Mitigation					
	Environmental Mitigation	3% of Line Cost			27,864,042
	Total enviromental Mitigation				27,864,042
Signals and Communication					
1	Signaling (ATC)	mi	1,000,000	54.56	54,558,695
2	Contro point signaling	EA	422,000	4.00	1,688,000
3	Electric-lock for switch	EA	100,000	3.00	300,000
4	Wayside Protection System At-grade highway-rail crossing signaling	mi	92,075	54.56	5,023,514
	Total signal				61,570,209
Vehicle Costs					
1	Fleet size estimate (1 loc+ 1 cab car + 5 bi-level coaches)	train set	11,800,000	7	94,800,000
Support Facility Costs					
1	Facility cost breakdown	ea	20,000,000	1	20,000,000
Program Implementation Costs					
	Program Implementation Costs	15% of Total Cost and Procurement			178,411,080
Contingencies					
	Contingencies	30% of Total Construction Cost			278,640,421
Total Construction					928,801,404
Total Construction, Right-of-Way, Environmental Mitigation, and Vehicles					1,189,407,198
Grand Total					1,646,458,699

Interstate -15
Commuter Rail
Feasibility Study

Appendix C:
Maps
Access for Low Income Housing

RCTC I-15 Commuter Rail Feasibility Study
Household Income Level Map

Corona - Temecula (Alternative A)



The percentage of household income levels were calculated using the median household income for each county and the median household income data from the 2000 census at the block group level. The median household income level for Riverside county in 2000 was $42,887.
Very Low - Less than 50%
Low - 50% to 80%
Moderate - 80% - 120%
High - More than 120%

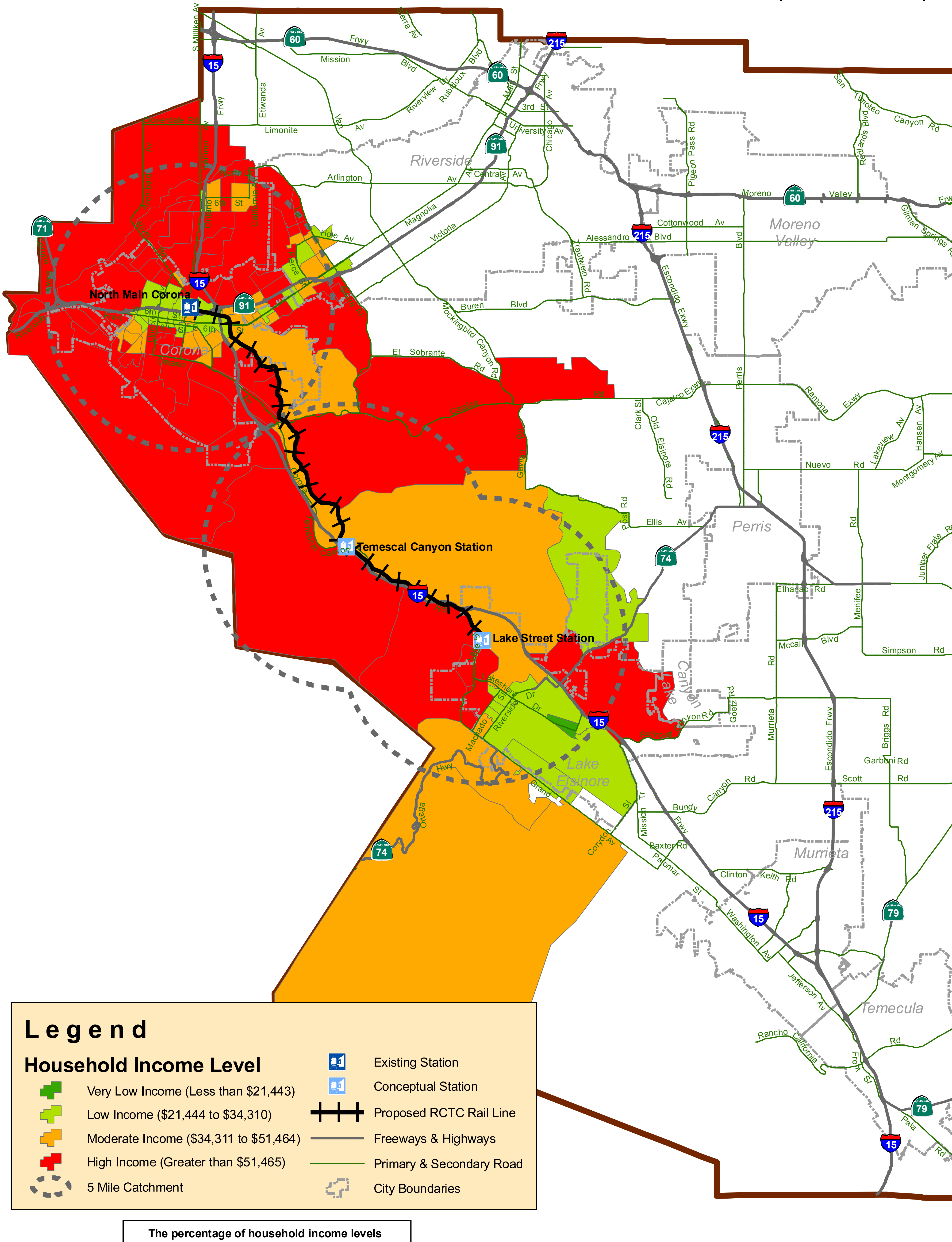
0 3 6 12 Miles

r:\arc1\rctc\proj4199\I15CorridorAltA.mxd

Map Created January 23, 2007

RCTC I-15 Commuter Rail Feasibility Study
Household Income Level Map

Corona - Lake Elsinore (Alternative C)



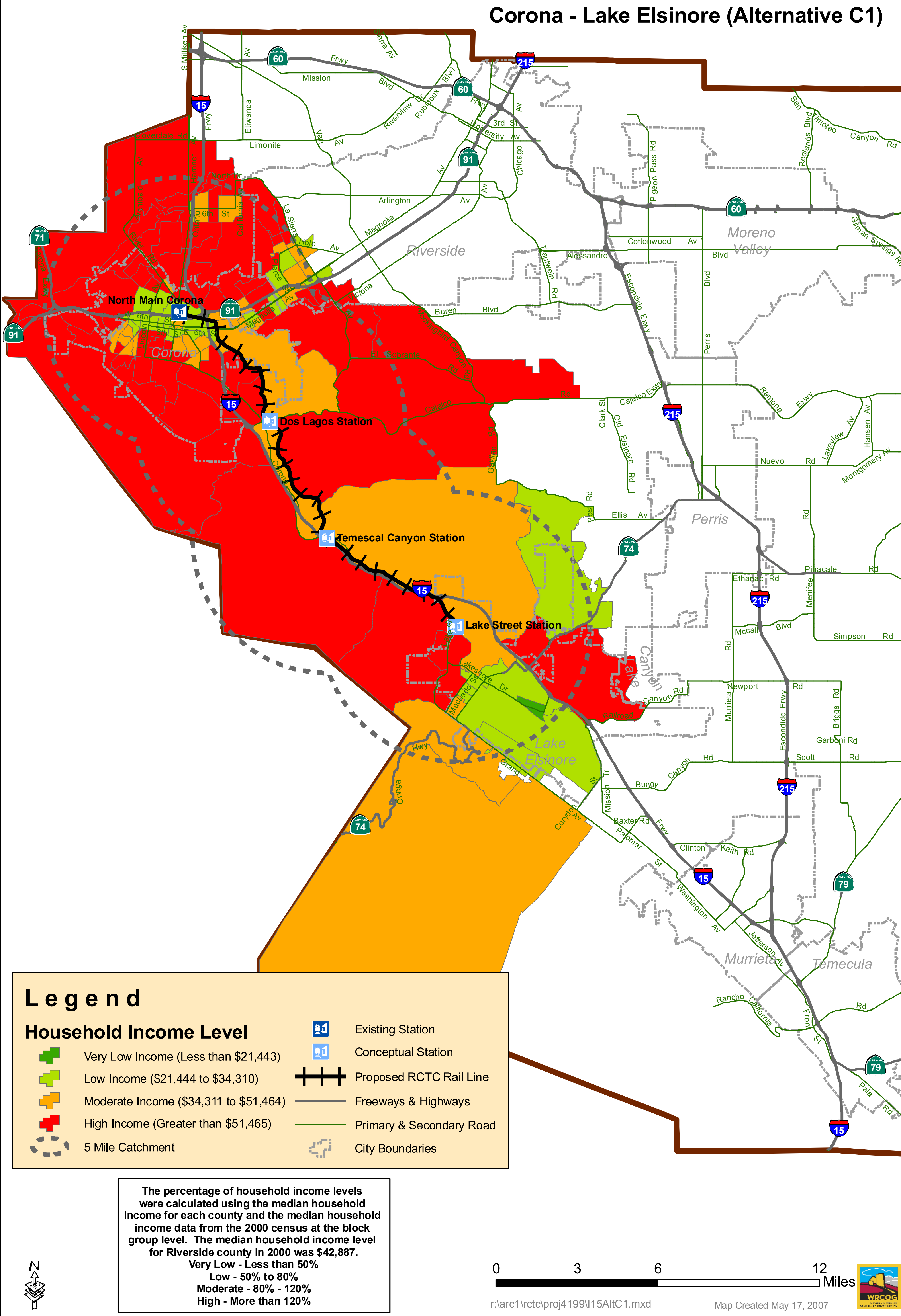
The percentage of household income levels were calculated using the median household income for each county and the median household income data from the 2000 census at the block group level. The median household income level for Riverside county in 2000 was $42,887.
Very Low - Less than 50%
Low - 50% to 80%
Moderate - 80% - 120%
High - More than 120%

r:\arc1\rctc\proj4199\I15CorridorAltC.mxd

Map Created March 2, 2007

RCTC I-15 Commuter Rail Feasibility Study
Household Income Level Map

Corona - Lake Elsinore (Alternative C1)



The percentage of household income levels were calculated using the median household income for each county and the median household income data from the 2000 census at the block group level. The median household income level for Riverside county in 2000 was $42,887.
Very Low - Less than 50%
Low - 50% to 80%
Moderate - 80% - 120%
High - More than 120%

r:\arc1\rctc\proj4199\I15AltC1.mxd

Map Created May 17, 2007

RCTC I-15 Commuter Rail Feasibility Study
Household Income Level Map

Temecula-San Diego (Alternative G)