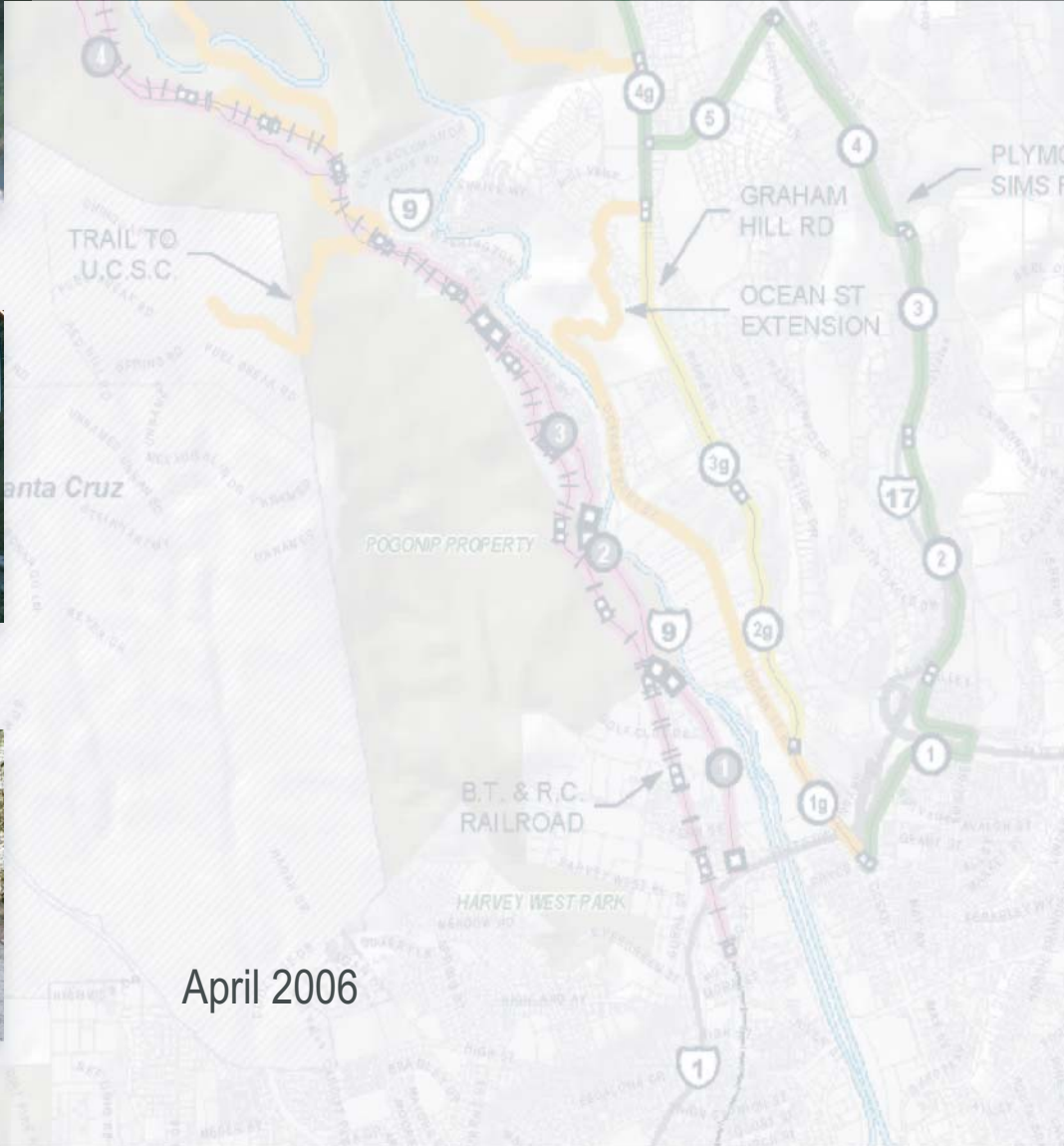


SAN LORENZO VALLEY TRAIL FEASIBILITY STUDY

EXECUTIVE SUMMARY



April 2006



PREPARED FOR COUNTY OF SANTA CRUZ
DEPARTMENT OF PUBLIC WORKS



**Draft Report
San Lorenzo Valley Trail Feasibility Study
Executive Summary**

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Executive Summary

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1.0 Introduction

1.1 Project Background and Objectives

Improved bicycle and pedestrian routes have been discussed in the San Lorenzo Valley for many years. In the past few years, the San Lorenzo Valley (SLV) Trail Committee formed and conducted field studies to focus on this objective. In 2001 the Santa Cruz County Public Works Department and the Rails-to-Trails Conservancy collaborated on an application for a Caltrans Community-Based Transportation Planning Grant. In May 2002 Caltrans approved the grant to conduct a feasibility study of a trail along the San Lorenzo Valley/Highway 9 corridor between Santa Cruz and Boulder Creek (approximately 15 miles), including an assessment of the potential to use the Big Trees/Roaring Camp Railroad line as part of the trail (see Figure 1.1: Project Location Map).

The planning firm LandPeople was selected in January 2004 to conduct the feasibility study for the trail, working closely with the San Lorenzo Valley Trail Committee and other interested parties and stakeholders. The Rails-to-Trails Conservancy, a private non-profit organization, was contracted separately to the County to provide the railroad portion of the study.

The objectives of this study were to: 1) provide a thorough evaluation of the conditions, opportunities and constraints of constructing a continuous bicycle and pedestrian trail, or separate facilities, along the main study routes, or any identified alternative routes; 2) prepare conceptual improvement plans and cost estimates for the most feasible routes; and, 3) with public and agency input, prepare recommendations for trail improvements.

1.2 Summary of Recommendations

There are three possible primary trail corridors from Santa Cruz to Felton:

- Highway 9 from Highway 1 in Santa Cruz to Felton;
- The Big Trees/Roaring Camp Railroad from Highway 1 in Santa Cruz to Felton;
- Graham Hill Road from Ocean Street in Santa Cruz to Highway 9 in Felton.

From Felton north to Boulder Creek the sole primary corridor is along Highway 9.

Along each primary corridor, parallel and alternative routes were evaluated. Connections to each possible route from communities, schools, and other resources were considered as well. The evaluation included County and City bike route plans, and the Town Plans of Felton, Ben Lomond and Boulder Creek. Concept designs and cost estimates were prepared for the main routes and for parallel and connecting routes that were determined to be worthy of further study. In addition to the Santa Cruz to Boulder Creek regional connection reflected in the recommended route, the study examined needs and opportunities to create local bicycle and pedestrian enhancements within communities.

The recommended route, illustrated in Figure 1.2, extends from Ocean Street in Santa Cruz north along Plymouth Street, El Rancho Drive, La Madrona Drive, and Sims Road (the Plymouth-Sims Route), bypassing the steep and winding southern portion of Graham Hill Road. From the intersection of Sims Road and Graham Hill Road the recommended route runs north along Graham Hill Road to Highway 9 in Felton. The recommended route follows Cooper Street north parallel to Highway 9 in Felton, and then along the right of way of Highway 9 north to the terminus in Boulder Creek.

The study found that the southern portion of Highway 9 and the entire railroad alignment have such severe physical constraints that construction of a continuous trail in the right-of way would have environmental and economic costs significantly greater than the recommended route. However, the aesthetic and recreational value of these two scenic routes is considerable. It is primarily due to the low feasibility of funding these improvements that the alternative involving a County road is recommended. The improvements along County roads can be incrementally funded and can also be incorporated into any private development which occurs along the routes. The funding for improvements along Highway 9 or the railroad would likely require a bond or large grant. In these financially constrained times it is unlikely that either would occur. The Plymouth-Sims route was recommended because the vehicle volumes and speeds on these roads would be much less than on Graham Hill Road. In addition, the gradient is less steep on the Plymouth-Sims Route. The route along Graham Hill Road north of Sims is desirable because it will have opportunities for a path separated from the road.

Table 1.1 provides a summary of the estimated cost for constructing continuous bicycle and pedestrian facilities along each of the primary study corridors. The Railroad Corridor and the Graham Hill Road Corridor area are alternatives to the southern portion of the Highway 9 Corridor. Table 1.1 also presents the estimated cost for constructing the recommended route, which includes the Plymouth-Sims bypass of lower Graham Hill Road, the northern two thirds of Graham Hill Road, the Cooper Street bypass paralleling Highway 9 in Felton, and improvements in the right-of-way of Highway 9 from Felton north to central Boulder Creek. These planning-level cost estimates are based on preliminary investigations of site conditions and requirements, and concept-level design. The construction costs vary significantly along the route, as detailed in report Section 2.0, and the Appendices. Overall, constructing these improvements would be an expensive project that would be phased over a long period, and potentially completed in conjunction with other roadway improvement and private development projects.

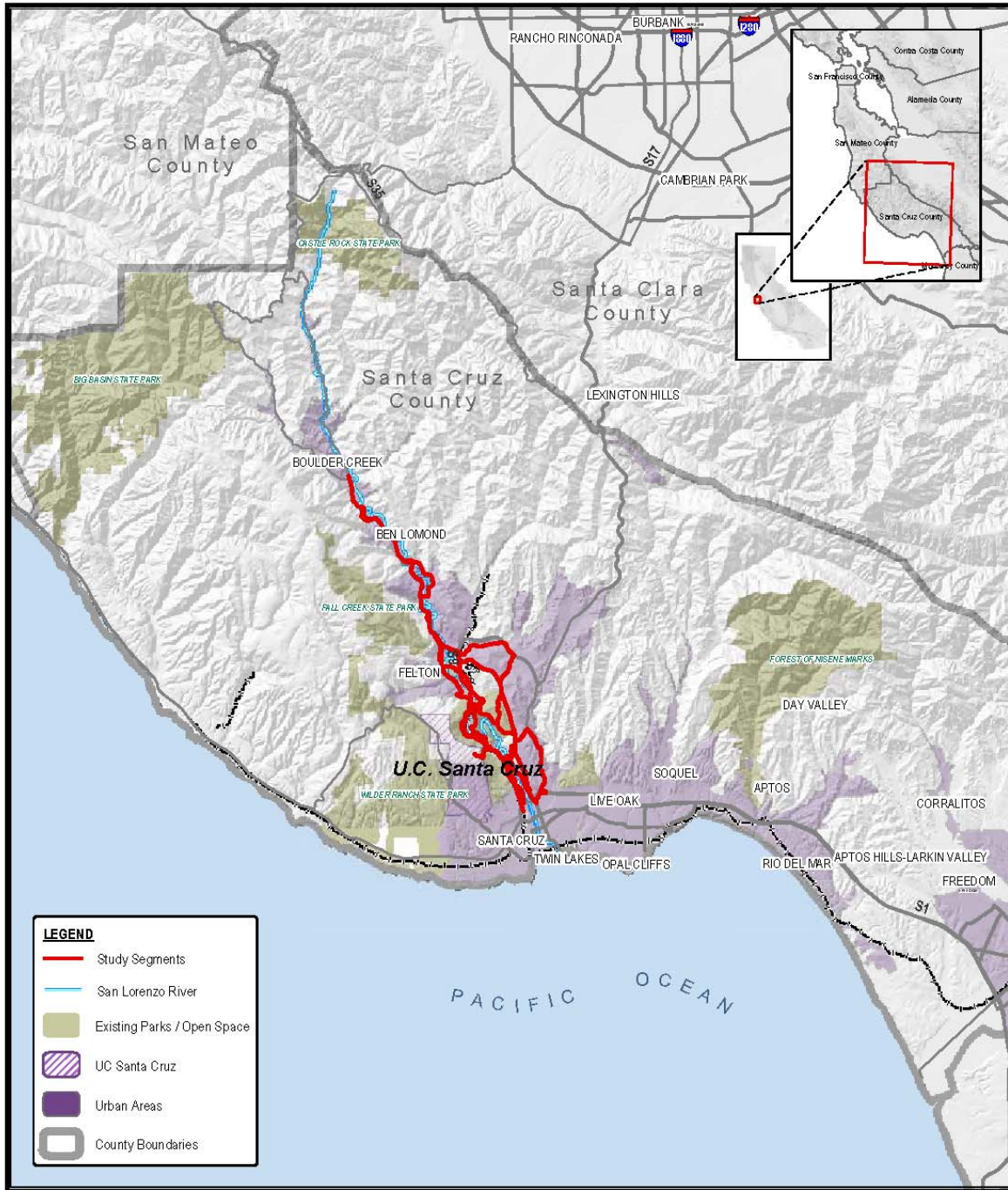
Table 1.1: Improvement Cost Summary

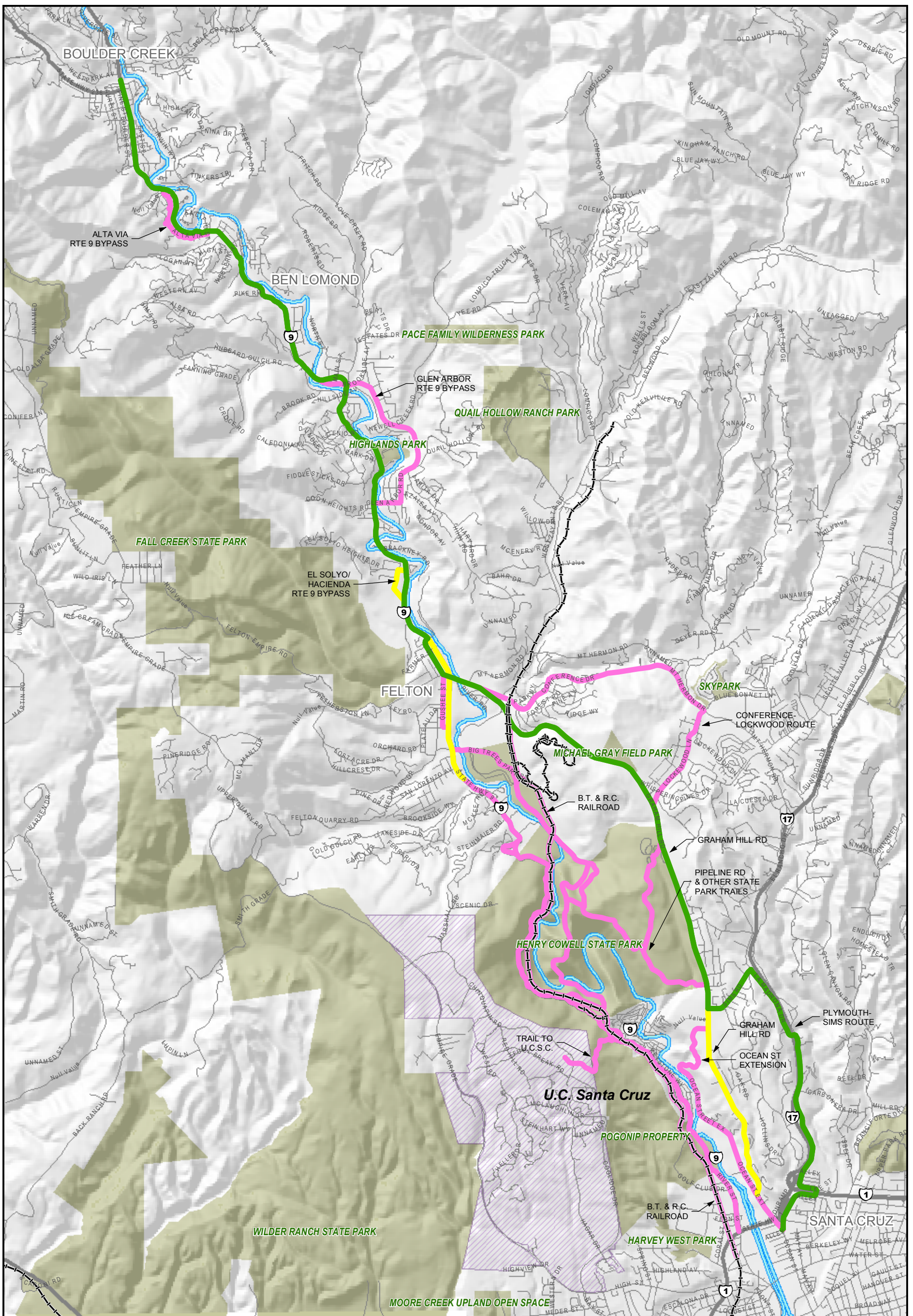
Santa Cruz to Felton Alternatives			
Route	Length in Miles	Cost	Cost/mile
Railroad, entire corridor	5.25	\$25,562,107	\$4,868,973
Highway 9, south corridor	6.44	\$23,390,291	\$3,631,734
Graham Hill Road, entire corridor	6.08	\$16,166,076	\$2,658,894
Plymouth-Sims/Graham Hill Road North (Recommended Route)	7.65	\$20,521,421	\$2,682,539

Felton to Boulder Creek Alternatives			
Route	Length in Miles	Total Cost	Cost/mile
Highway 9, north corridor	7.48	\$23,369,481	\$3,125,639
Highway 9, north corridor w/ Cooper Street Alternative (Recommended Route)	7.48	\$21,116,323	\$2,823,038

Recommended Route Overall			
	Length in Miles	Total Cost	Cost/mile
	15.13	\$41,637,744	\$2,751,999

Figure 1.1: Project Location Map





LEGEND

Study Segment Findings

- Recommended Route
- Studied, designed, estimated - recommended second priority for improvements
- Studied & eliminated

- Existing Parks / Open Space
- UC Santa Cruz
- San Lorenzo River

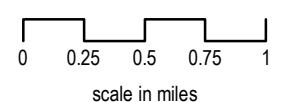


FIGURE 1.2: Recommended Route Overview
SAN LORENZO VALLEY TRAIL FEASIBILITY STUDY



1.3 Summary of Trail Bypass and Connections Evaluation

In addition to the three main corridors, several shorter alternative connections to the Highway 9 and Railroad routes were examined. Four of these are recommended for elimination from further consideration due to physical, land use, and environmental constraints:

- Trails connecting through UCSC or the upper portions of the City of Santa Cruz Pogonip property;
- Ocean Street Extension to Graham Hill Road via the equestrian trail through Woods Cove subdivision or City water property;
- A bypass of Highway 9 segments 9, 10, and part of 11 from Felton to Boulder Creek via Glen Arbor Road;
- A bypass of Highway 9 segment 14 using Alta Via, a local road to the west.

Three other short Highway 9 bypass alignments are recommended for further consideration as trail routes. Design concepts and cost estimates are included with the related Highway 9 segment evaluations:

- A bypass of Highway 9 segment 8 via El Solyo Heights Drive and Hacienda Way north of San Lorenzo Valley Elementary School;
- A bypass of Highway 9 segment 7 along Cooper Street north of Felton Empire Road (part of the Preferred Route);
- Connecting to the above, a bypass of Highway 9 segment 6 along Gushee Street south of Felton Empire Road (part of the Preferred Route).

In addition to the above shorter bypasses and connections, three major alternative routes were studied. These routes would bypass some or all of the constrained southern portion of Highway 9 and the railroad alignment:

- Pipeline Road in Henry Cowell Redwoods State Park, which connects to Graham Hill Road at the County Equestrian Park via Big Trees Road/Entrance Road and/or River Trail or Meadow Trail. This route was determined to be infeasible due to steep grades, environmental issues, and land use conflict with the park's purposes.
- Plymouth Street, El Rancho Drive, La Madrona Drive, and Sims Road from Ocean Street to Graham Hill Road (the Plymouth – Sims Route, part of the Recommended Route), which bypasses the southern portion of Graham Hill Road. Evaluation of this route includes design concepts and cost estimates, contained in Appendix A, B and C;
- Conference Drive, Mt. Hermon Road, and Lockwood Lane from north Graham Hill Road to central Graham Hill Road. This route bypasses the northern portion of Graham Hill Road. This alternative was determined to be infeasible due to a long narrow bridge, a major landslide zone, and a long circuitous route.

The study ultimately evaluated over 45 miles of potential trail routes. Conceptual plans and cost estimates were prepared for 29 miles, of which 17.7 miles are recommended for further consideration as trail routes.

A more detailed summary of results and recommendations is provided in Section 1.4.

1.4 Study Methods and Process

The Trail Feasibility Study was initiated with a public Trail Advisory Committee meeting on February 12, 2004 at Highlands Community Park in Felton. This meeting provided an overview of the project, and allowed County staff and the consultants the opportunity to hear public ideas and concerns.

A series of geographic information system (GIS) based maps was prepared to cover the study area. These maps were prepared from data supplied by Santa Cruz County and augmented with information collected from Caltrans, other public domain sources, and field studies. LandPeople, Landscape Architects and Planners, and Higgins Associates, Traffic Engineers, collaborated on the Highway 9 route assessment. The Rails-to-Trails Conservancy staff prepared the Big Trees/Roaring Camp Railroad route assessment. The environmental resource consultants each characterized the conditions and issues associated with their area of expertise.

The major study corridors were broken down into a series of segments for more detailed evaluation. Figures 1.3 and 1.4 show the study segments and the resulting recommended priorities for improvement. Green lines indicate the highest priority for improvement along the Recommended Route. Some portions of the Recommended Route are already improved, or are to be improved by other projects, or are very expensive to improve and are thus indicated as a secondary priority for improvements (yellow lines). The pink and orange colored routes are not recommended for improvement for regional bicycle or pedestrian access, though they may be worth using or improving for local access.

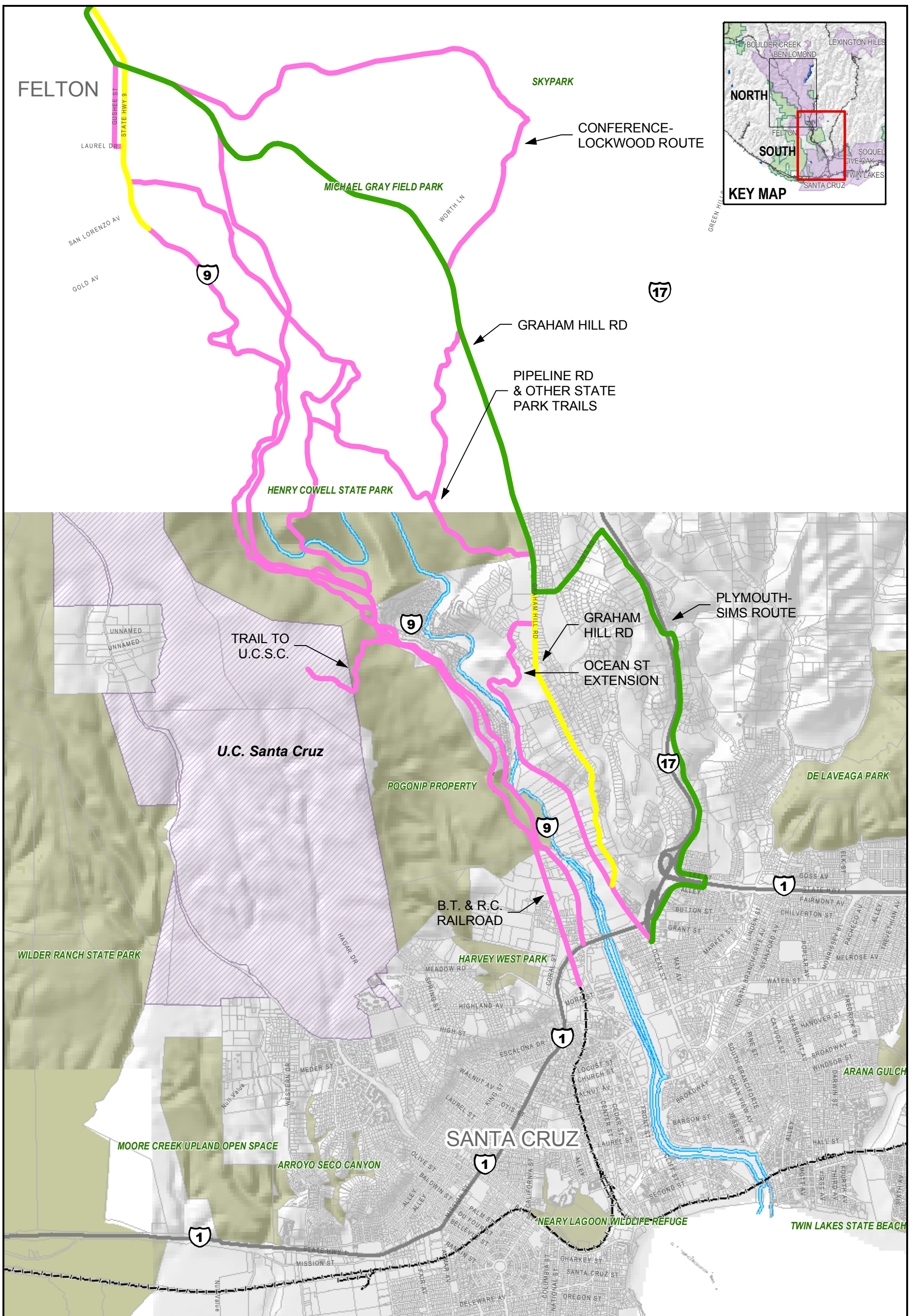
Detailed route maps for Highway 9 are contained in Appendix B, and cost estimates are contained in Appendix C. The Railroad route maps and cost estimates are contained in Appendix E. As a means of indicating the relative feasibility for constructing a trail, a set of typical condition ratings from A to F was developed, including some adaptations for the railroad route. A is the most feasible condition, while F is the least feasible condition. These ratings systems are described in detail in Section 2.1. The condition percentages presented in the evaluations indicate how constrained the alternative routes are. Detailed descriptions of the conditions along the routes are provided in Appendix A. Detailed maps of the conditions along the routes are provided in Appendix B.

After extensive efforts to solicit participation and comments on the study, and County staff and stakeholder review of preliminary concepts, a Community Meeting was held on June 2, 2004 to present the findings of the preliminary trail route assessment. Based on comments at this meeting, additional alternative routes were added to the study for the portion between Santa Cruz and Felton. These routes were assessed for feasibility in the same manner as the routes assessed initially.

Due to the great extent, variability, and complexity of the routes under study, graphic symbols were developed to indicate the type of trail improvements proposed along the routes. Improvement concepts, preliminary cost estimates, and comparative analyses of features and benefits were then developed for all the major alternatives, and preliminary recommendations were formulated. This information was published on the consultant's website on February 28, 2006 and presented at a community meeting on March 14, 2006. Articles

in the Santa Cruz Sentinel and San Jose Mercury News highlighted the study and the availability of the study information. Comments received by March 24, 2006 were considered in preparing the current draft.

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LEGEND

Study Segment Findings

- Recommended Route
- Studied, designed, estimated - recommended second priority for improvements
- Studied & eliminated

- Existing Parks / Open Space
- Parcel Boundaries
- UC Santa Cruz
- San Lorenzo River

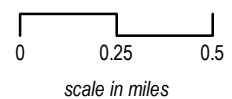
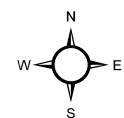


FIGURE 1.3: Recommended Route Overview South
SAN LORENZO VALLEY TRAIL FEASIBILITY STUDY

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1.5 Overview of Findings and Recommendations

Overall, constructing bicycle or pedestrian trail improvements in this study area will be extremely expensive due to steep, often unstable slopes, dense trees, and adjacent development that has occupied most areas of buildable land. Constructing trail facilities in some portions of the study area, especially along Highway 9, could result in major changes to the appearance of the highway corridor, though not necessarily significant environmental impacts.

Tables 2.1 and 2.2 provide a summary of the cost, conditions, and features of the alternative trail routes. Conclusions of the study are presented below. The study routes and segments are shown in Figures 1.3 and 1.4:

1. A continuous bicycle and pedestrian trail along Highway 9 from Santa Cruz to the south boundary of Felton would be economically infeasible due to extreme constraints of steep unstable slopes, including many that are already supported by massive retaining walls, dense redwoods that are protected in a State Park, and adjacent residential development at Paradise Park.¹
2. A trail along the Big Trees and Roaring Camp Railroad line would also be economically infeasible because the line passes through the same highly constrained terrain as the Highway.
3. Graham Hill Road is a more practical route to improve for bikes and pedestrians from Santa Cruz to Felton, as the central portion already has some paths, wide shoulders, and formal bike and pedestrian facilities. However, the north and south ends of Graham Hill Road have steep curving segments that are more difficult to improve, have some environmental or land use constraints, and are less suitable for bike and pedestrian use than the central portion.
4. A route combining Plymouth Street, El Rancho Drive, La Madrona Drive and Sims Road provides a bypass of lower Graham Hill Road that has lower traffic volumes, less steep grades, and more neighborhood connections, but it would be far more expensive to improve than the portion of Graham Hill Road that it would bypass.
5. A route following Conference Drive, Mt. Hermon Road and Lockwood Lane would provide a bypass of the northern "S curve" portion of Graham Hill Road, however this route would be circuitous, passes through a massive unstable landslide area, and is constrained by dense residential development that limits the ability to widen Lockwood Lane. Designs and estimates were not prepared for this alternative.
6. Segments of Highway 9 from south Felton to Boulder Creek have varying levels of feasibility: some already have space for bikes and pedestrians and require minimal improvement, and some are nearly as constrained as the worst segments of Highway 9 between Felton and Santa Cruz. The segments that have the greatest benefit-to-cost ratios for improvement are:
 - Segment 6 Alternative – the Gushee Street Bypass of Highway 9 from Laurel Drive to Felton Empire Road.
 - Segment 7 Alternative – the Cooper Street Bypass of Highway 9 from Felton Empire Road to Highway 9.
 - Segment 8 – North Felton at SLV Schools
 - Segment 10 – Highway 9 in Central Ben Lomond.
 - Segment 10 – Highway 9 in North Ben Lomond.

¹ The idea was suggested in the public workshop of negotiating an agreement to transfer ownership of the current portion of Highway 9 between Santa Cruz and Felton from Caltrans to the County, and to designate Graham Hill Road as the new Highway 9. Old Highway 9 would be closed to vehicles at the north and south boundaries of the State Park. While an interesting concept, this is beyond the scope of the current study to evaluate.

- Segment 15 – Highway 9 in Central Boulder Creek.
- Other Highway 9 bypass routes were studied but found to be infeasible due to steep rugged slopes, dense trees, dense adjacent development, and stream or river crossings.
7. Existing unpaved and paved recreational trail routes west and east of Highway 9 and Graham Hill Road are infeasible for use as major bike and pedestrian connections due to steep grades, sensitive habitat, and lack of established public access rights.

Although many segments of Highway 9 and the railroad are highly constrained and are not recommended for trail improvement, this report evaluates the requirements and cost for improvement of these entire routes on a segment-by-segment basis so that the public, stakeholders, and decision-makers can be informed about the challenges and opportunities along each part. Though not the objective of the current study, it may be desirable and feasible to improve portions of the overall route on the highway or the railroad to serve more localized transportation needs.

1.6 Summary of Public Comments

Most of the written and verbal comments were from bicyclists. While the study also sought to accommodate pedestrians, the primary objective was to accommodate bicycles.

Many comments emphasized that Graham Hill Road is a very fast, heavily traveled route by motor vehicles. There are steep winding sections at the north and south ends. Bicyclists do not feel safe using this route, and would not feel safe even with improvements.

Many comments supported the concept of closing Highway 9 between Santa Cruz and Felton to all but local traffic, and using it as a bike route. Graham Hill Road would presumably be designated as the highway, and the County would take over responsibility for the abandoned portion of Route 9. It was explained that study of this concept is outside the scope of the current trail study.

Generally bicyclists would prefer a route that is on a slower speed, lower volume road rather than a route along Graham Hill Road, even if it is more expensive.

Other specific comments and responses are summarized below:

1. Was bike count conducted to form a base for trail use estimates? No. The assumption was made that if trail is built, the users will come.
2. What funding resources are available to continue? Potential funding sources include the Bicycle Transportation Account, Safe Routes to Schools Program, and other state and federal programs.
3. Was a barrier considered between the bike lanes and vehicle lanes on Graham Hill Road along steep grades? Yes, but this would require shoulder + barrier + trail, which would require acquiring additional ROW, which was specifically excluded from the study scope.
4. The Boulder Creek to Felton segments have local benefits. Further efforts should focus on this portion, rather than Felton to Santa Cruz.
5. Was area to west of Highway 9 connecting to UCSC studied? Yes - through the State Park and City's Pogonip property to UCSC. These routes are extremely steep. Approaches from the east would cross private land, which is not part of the study scope.
6. Is connection via underpass at Highway 1 at the San Lorenzo River included in the study, to link up with City Bike Plan? Yes – this is a City of Santa Cruz project mentioned in the Highway 9 route

evaluation. However the study defers to City regarding their current Bike Plan and related improvements.

1.7 Report Organization

This report is organized to summarize the study scope and results first, and to cover the study details and background information in subsequent sections and appendices.

Section 2.0 summarizes the route evaluations, including existing conditions and specific trail improvement concepts and costs. It includes Table 2.1, a matrix comparing all the major alternative trail routes, and Table 2.2, with segment-by-segment descriptions of conditions, improvement concepts and costs.

Section 3.0 contains general standards and specific criteria and assumptions used for the trail concepts. This includes a series of concept sketches illustrating trail improvements in typical settings.

Appendix A presents detailed written evaluations of each alternative route on a segment-by-segment basis, except for the Railroad route, which is contained in the stand-alone **Appendix E**.

Detailed existing conditions and improvement concepts maps and tables are contained in **Appendix B**. Cost estimates for the alternative trail routes are contained in **Appendix C**.

Appendix D contains planning and environmental information used to develop or evaluate the trail improvement concepts. Detailed environmental analysis is beyond the scope of the current study. This background information indicates the issues that may be faced in planning and constructing trail improvements.

Appendix E is a stand-alone report on the Railroad route, including evaluation, improvement concepts, cost estimates, and findings.

2.0 Route Evaluation and Improvement Concepts Summary

This section summarizes the evaluation methods, and results, design concepts and cost estimates. Detailed route evaluations are contained in Appendix A. Detailed improvement concepts and cost estimates are contained in Appendix B and Appendix C, respectively.

2.1 Route Alternatives Evaluation Summary

This trail feasibility study encompasses an extensive series of routes, shown in Figures 1.2 and 1.3. A brief segment-by-segment summary of the findings is provided below.

Highway 9 South (Santa Cruz to Felton) (see Figure 1.2 and Appendix A)

- Segments 1 and 2 are in the City of Santa Cruz – they are provided for reference purposes only, and would primarily serve the nearby Paradise Park residential area.
- Segment 3 would serve eastern Paradise Park and connect to southern Henry Cowell Redwoods State Park. It has a very high cost due to steep slopes and existing retaining walls.
- Segments 4 and 5 would make the connection from Central Felton to the south boundary of the Park. These segments include portions that are highly constrained, but also some portions that are relatively easy to improve with a trail. Overall, the cost to complete the connection would be very high.
- Segment 6, in central Felton is essentially a commercial district improvement project, with the associated high costs and changes to private improvements. Segment 6 Alt., the Gushee Street bypass, would be a much lower cost bike and pedestrian route, but it is indirect and doesn't serve the Highway 9 businesses and destination most people will want to access.

Highway 9 North (Felton to Boulder Creek) (see Figure 1.3 and Appendix A)

- Generally these segments are comparable in cost to the Highway 9 south segments. While most of these segments have fewer physical constraints than Highway 9 south, they have more conflicts with land use and improvements that will raise the cost.
- This route serves local bicycle and pedestrian destinations as well as regional through traffic. It provides a greater safety benefit than Highway 9 south trail improvements because the traffic levels are 2 to 3 times higher than Highway 9 south.
- Segment 7, north of Graham Hill Road is very expensive due to adjacent slopes on the east, and structures and major retaining walls on the west.
- Segment 7 Alt., the Cooper Street Bypass would be much less expensive, but has a serious constraint/land use conflict for constructing a connection to Highway 9 at a reasonable grade.
- Segment 8 has particular significance because it includes the frontages of the SLV schools, and proposes trail improvements on school property. The appropriate improvements should be carefully resolved working with the School District.
- Segments 8 through 15 have varying price tags due to constraints, and due to the fact that some bike and pedestrian facilities already exist in the towns.

Santa Cruz Big Trees Railroad (Santa Cruz to Felton) (see Figure 1.2 and Appendix E)

- The 21 individual ¼ mile segments identified for the railroad study were too numerous to detail in the matrix, therefore there are no numerical scores.
- This route is even more expensive than the Highway 9 South route because there is no option to use existing Highway shoulders or create sidewalks – the entire route would be a Class I multi-use path. The need for a new bridge over the San Lorenzo River also adds significant cost.

- The constraints, advantages, and disadvantages of this route are otherwise similar to Highway 9 South.

Graham Hill Road (see Figure 1.2 and Appendix A)

- Completing this connection would be far less expensive overall and per mile than the Highway 9 South route or the Railroad route.
- Part of the reason this route is less expensive is that portions of it are already improved for bikes and pedestrians.
- This route has far more traffic at much higher speeds, and serves more local neighborhoods and bike and pedestrian destinations, than Highway 9 South or the Railroad route.
- Significant parts of the route have physical constraints and land use conflicts similar to Highway 9 South or North, specifically segments 2g, 3g, and 6g.
- Segment 5g, north of Henry Cowell State Park, probably has the most serious environmental constraints of any portion of any of the routes in that it passes through federally-protected special status species habitat.
- The improvement concepts and estimates assume the completion of 2 major County road improvement projects – a new traffic signal at Lockwood Lane and a traffic signal modification at Mt. Hermon Road. If budget constraints prevent the completion of those projects, the trail project costs would be increased.

Plymouth – Sims Route (Santa Cruz to central Graham Hill Road) (see Figure 1.2 and Appendix A)

- The Plymouth Street/El Rancho/La Madrona/Sims route from Ocean Street to Graham Hill Road is an alternative to the lower portion (segments 1g through 3g) of the Graham Hill Road Route. It would bypass some steep, constrained segments of Graham Hill Road, allowing bicyclists and pedestrians to connect from the central City of Santa Cruz bike route and sidewalk system to central Graham Hill Road and adjacent neighborhoods.
- Segment 1, from Ocean Street to the Santa Cruz City Limits on North Plymouth Street, features existing bike lanes on the portion south of Highway 1, and discontinuous segments of sidewalk. Completing the bike lanes would require mainly parking restrictions in a residential neighborhood, but little construction. Completing the sidewalks would require some retaining walls and modification of private improvements.
- Segment 2, from the Santa Cruz City Limits to the Highway 17 Pasatiempo Drive on-ramp at El Rancho Drive would be relatively straightforward to widen and continue a sidewalk or path on the east. There are approximately 3' wide existing shoulder and one section with sidewalk and pavement for bike lanes exists. Retaining walls may be required in some locations to provide wider bike lanes and a sidewalk or pedestrian path on the east side.
- Segment 3, on El Rancho Drive from the Highway 17 on-ramp at Pasatiempo Drive to La Madrona Drive has embankments or ditches on one or both sides, constraining the available shoulder from 0 to 1'. Widening to continue bike lanes, and ideally to provide a sidewalk or path on the east side, would require construction of a series of significant retaining walls.
- Segment 4, La Madrona Drive to Sims Road follows La Madrona Drive along an undercrossing of Highway 17, and then parallels Highway 17 on the west side. There is no existing paved shoulder, pathway or sidewalk. There is room to widen the roadway on the east shoulder in some locations, but others have steep slopes. Widening would require construction of retaining walls along approximately half the portion of the route that drops off steeply to the Highway 17 right-of-way.
- Segment 5 follows Sims Road to Graham Hill Road. Sims Road has adequate room to construct bike lanes if curbside parking is restricted. The grades are relatively level and the main obstacles are some private fences, driveway columns, and trees located in the right-of-way. Santa Cruz County Public

Works Department has prepared a conceptual plan and estimate to improve Sims Road from Graham Hill Road to Brook Knoll Drive with bike lanes and sidewalks. This included concrete sidewalk, curb, and gutter on the north side, and A.C. (asphalt) dike on the south side, bike lanes on both sides, and drainage improvements in several locations. Parking would be prohibited on both sides of the road.

Conference Drive/Mt. Hermon Road/Lockwood Lane Route (north Graham Hill Road to central Graham Hill Road) (see Appendix A)

Improvement concepts and estimates were not developed for this route due to its indirect connection, potential land use conflicts with the Mt. Hermon Conference Center, major constraints of constructing a trail through a huge landslide that severed Conference Drive, and private residential improvements and narrow right-of-way that constrain bike lane or trail development along southern Lockwood Lane. This alternative is not recommended for further study as part of the San Lorenzo Valley Trail Study, though it may warrant study for other regional bike and pedestrian circulation purposes – e.g. a Felton to Scotts Valley connection, and a Scotts Valley to Santa Cruz connection.

2.2 Route Alternatives Evaluation Matrix

The matrix in Table 2.1 provides an overview and comparison of the various trail alternatives and segments on a very simplified basis. This matrix does not include some alternatives that were eliminated from further study, such as the Alta Via route, the Pipeline Road route and the Conference Drive-Lockwood Lane route. These conclusions are discussed in Appendix A. The matrix includes the Highway 9 South route and the Railroad route for comparison purposes, though these routes were identified as economically infeasible during review of Working Paper No. 1.

In the matrix, a segment that has more darkened circles is generally more feasible/desirable than a segment with lighter circles, and the overall scores reflect the results – a higher score being more feasible/desirable. Again, this matrix is generalized and subjective, and should be used as a guide to help focus consideration of the study, and not as a direct basis for feasibility decisions.

Overall, the cost for these trail improvements is very high. This is due to the major physical constraints along most of the route, the high improvement standards for a public trail, especially in the Caltrans right-of-way; and the very preliminary nature of the plans and estimates, which increases uncertainty and thus requires a more conservative estimate.

Table 2.1: Route Alternatives Evaluation Matrix

Scoring: ● = high (supports trail) ○ = medium ○ = low (does not support trail)

Cost ● = (0 - \$2,999,999/mi.) ○ = (\$3,000,000 - 4,999,999/mi.) ○ = (\$5,000,000+/mi.)

	Length	Estimated Cost	Cost/Mi.	Safety Need/Benefit	Prospective Use Level	Land Use/Existing Improvements Compatibility	Environmental Compatibility	Total Score
HIGHWAY 9 SOUTH								
Segment 1 - in City of Santa Cruz, for ref. Only	2991	\$822,484	\$1,451,928	High, but some facilities exist	Heavy use			45
Segment 2 - in City of Santa Cruz, for ref. only	2429	\$1,230,898	\$2,675,645			Pogonip property	Some tree removal, 2 creek crossings	20
Segment 3 - Paradise Park	3301	\$3,849,754	\$6,157,740		Connects Paradise Park to Santa Cruz	Paradise Park, some Pogonip	Tree removal	25
Segment 4 - Henry Cowell State Park	15,054	\$10,720,006	\$3,759,906	No shoulder or path in many portions	Connectors to State Park trails	State Park land	Tree removal, bridges	20
Segment 5 - South Felton	6898	\$4,608,427	\$3,527,471	Wide shoulders exist on part	Connects north to town	Existing private drives, improvements	Tree removal	25
Segment 6 - Downtown Felton	3333	\$2,158,722	\$3,419,758	Wide shoulders exist	Serves busy commercial area	Sidewalks needed on private land		40
Segment 6 Alt. - Gushee Street bypass	2376	\$221,923	\$493,162	Doesn't address access to stores	Many will still use Highway 9			40
Hwy 9 South Summary - Santa Cruz to Felton Segments	34006 total feet	\$23,390,291 total est. cost	6.4 avg. score	7.1 avg. score	6.4 avg. score	5.0 avg. score	5.7 avg. score	30.7 avg. score
HIGHWAY 9 NORTH								
Segment 7 - North of Graham Hill Road	2049	\$2,389,947	\$6,158,575	Contains very busy traffic	A major route to schools, shopping	Conflicts with existing residences	Related to slopes, walls, land use	20
Segment 7 Alt. - Cooper Street bypass	2049	\$136,789	\$352,487	Contains very busy traffic	Bikes would still use Highway 9	Generally none but conflicts with residence		35
Segment 8 - North Felton, SLV schools	7107	\$4,959,673	\$3,684,687	Heavy fast traffic near schools	Major route to schools, shopping	School property, private improvements	Some tree removal, new bridges	35
Segment 9 - South Ben Lomond	1792	\$1,694,105	\$4,991,559	Winding, narrow segment	Connectors to Highlands Park		Steep slopes, above creek, tree removal	35
Segment 10 - Central Ben Lomond	3978	\$1,991,008	\$2,642,665		Connects from central Ben Lomond to Highlands Park	Private improvements	Some tree removal	35
Segment 11 - North Ben Lomond	5595	\$2,546,349	\$2,402,989	Most parts have shoulders	Lower density area	Private improvements	Some tree removal, new bridges	35

Table 2.1: Route Alternatives Evaluation Matrix (cont'd)

Scoring: ● = high (supports trail) ◐ = medium ○ = low (does not support trail)

Cost ● = (0 - \$2,999,999/mi.) ◐ = (\$3,000,000 - 4,999,999/mi.) ○ = (\$5,000,000+/mi.)

	Length	Estimated Cost	Cost/Mi.	Safety Need/Benefit	Prospective Use Level	Land Use/Existing Improvements Compatibility	Environmental Compatibility	Total Score
HIGHWAY 9 NORTH (cont'd)								
Segment 14 - South Boulder Creek	4373	\$3,041,548	\$3,672,393	Narrow, winding	Connection between Brookdale and Boulder Creek	Private driveways	Tree removal	30
Segment 15 - Boulder Creek	4250	\$204,234	\$253,731	Part already improved, most has wide shoulder	Urbanized area	Private driveways, improvements	Some tree removal	40
Hwy 9 North Summary - Felton to Boulder Creek Segments	34552 total feet	\$21,347,558 total est. cost	6.0 avg. score	7.5 avg. score	8.0 avg. score	4.0 avg. score	6.5 avg. score	32 avg. score
RAILROAD ROUTE								
Railroad Route Summary	27720 total feet	\$25,559,107 total est. cost	\$4,868,401 avg. cost/mi. (Severe physical constraints, SLR Bridge)	Bypasses very busy, hwy portions addresses informal/unsafe use of RR as trail	High, at least seasonally, for local connections, moderate for regional connection	Similar to Highway 9 - conflicts with State Park, Paradise Park	Similar to south Highway 9 - trees, scenery	
GRAHAM HILL ROAD								
Segment 1g - City of S. Cruz, for ref. only	1980	already improved	N/A	High, but facilities exist				45
Segment 2g - Part in City of Santa Cruz	3752	\$2,729,783	\$3,841,486	Steep, narrow, fast, winding segment	An important connection, but steepness may deter use	Assuming adequate ROW	Some tree removal, visibility	40
Segment 3g	4224	\$2,122,856	\$2,653,570	Narrow, fast segment	Important connection	Many conflicting private drives, improvements	Tree removal	35
Segment 4g	1992	already improved	N/A	High, but facilities exist				45
Segment 5g	13518	\$7,294,068	\$2,848,992	Heavy, fast traffic but wide shoulders, parallel path exist	Would serve recreational, local, regional users	Potential conflict with State Park	Tree removal, sensitive habitat north of State Park	30
Segment 6g	3460	\$3,127,988	\$4,773,346	Steep, narrow, winding, fast traffic	Connects to neighborhoods, parks, central Felton		Tree removal, steep slopes	40
Segment 7g	3199	\$379,161	\$625,811	Narrow, heavy, fast traffic	Connects neighborhoods to central Felton	Some driveways and improvements		45
Graham Hill Route Summary	32125 total feet	\$15,653,856 total est. cost	8.6 avg. score (Segments 2g, 3g and 6g have similar constraints to Highway 9)	7.1 avg. score	10.0 avg. score	7.9 avg. score	6.4 avg. score	40 avg. score

Table 2.1: Route Alternatives Evaluation Matrix (cont'd)

Scoring: ● = high (supports trail) ◐ = medium ○ = low (does not support trail)

Cost ● = (0 - \$2,999,999/mi.) ◐ = (\$3,000,000 - 4,999,999/mi.) ○ = (\$5,000,000+ /mi.)

	Length	Estimated Cost	Cost/Mi.	Safety Need/Benefit	Prospective Use Level	Land Use/Existing Improvements Compatibility	Environmental Compatibility	Total Score
PLYMOUTH-SIMS ROUTE								
Segment 1 - Ocean St. to Santa Cruz city limits	4340	\$703,830	\$856,272	Some facilities exist	Relatively high			45
Segment 2 - Santa Cruz city limits to Hwy 1 @ El Rancho Dr.	3506	\$2,205,444	\$3,321,376		High - County Health Complex generates use			50
Segment 3 - El Rancho Dr. to La Madrona Dr.	2920	\$2,713,652	\$4,906,878			Embankments, trees, driveways		40
Segment 4 - La Madrona Dr., El Rancho to Sims	3675	\$2,581,976	\$3,709,614					45
Segment 5 - Sims Road	2774	\$1,003,182	\$1,909,445	Already under study by County	Serves elementary school	Adjacent residential improvements		45
Plymouth-Sims Route Summary	17215	\$9,208,084	7.1	\$1,978,188	9.0	8.0	10.0	45
	total feet	total est. cost	avg. score	avg. score	avg. score	avg. score	avg. score	avg. score

2.3 Existing Conditions and Improvement Concepts

Detailed evaluations of conditions are contained in Appendix A. Detailed existing conditions and improvement concept maps and tables are contained in Appendix B. They cover the alternative routes, segment-by-segment, typically moving south to north, consistent with the direction of the post miles on the highway and railroad. Where deemed worthy of consideration, concepts for some short bypass routes are included in the maps and tables along with the description of the parallel highway segment.

Note that improvements within the City of Santa Cruz are technically not a part of the study, but are identified for consideration as part of the total requirement to create a complete regional connection.

The cost estimates for the highway and roadway portions of the study are presented in detail in Appendix C. The scope and budget for this study dictates a very “broad brush” approach to design and estimation, based on many generalizations and assumptions. The maps, tables and estimates are organized to provide as much specific and accurate information as possible, to provide the basis for informed decisions on the relative merits of various segments and alternative routes, and to provide a clear starting point for more detailed plans and estimates.

Table 2.2 summarizes the existing conditions and route improvement concepts and costs for each major alternative route. This table is designed as a series of center-spreads. The portion of the table on the left shows the existing conditions. The portion on the right shows the proposed improvements. The “west side” is typically the southbound side of the route, which could actually be on the north or south depending on twists in the route. The “east side” is similarly the northbound side.

The A-F existing conditions types, the 1-4 improvement types, and the concept design examples are detailed in Section 3.0.

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Table 2.2: Route Conditions and Improvement Concepts

HIGHWAY 9 EXISTING CONDITIONS					
Current Condition: A, B, C, D, E, F (Best to worst, see Section 3.3, for descriptions of typical conditions.)					
Seg.	Location, Existing Conditions	Current Bike and Ped Access	Condition in I.f. West Side	Condition in I.f. East Side	Notes
1	Highway 1 to Pogonip boundary, Santa Cruz commercial area, flat, relatively straight	Sidewalks and bike lanes on W, some on E	A 595 B 2396	A 311 B 1669 C 826 D 186	Within City of Santa Cruz
2	Pogonip Open Space, Santa Cruz gently winding road through open space, gentle terrain at S end; gets steep at N	2 – 4' shoulders, disappear after PM .8	C 1015 D 1414	B 1339 C 490 D 599	Within City of Santa Cruz/Pogonip Open Space
3	Southern Paradise park Area. Highly constrained by slopes and trees, sharp curves – about 2/3 is condition E, 1/3 F (retaining walls)	None, except 2-4' shoulder around PM 1.4	D 368 E 1795 F 1138	D 382 E 1745 F 1174	South end within City of Santa Cruz /Pogonip Open Space
4	Northern Paradise Park area through Cowell Redwoods S.P. Highly constrained by slopes and trees – almost 1/3 is condition D and E, 1/3 F (retaining walls)	Generally little or no shoulder, but some wider, flatter portions	C 1915 D 545 E 11589 F 1005	C 1193 D 2462 E 2321 F 4628	Primarily w/in Henry Cowell State Park, portion is w/in Pogonip Open Space
5	South Felton to State Park Entrance. Rural/ suburban with more gentle slopes than Segment 4. Some large trees	None. Shoulder width varies	B 1892 C 1294 E 3712	B 2978 C 1235 D 356 E 2329	Low density residential use doesn't warrant major alteration to adjacent private improvements
6	Central Felton – State Park Entrance to Graham Hill Road. Generally flat and straight. South half is suburban residential, some commercial; church. Northern half is Felton commercial district	Wide shoulders generally in place. Short segment of sidewalk on E. at Fire Station	A 280 B 2590 C 463	B 2189 C 1144	See Section 3.4 for considerations regarding improving access on commercial frontages
6 Alt.	Gushee Street Bypass Laurel Drive to Felton Empire Rd. Mixed residential and rear of commercial uses, fire station. Low traffic.	Some sidewalk/ path; mostly paved parking driveway areas			Potential bypass for northern part of segment 6 – an interim solution
7	Cooper Street Bypass Felton Empire Road to Highway 9	None, but low traffic volume, speed	A 124 B 462 C 237	C 1087 E 963	Steep slopes, 1 driveway constrain improvement at N end
8	North Felton – Cooper Street to Glen Arbor Road Generally has fewer slopes, walls, sharp curves and other constraints, very heavy traffic; Hacienda Way Bypass route features moderate slope in undeveloped area of school grounds	Shoulders vary 3-6', major ret. walls at Glen Arbor have 4' walk, 1' shoulder on W, 3' shoulder on E, Informal path and wooden footbridge at small drainage on school grounds at Hacienda Way bypasses F section on Highway 9	B 1481 C 3801 D 640 E 618 F 567	A 953 B 2189 C 1786 D 1164 E 685 F 330	Includes frontage of SLV elementary, middle and high schools

HIGHWAY 9 IMPROVEMENT CONCEPTS						
Proposed Improvement: 1 Bike lanes/wide shoulders 2 Sidewalk or path 3 Class I multi-use path/bike trail 4 Sign as a bike/pedestrian route						
Seg.	Improvement Concepts	Improvement Types, I.f. West Side	Improvement Types, I.f. East Side	Improve Bridges & Major Drainage Structures	Concept Design Examples See Section 3.5	Estimated Segment Cost
1	Complete shoulder/bike lane widening/stripping to 4' on both sides (add'l 20% of length), complete sidewalk on both sides, extend 1 large culvert.	1662 2662 30 40	12668 2668 30 40	Culvert at PM 0.2	1, 3	\$822,484
2	Provide Class I path/bike trail on east, extend 2 large culverts/bridges	12428 20 30 40	12428 20 31492 40	Creek/large culvert at PM .75, Creek/large culvert at PM 1.06	2, 6, 7	\$1,230,898
3	Class I path/bike trail along east side	10 20 30 40	10 20 33301 40	None	8, 11, 14, 15	\$3,849,754
4	Class I path/bike trail along east side, bike/ped bridge at PM 1.97, extend large culvert/bridge at PM 3.45	10 20 30 40	10 20 315,055 40	Concrete girder bridge (Rincon Creek) PM 1.97 161'Lx24'W; Sidehill Viaduct (SV) PM 2.11 162'Lx29'W; culvert crossing PM 3.45; SV PM 3.67 62'Lx21'W; SV PM 3.87 163'Lx20'W; SV PM 4.27 82'Lx18'W	11, 14, 15	\$10,720,006
5	Limited shoulder widening to 4' on both sides; Class I path/bike trail on east with bike/ped bridge at PM 4.75 to crosswalk at Old Big Trees Road, then sidewalk/path on east to end; extend large box culverts/bridges, PM 5.55, 5.8	14874 20 31157 40	14869 20 30 40	Creeks/large culverts at PM 4.75, PM 5.55, narrow box culvert at PM 5.8; Provide trail bridge at creek to west of 4.75	1, 2, 4, 7, 8, 11, 12	\$4,608,427
6	Complete sidewalk along both sides, stripe and sign bike lanes on existing shoulders, improve/provide landscaping on commercial frontages	10 23140 30 40	10 23333 30 40	None	Figure 3-1, 1, 3, 4	\$2,158,722
6 Alt.	Sidewalk/pathway improvements both sides, stripe and sign bike/ped route	10 20 30 42601	10 20 30 40	None	-	\$221,923
7	Limited shoulder widening to 5' on both sides, provide sidewalk/ped path along west side; redo landscaping on some frontages, west side	12050 21858 30 40	12050 20 30 40	None	3, 12, 13	\$2,389,947
7 Alt.	Minor pavement improvements both sides, sidewalk/ramps at Hwy 9 connection, stripe and sign bike/ped route	10 20 30 41945	10 20 30 40	None	-	\$136,789
8	Complete shoulder widening to 5' on both sides, sidewalk/ped path along west side to north end of school property; improved ped bridge at north side of school property; signed ped route on Hacienda and El Solyo Heights Dr.; Class I bike path/trail from El Solyo Heights Dr. to Willowbrook; new bike/ped bridges on west side of existing "Twin Bridges"; sidewalk/ped path on west from Willowbrook to Glen Arbor Rd.	17106 26314 30 40	17106 20 30 40	Fall Creek Bridge PM 7.01 92'Lx23'W, has 6' sidewalks. Pre-fab trail bridge over intermittent creek on school property. Twin Bridges at PM 7.76 (307'Lx21'W), PM 7.87 (151'Lx24'W) require parallel trail bridges	5, 6, 7	\$4,959,673

Table 2.2: Route Conditions and Improvement Concepts (cont'd)

HIGHWAY 9 EXISTING CONDITIONS					
Current Condition: A, B, C, D, E, F (Best to worst, see Section 3.3, for descriptions of typical conditions.)					
Seg.	Location, Existing Conditions	Current Bike and Ped Access	Condition in I.f. West Side	Condition in I.f. East Side	Notes
9	South Ben Lomond Glen Arbor Road to Highlands Park – very steep wooded slopes, many curves, close to SL River on E side. No adjacent structures due to steep slopes. Existing major ret. wall on E around PM 8.3	Shoulders vary 0' to 3-4'	E 1682 F 110	D 483 E 849 F 461	A desirable connection to due to relationship to Highlands Park
10	South Ben Lomond Highlands Park to Hillside Ave. Moderate slopes on E, steeper slope on W. Some flat areas w/turnouts. Many curves in central portion.	2-3' shoulders	B 1604 C 2015 D 359	B 1162 C 2817	Improved connection to Highlands Park mentioned as a priority in community meetings
11	Central Ben Lomond Hillside Ave. to opposite California Ave. relatively flat to gently sloping terrain. Straight road or sweeping curves. Generally ample room to improve.	Initially 5-6' shoulders, then 2' until after bridge at PM 9.8, 0' shoulder at end. Sidewalks in commercial district from Glen Arbor to Mill St., incl. improvement project currently underway	A 408 B 1873 C 1595 D 1720	A 1477 B 3860 C 259	New downtown improvements include curbside parking, no bike lanes. Mill St. is intended bypass. N of central Ben Lomond, low residential densities, rural character don't warrant formal pathway improvements.
12	South Brookdale Steep wooded terrain with sharp curves, very close proximity to SL River. Recent slope failures S of existing house close to road on E. Few adjacent structures or roads due to steep slopes	Initially 2-3' shoulder, then no shoulder except wide spot around PM 10.7	B 206 C 402 D 2890	B 218 C 280 E 2050 F 948	A very narrow segment for bikes and pedestrians. May warrant construction of path.
13	Central Brookdale To Pacific St. relatively straight road and moderate slopes, but many cross-streets, driveways, close structures & embankments	2-3' shoulder	B 1102 C 809	B 1119 C 792	A higher density residential area and busy tourist/commercial zone warrant improvements
14	North Brookdale Pacific St. to S Boulder Creek. Similar to Segment 12 – steep wooded slopes, sharp curves, close proximity to SL River	Little or no shoulder. Turnouts around PM 11.4, 11.5	C 1544 D 1718 E 1111	C 1525 D 1440 E 852 F 557	A very narrow segment for bikes and peds. Alta Via bypass deemed infeasible due to narrow width, sharp curves, drives and structures
15	Boulder Creek Relatively flat terrain, straight road through residential village area, commercial district	Approx. 3' shoulders in S residential area. Wider shoulders, sidewalks in CBD.	A 1833 B 1454 C 1201 D 262	A 1146 B 2155 C 1003 D 445	Generally easy to improve to conform with downtown area improvements.

HIGHWAY 9 IMPROVEMENT CONCEPTS						
Proposed Improvement: ❶ Bike lanes/wide shoulders ❷ Sidewalk or path ❸ Class I multi-use path/bike trail ❹ Sign as a bike/pedestrian route						
Seg.	Improvement Concepts	Improvement Types, I.f. West Side	Improvement Types, I.f. East Side	Improve Bridges & Major Drainage Structures	Concept Design Examples See Section 3.5	Estimated Segment Cost
9	Limited shoulder widening to 4' on both sides, sidewalk/path on east side outside guardrail	❶1792 ❷0 ❸0 ❹0	❶1792 ❷1792 ❸0 ❹0	None	8, 11	\$1,694,105
10	Shoulder widening to 5' on both sides, Class I bike path/trail on east side in Highlands Park, sidewalk/path on east side to Grace Street (end)	❶3978 ❷0 ❸0 ❹0	❶3978 ❷0 ❸1020 ❹0	Concrete box girder bridge PM 9.33 has 3-4' shoulders, 4-5' sidewalks – 168'Lx45'W	1, 2, 6, 7	\$1,991,008
11	Complete sidewalk/path along both sides from Hillside Ave. to S. Mill St.; stripe and sign bike lanes to S. Mill St./Glen Arbor Road; from N. Mill St. widen shoulders to 5"; provide sidewalk/path on east side to Middle Rd.; provide ped bridge on west at Hubbard Gulch; provide crosswalk at Middle Rd., then Class I bike path/trail	❶5596 ❷370 ❸1002 ❹0	❶5596 ❷394 ❸0 ❹0	Marshal Creek Bridge PM 9.71 has 5-6' shoulders, 4' sidewalks, (161'Lx23'W); Hubbard Gulch Bridge PM 9.85 concrete girder (26'Lx28'W)	1, 6, 7	\$2,546,349
12	Provide Class I bike path/trail on west side, extend large culvert/bridge at PM 10.87	❶0 ❷0 ❸3497 ❹0	❶0 ❷0 ❸0 ❹0	Extend large culvert at Alba Creek, PM 10.87	7, 8	\$2,534,969
13	Limited shoulder widening to 4' on both sides, Class I bike trail/path on W. to crosswalk at Larkspur, from crosswalk at Alameda; sidewalk/path elsewhere on both sides; extend large culvert/bridge at PM 11.4; redo landscaping along some frontages	❶1911 ❷1911 ❸0 ❹0	❶1911 ❷1911 ❸0 ❹0	Clear Creek Bridge (culvert w/K-rails) at PM 11.4	1, 3, 6, 7, 12, 13	\$1,848,936
14	Provide Class I bike path/trail on west side	❶0 ❷0 ❸4373 ❹0	❶0 ❷0 ❸0 ❹0	None	7, 8, 11	\$3,041,548
15	Complete shoulder widening to 5' along south end of segment; shoulder striping and signing for bike lane and parking on both sides, provide Class I bike trail path to new crosswalk at Grove St.; complete sidewalk/path on both sides in south end; extend large culvert/bridge at PM 12.22	❶0 ❷1465 ❸1467 ❹0	❶637 ❷2128 ❸0 ❹0	Creek/culvert at PM 12.22 Malosky Creek; Boulder Creek Bridge PM 13.11 has 2-3' shoulder and 3-4' sidewalk (marginal); 95'Lx30'W	1, 2, 4, 6, 7, 8	\$2,004,234

Table 2.2: Route Conditions and Improvement Concepts (cont'd)

GRAHAM HILL ROAD EXISTING CONDITIONS					
Current Condition: A, B, C, D, E, F (Best to worst, see Section 3.3, for descriptions of typical conditions.)					
Seg.	Location, Existing Conditions	Current Bike and Ped Access	Condition in I.f. West Side	Condition in I.f. East Side	Notes
1g	Ocean St. at Plymouth St. to Ocean St. Extension/Cemetery urban setting	Bike lanes & sidewalks	A 1980	A 1980	Within City of Santa Cruz
2g	Ocean St. Extension/ Cemetery to Michael Ln. steep terrain, steep grade, embankments, retaining walls on east	Shoulders 0-3'	D 3752	D 3752	Leaves Santa Cruz city limits above Tanner Heights Dr.
3g	Michael Ln. to Woods Cove Subdivision relatively level terrain, but many res. driveways, util. poles, oaks, planters, low walls & ditches constrain improvements	From Mosswood Dr. to Woods Cove entrance, road narrows, embankments on both sides	C 4224	C 4224	
4g	Woods Cove Subdivision to Equestrian Park Relatively flat terrain made improvements easy	3-4' shoulders; signal & crosswalk at Sims; Class I path on W & bike lanes	A 1992	A 1992	A prototype for other areas
5g	Equestrian Park to Bear Mountain Picnic Area Access Road Initially wide & straight, constrained by few trees and util. poles, then increasing embankments and trees. Beyond State Park enters sensitive habitat area	Shoulders widest near south boundary of State Park.	B 3456 C 9691 D 372	B 4316 C 9159	Construction of path would require significant tree removal and grading. Signal planned at Lockwood Lane in other project
6g	Bear Mountain Picnic Area Access Rd. to Roaring Camp Rd. "Tunnel" segment w/downhill "S" curve, steep terrain, many redwoods & util. Poles. Existing trails on Big Trees Roaring Camp property extensively used by public, incl. base rock surface road to picnic area, unpaved old roads and informal trails parallel G.H. Rd.	2 - 3' shoulders, turnout on S side near middle of segment. Old Graham Hill Road still a county-owned r.o.w.?	C 1191 D 2269	D 3460	Separate trail is an option.
7g	Highway 9 to Roaring Camp Rd. relatively flat terrain, 2 bridges are major constraints	Wide 5' shoulders/bike lanes and sidewalks exist from Zayante Rd. to Hwy 9	A 2452 C 747	A 2442 C 757	Mt. Hermon signal to be improved

Table 2.2: Route Conditions and Improvement Concepts (cont'd)

GRAHAM HILL ROAD IMPROVEMENT CONCEPTS						
Proposed Improvement: 1 Bike lanes/wide shoulders 2 Sidewalk or path 3 Class I multi-use path/bike trail 4 Sign as a bike/pedestrian route						
Seg.	Improvement Concepts	Improvement Types, I.f. West Side	Improvement Types, I.f. East Side	Improve Bridges & Major Drainage Structures	Concept Design Examples See Section 3.5	Estimated Segment Cost
1g	None required - sidewalks and bike lanes exist	10 20 30 40	10 20 30 40	none	Not Applicable	\$0
2g	Class I path/bike trail on west - some tree removal required (acacia and eucalyptus). Provide crosswalk at each end.	10 20 33751 40	10 20 30 40	none	8	\$2,729,783
3g	Limited shoulder widening up to 4 feet each side (minimize tree removal & modification of private improvements), provide sidewalk/path on west side.	14223 20 30 40	14223 20 30 40	none	6, 7	\$2,122,956
4g	None required: Class I path/bike trail exists along east side, bike lanes/wide shoulders in place	10 20 30 40	10 20 30 40	none	Not Applicable	\$0
5g	Widen shoulder to 5' on both sides; use existing parallel road on west, then provide ped path/sidewalk in r.o.w. Widening, signal and crosswalk to be provided at Lockwood Ln. by separate Co. project. Alternative to above: Improve multi-use path in State Park (S.P.) on alignment of existing unpaved trail and connecting to paved road – requires S.P. approval.	112017 20 312017 40	113514 20 30 40	none	1, 2, 6, 7, 8, 9	\$7,294,068
6g	Widen shoulders to 5' to provide bike lanes; provide Class I multi-use path/bike trail by additional widening on south side, providing K rail barrier at edge of roadway.	13458 20 33458 40	13458 20 30 40	none	9	\$3,127,988
7g	Widen shoulders to 5' on both sides; provide Class I path/bike trail on south side to Bean Creek; provide pre-fab bike/ped bridge at Bean Creek (alt. to reconstruct Zayante intersection and bridge); sidewalk and bike lanes exist from Bean Creek Bridge to Hwy 9.	1722 2722 30 40	1734 2734 30 40	new parallel bike/ped bridge or Bean Creek Bridge to be replaced	6, 7	\$891,281

Table 2.2: Route Conditions and Improvement Concepts (cont'd)

PLYMOUTH-SIMS EXISTING CONDITIONS					
Current Condition: A, B, C, D, E, F (Best to worst, see Section 3.3, for descriptions of typical conditions.)					
Seg.	Location, Existing Conditions	Current Bike and Ped Access	Condition in I.f. West Side	Condition in I.f. East Side	Notes
1	1. Plymouth Street - Ocean Street to Santa Cruz City Limits. Relatively light traffic, flat to gentle grades.	Existing bike lanes S. of Hwy 1. Bike lanes not striped near Ocean St. and on-ramps, Only short sections of sidewalk. No crosswalks at Emeline.	A 2027 B 2272	A 844 A/B 860 B 2483 C 153	Not a part of formal study area - comments for reference only. Consistent with City Bike Plan.
2	2. N. Plymouth Street - Santa Cruz City Limits to Highway 17 on-ramp at El Rancho Drive. Relatively light traffic. Flat to gentle grades.	Minimal striped shoulders 3' to 4' except at Co. Health Services. Sidewalk for 1 block adjacent to Co. Health Services.	A 663 B 836 C 902 D 1119	A 591 B 249 C 1649 D 375 D/C 642	Pedestrian traffic on narrow shoulder originating from Heath Services complex.
3	3. El Rancho Drive - Highway 17 on ramp to La Madrona Drive. Gently climbing grade, some flat shoulders but mostly embankments and drop-offs.	Little or no paved shoulder, sidewalk or path for 1 block north of Carbonara on east side.	B 222 422 147 2130	B/D C D B 741 C 383 D 1795	Steep embankment w/ large eucalyptus trees NW of Carbonara
4	4. La Madrona Drive - El Rancho to Sims Road. Steep grade initially then gently climbing. Significant cross-slope. Numerous driveways on W., intermittent flat shoulder or drop-offs on E.	Little or no paved shoulder, no path or sidewalk. Some room to walk on parts of unpaved E shoulder. Crosswalks at south and west sides of La Madrona/Sims intersection.	B 244 C 1581 D 1852	B 1783 D 1892	Room to widen at Hwy 17 undercrossing; would involve Caltrans encroachment permit. Also potentially for improvements adjacent to Hwy 17 row on E.
5	5. Sims Road - La Madrona to Graham Hill Road. Relatively flat gradient and level terrain. A heavily used connector to/from Hwy 17.	Paved shoulder width varies from 5' to 1'; no path or sidewalk. Crosswalks at Brook Knoll and near Pied Piper Lane. Signal w/ bike/ped activation and crosswalks at Graham Hill Road.	B 2774	B 2774	Brookknoll Drive at NE end leads to Brook Knoll Elementary School. SC Co has prelim plan for G.H. Rd. to Brook Knoll improvements

PLYMOUTH SIMS IMPROVEMENT CONCEPTS						
Proposed Improvement: ❶ Bike lanes/wide shoulders ❷ Sidewalk or path ❸ Class I multi-use path/bike trail ❹ Sign as a bike/pedestrian route						
Seg.	Improvement Concepts	Improvement Types, I.f. West Side	Improvement Types, I.f. East Side	Improve Bridges & Major Drainage Structures	Concept Design Examples See Section 3.5	Estimated Segment Cost
1	Complete sidewalks on Fernside, Lee, and Plymouth. Stripe crosswalks at Emeline/ Fernside and Emeline/Lee. Stripe bike lanes on Emeline, Lee, and N. Plymouth. Convert 2-way stop at Fernside/Emeline to 4-way.	❶817 ❷0 ❸0	❶2272 ❷1721 ❸0	none	1, 3, 6	\$703,830
2	Widen shoulders to provide at least 5' wide bike lanes and complete sidewalk or pathway on E. side of N. Plymouth St.	❶2982 ❷0 ❸0	❶2664 ❷2915 ❸0	none, but some culvert extension	1, 6, 7, 9	\$2,205,444
3	Widen shoulders to provide at least 5' wide bike lanes and to complete sidewalk or pathway on E. side of El Rancho Dr.	❶2920 ❷0 ❸0	❶2920 ❷2398 ❸0	none, but some culvert extension	9	\$2,713,652
4	Install crosswalks at El Rancho/La Madrona intersection. Widen/realign road to construct bike lanes and informal path on N. or E. to Sims Rd.	❶3677 ❷0 ❸0	❶3675 ❷3675 ❸0	none, but some culvert extension	10	\$2,581,976
5	Widen to provide bike lanes and sidewalk on N. side of Sims Rd. Provide crosswalk at north side La Madrona/Sims intersection.	❶2774 ❷0 ❸0	❶2774 ❷2774 ❸0	none	1, 3, 6	\$1,003,182