

# Introduction

This report documents the need for and feasibility of constructing a bicycle and pedestrian bridge over the Highway 101 freeway near the Santa Rosa Junior College (SRJC) in Santa Rosa, California. This study was conducted by Steven Grover & Associates (SGA), a consulting architecture and engineering firm in Berkeley, California. Numerous other entities provided contributions and assistance. These include City of Santa Rosa staff, representatives of the SRJC, the Santa Rosa School District, Caltrans, and local stakeholders. SGA was also assisted by several subconsultants including PBS&J, Kleinfelder, and Bicycle Solutions of San Francisco, California.

The Executive Summary below provides an overview of the findings of this study. Sections 2 and 3 of this report together define the problem to be solved; Section 2 provides an analysis of the project context, and Section 3 documents goals for the project identified during the study period and design criteria for achieving them. Section 4 presents solution alternatives studied, and assessment of their relative merits. Section 5 provides a summary of project development steps that will be needed for project implementation, should the City of Santa Rosa elect to move forward with the project.

In addition, the Appendices include a draft Preliminary Environmental Assessment Report (PEAR), as well as a draft Project Study Report - Project Report (PSR-PR). These documents are preliminary; they lack supporting studies which are beyond the current scope of this feasibility study. However, each has been prepared in accordance with the latest Caltrans templates and guidelines and provides a starting point for accurately scoping the Project Initiation Document (PID) phase of the project.

# Executive Summary

This study finds that there is a need for improved bicycle and pedestrian access across Highway 101 within the project study area, that this need will increase significantly within the next decade, and that improvements to existing crossings at Steele Lane and College Avenue will not adequately address this need. Broadly speaking, to be considered successful, the proposed project must a) effectively close a gap in the bicycle and pedestrian transportation network, and b) encourage walking and biking in Santa Rosa and the region.

This study finds that a freeway overpass structure near the center of the project study area can substantially achieve the project goals identified, provided it is designed to

1. Attract interest by presenting an inviting and exciting visual presence,
2. Encourage repeat usage by providing a safe and comfortable user experience by meeting and in some cases exceeding minimum width, design speed, gentle ramp slopes, mode separation, and sightline requirements established by American Association of State Highway and Transportation Officials (AASHTO) and California Department of Transportation (Caltrans),
3. Accommodate future peak usage and bicycle/pedestrian mode split requirements unique to this location,
4. Make safe and strong connections to existing bicycle and pedestrian routes and to transit.

The proposed project also presents opportunities for additional benefits beyond fulfilling a transportation need:

- The project can help invigorate pedestrian/bicycle and transit-oriented development in its immediate vicinity.
- Because of its prominent location on the Highway 101 corridor, the project could provide a symbolic gateway to Santa Rosa and a source of civic pride for residents.

## Importance of User and Viewer Experience

Quality of user experience is perhaps the most important factor in determining whether people will regularly choose to use a grade-separated crossing when they have an equal travel-time alternative of crossing at-grade or driving a car. Public input gathered at community meetings as part of this study supports this: an attractive structure and comfortable geometry were overwhelmingly considered high priorities by public meeting attendees. Specifically, "standard" concrete crossing structure designs were considered less desirable, and gentle ramp slopes and greater width of the traveled way were consistently identified as important goals for the project.<sup>1</sup>

User safety is a key aspect of user experience. Unlike roadways, bicycle/pedestrian pathways must accommodate different travel modes simultaneously; cyclists may be moving 10 or more times faster

---

<sup>1</sup> Two community meetings were held for this project, on February 19, 2009 and June 16, 2009. See Appendix E.

than pedestrians. Gentle curves, good lighting, clear sightlines, and plenty of room at the bottom of ramps before users need to mix with vehicular traffic are all important for a successful project.

Because bicycle and pedestrian crossings are typically enclosed by railings and fencing, they may be considered architecturally more like urban sidewalks than open pathways, and the principles of pedestrian and bicycle friendly urban streetscape design – with respect to things like lighting, traveled way widths, materials, sightlines, and stopping points – which have gained traction in the past two decades, may be applied to bridge and underpass design to good effect.

Unfortunately, these design principles have not yet fully made their way into highway facilities design guidelines, and many bicycle/pedestrian crossings for large roadways in the US continue to be built to meet minimum geometric, lighting, and safety standards which make walking or taking a bike possible, but not necessarily pleasurable, safe, or easy. To make the proposed project as successful as possible, we recommend the City of Santa Rosa formally adopt project-specific design guidelines to guide subsequent phases of the project.<sup>2</sup>

### General Crossing Type and Geometric Recommendations

Based on the project goals and constraints, project context and usage analyses, experience with similar projects, and the input from the public and stakeholders, we conclude that a bridge with ramps is the most appropriate type of bike/pedestrian crossing facility for this project.<sup>3</sup> Further, based on community input, anticipated volumes, usage patterns, and mode splits, we recommend that:

- ramps connecting the bridge with adjacent streets and sidewalks be gently sloped at 1:20,
- both the bridge and ramps have adequate width (15.5 feet) to allow for positive mode separation,
- the design incorporate large radii curves in accordance with Caltrans Class 1 multiuse pathway design criteria (at least 154 feet) and open sightlines for a safe and positive user experience for all travel modes,
- touch-down areas for ramping should be located where there is ample “run out” room for descending cyclists as well as space for safe merging and mixing of bikes and pedestrians with automobile traffic.

Detailed recommended design criteria is presented in Section 3.

### Project Study Area

The project vicinity is expected to undergo significant change over the coming decade; as density increases and new transit options become available, bicycle/pedestrian circulation can be expected to play a greater role throughout the project area. On the west side of Highway 101, while land use at Coddington Mall and the surrounding area is expected to remain primarily commercial and retail, the type of retail and the specific markets served are changing quickly. To the south, several large

---

<sup>2</sup> Design Guidelines adopted by the City of Berkeley in 1997 at this stage of a similar project helped guide decisions during the detailed design review process, and the cumulative impact of design compromises in response to physical, financial, and political constraints was avoided. Today, the Berkeley structure is widely recognized as highly successful in encouraging cycling and walking and reducing vehicle miles traveled. Proposed Design Guidelines for the project are presented in Section 3.

<sup>3</sup> Elevator and underpass options were also considered. Underpass options are not recommended due to the cost and risks of excavation with a high water table under an active freeway, and the challenge of designing for a satisfactory user experience in a tunnel over 200' long. Elevator options are not recommended primarily because they cannot conveniently serve the expected volume of cyclists, and require ongoing maintenance.

medium-density housing developments have been constructed within the last decade and the remaining 19 acres of agricultural lands are also zoned for medium density housing. While the use and character of the SRJC campus is not expected to change, improvements to campus bicycle and pedestrian circulation are planned.<sup>4</sup> A new Sonoma Marin Area Rail Transit (SMART) station is to be constructed in the coming few years, along with a bicycle/pedestrian multiuse path which runs along the rail line.

### Best Location for a Crossing

Either of two existing streets on the east side of the highway, Elliott Avenue and Bear Cub Way, could effectively serve as conduits for east-west through bicycle and pedestrian traffic, and as entry corridors for bicycle and pedestrian traffic headed to or from the Santa Rosa Junior College campus. Both of these routes currently have existing constraints that could be addressed in connection with a Highway 101 crossing project. Signalization and striping improvements could be explored to improve safety for cyclists and pedestrians where Elliott Avenue and Dexter Lane make an offset intersection with Mendocino Avenue. Bear Cub Way has a constriction at the Haehl Pavilion limiting sightlines and width available for mode separation.

Connections at the center of the SRJC campus, in the Scholars Drive area, were also studied. These rank lower in overall viability than the other locations considered, primarily because the SRJC indicated they foresee significant challenges to safely routing bicycle traffic through the campus, and secondarily because existing development on the west side presents some challenges to accommodating a ramp structure and safe touch-down area.

Connections between destinations east of Highway 101 and the proposed SMART station emerged early on as a key factor in assessing alternative bridge locations and alignments. Throughout the first part of the study period, indications were that a station would be located at the “Wye” property south of Jennings Avenue. More recently, indications are a station will be located at Geurnevillle Road, near Coddington.

---

<sup>4</sup> SRJC 2006-2008 Operational Parking and Transportation Plan (February 7, 2006 Draft).

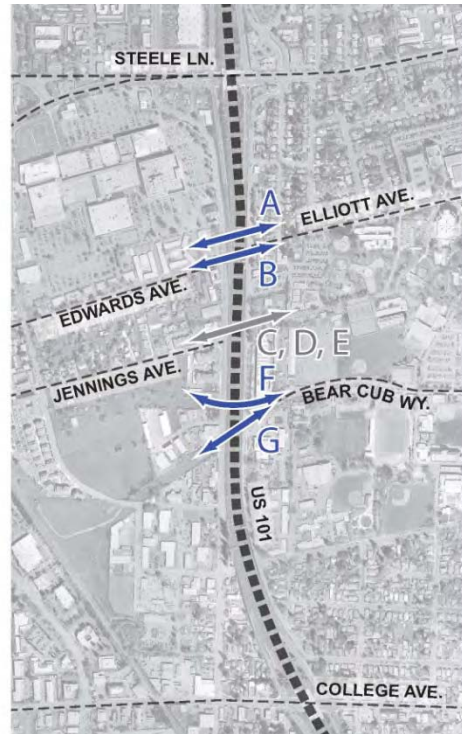


Figure 1 Overview of locations studied

### Constructability and Ease of Implementation

Detailed site analyses, conceptual design studies, and cost and constructability assessments were developed for both an Elliott Avenue location (alignment families A and B) and for a Bear Cub Way location (alignment families F and G). See Section 4 of this report for details.

For a project like this one, several key factors influence the feasibility and ease of constructing an overcrossing:

1. Ample space is required on either side of the crossing to accommodate ramp structures without the need for tight curves on the ramps.
2. Open areas also facilitate construction, particularly for steel structures, by allowing for large sections to be staged before lifting over the roadway.
3. If side spans can be more or less in line with the main span, this allows for a greater number of structure type options, which can offer a signature appearance more economically, a thinner deck depth and thus shorter ramps.
4. If geometric conditions can allow for a structure type that can economically span the entire freeway, this significantly simplifies Caltrans review and approval processes.
5. Construction of a crossing at an area with existing development may require removal or relocation of existing buildings and/or right-of-way acquisition, which adds to the complexity and cost of project delivery.

The Elliott Avenue location is characterized by several conditions that constrain the feasibility of realizing a successful bridge and ramp structure: mature heritage trees, fully developed parcels, high

voltage overhead utilities, an elevated freeway, and terrain on the west side that slopes away from the freeway. In comparison, the Bear Cub Way location has more favorable topography, large undeveloped parcels on the west side, and a wide-open parking lot devoid of mature vegetation on the east side.

### Detailed Alignment Studies Connecting to Jennings SMART Station

Detailed studies during the initial phase of this study were based on the understanding that the proposed SMART station would be located south of Jennings Avenue. For this station location, an alignment at Bear Cub Way enjoys a direct connection to SMART, open layout space allowing for good constructability and traveled-way geometrics for comfortable user experience, few impacts on existing uses, strong community consensus, and potential for speedier project implementation. However this alignment does not provide as direct a connection to Coddington Mall and the northern pedestrian core of the SRJC campus.

ALIGNMENT G : Southern alignment with SMART station assumed at Wye Property

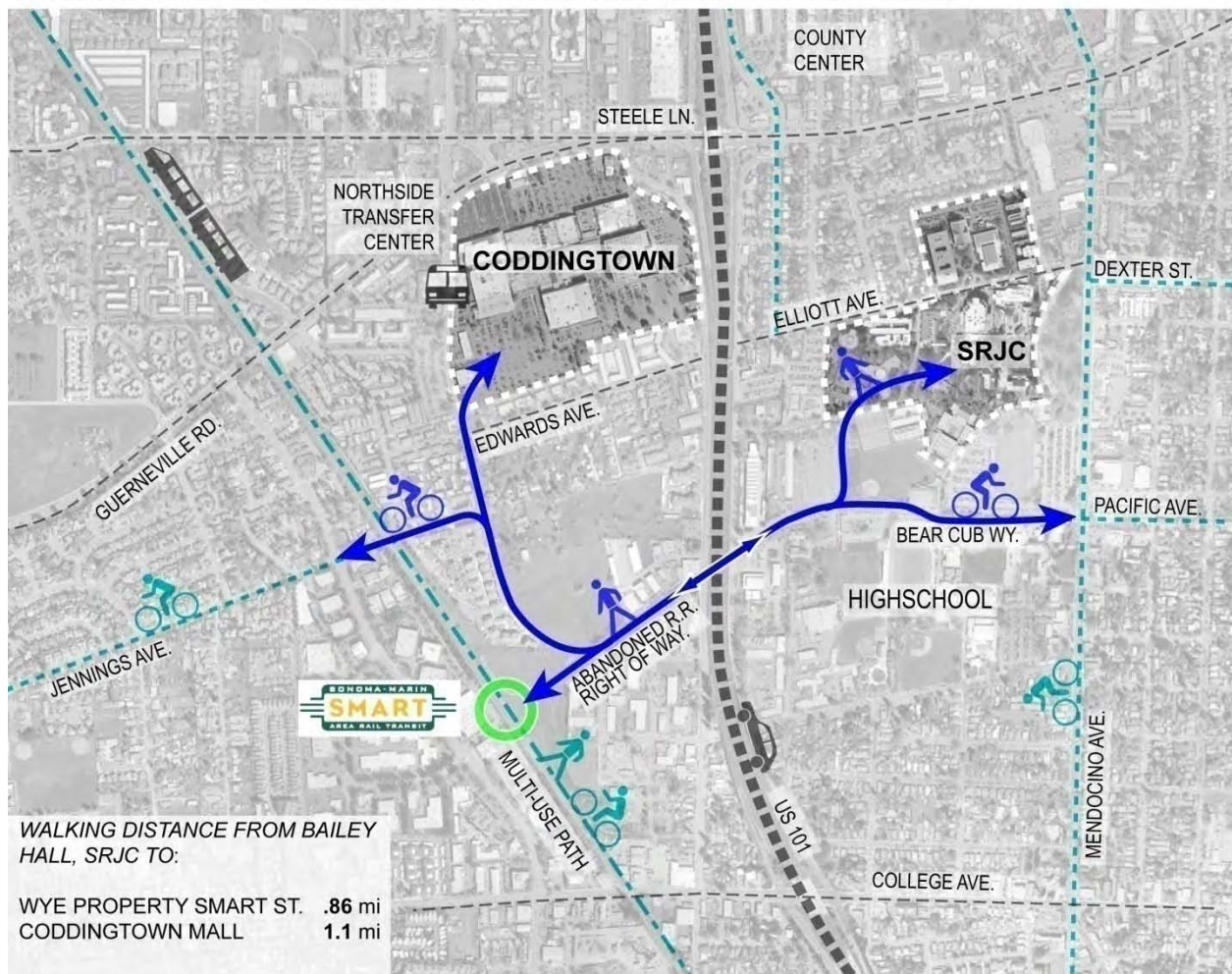


Figure 2 Alignment G: Southern alignment with SMART station assumed at Wye Property

### Additional Alignment Studies Connecting to Guerneville SMART Station

In the fall of 2009, SMART began considering requests by community groups to move the proposed Jennings station northward to Guerneville Road. Because such a change could affect the findings of this

study, the City elected to postpone delivery of a final feasibility study report. At this date indications are that the SMART station will be located at Guerneville Road. Consequently, in early 2010, additional detailed geometric, property acquisition, and construction cost studies were requested to more fully assess the feasibility of a bridge and ramps at Elliott Avenue.<sup>5</sup> Perhaps the most important impact a Guerneville station location has relative to selection of a bicycle/ pedestrian bridge location is the establishment of a nexus of transit-oriented development (TOD) in the Coddington/Guerneville Road area.

ALIGNMENT A : Northern alignment with SMART station assumed at Guerneville Rd.

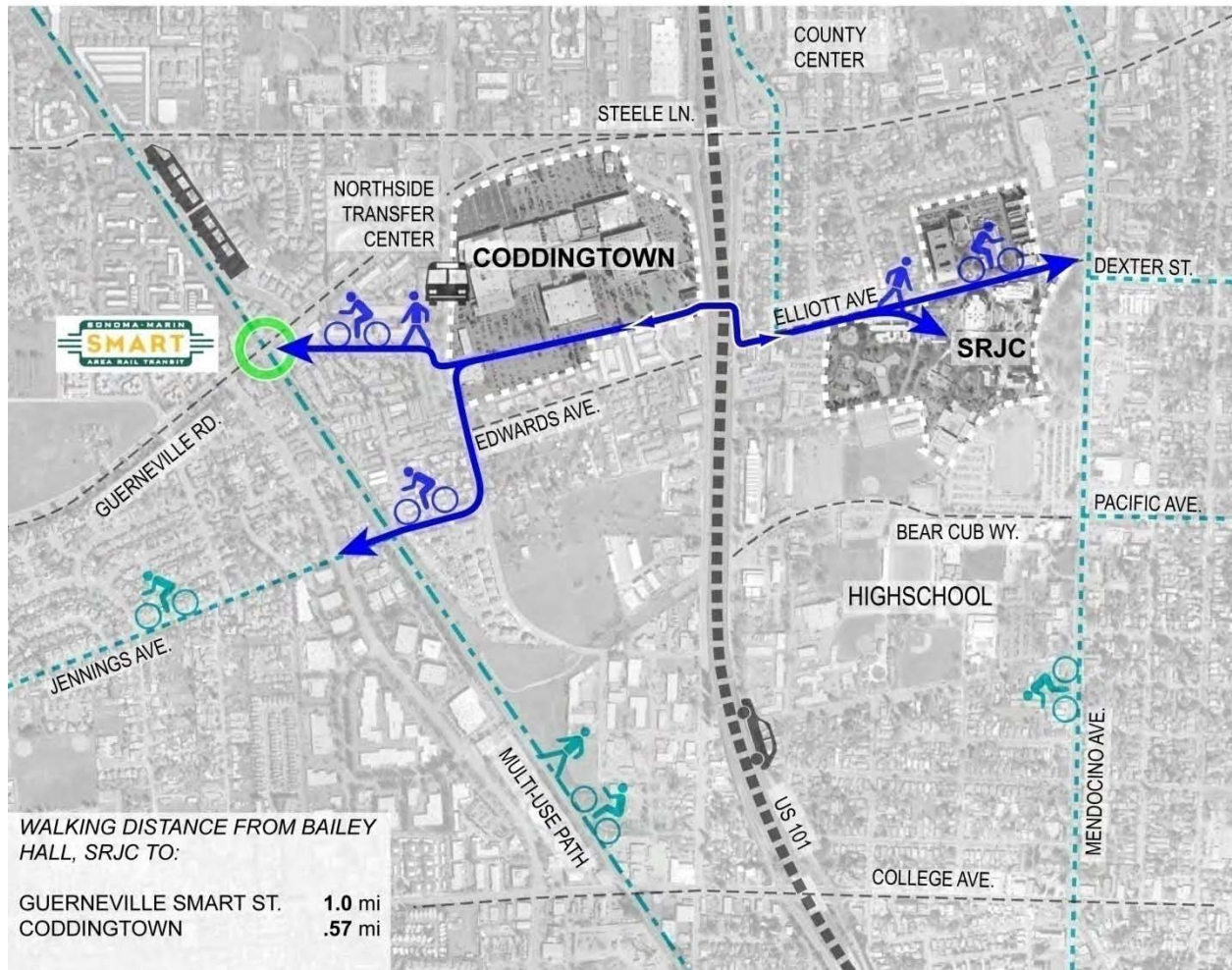


Figure 3 Alignment A-1: Northern alignment with SMART station assumed at Guerneville

<sup>5</sup> See Section 4.

ALIGNMENT F : Southern alignment with SMART station assumed at Guerneville Rd.

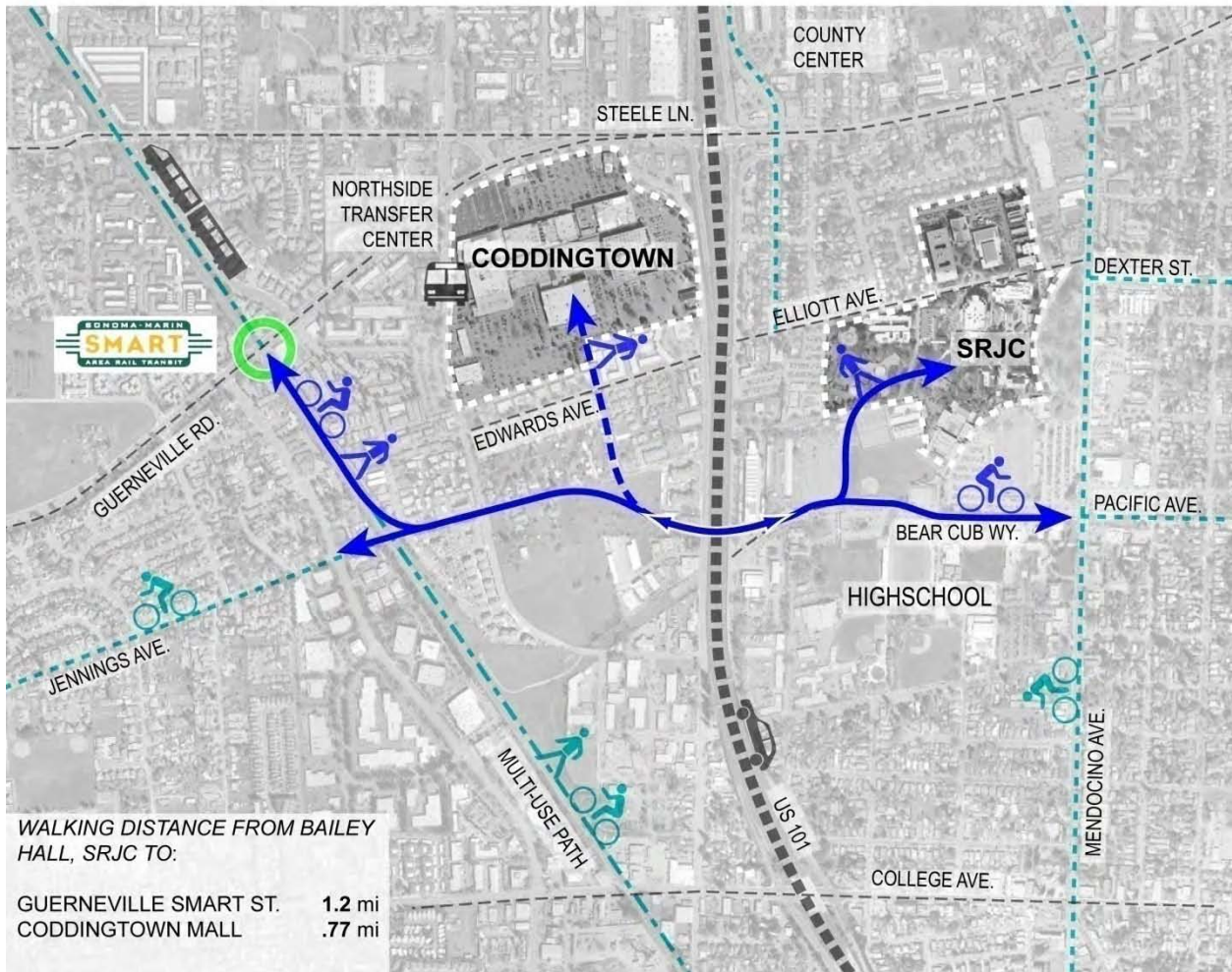


Figure 4 Alignment F-1: Southern alignment with a SMART station assumed at Guerneville

Several observations can be made:

1. For pedestrians traveling between the SRJC campus and Coddington destinations, a crossing at the Elliott Avenue location would provide shorter walking distances than a crossing at Bear Cub Way. For either location the distances involved exceed the generally accepted range of 0.25 to 0.5 miles considered comfortable for pedestrians in urban settings.<sup>6</sup>
2. Any bridge within the study area would provide for comfortable biking between the general Coddington/SMART area and the SRJC campus.

<sup>6</sup> *Envisioning Neighborhoods with Transit-Oriented Development Potential*, May 2002, by Earl G. Bossard et al. <http://transweb.sjsu.edu/MTIportal/research/publications/documents/01-15.pdf>  
*Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects*. 2004, by Robert Cervero et al. [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_rpt\\_102.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_102.pdf)  
*The Next American Metropolis* 1993 by Peter Calthorpe, p 56.

3. A crossing located at Elliott Avenue would provide approximately 16% shorter travel distances between SMART and the center of the SRJC campus compared with Alignment F at Bear Cub Way.
4. A crossing at Elliott would be more strongly associated with the Coddington/SMART/Guerneville commercial development area, and could provide greater impetus for bicycle-friendly development of this retail area.
5. A crossing at Bear Cub Way would be more strongly associated with residential and possibly urban park development.
6. A crossing located at Bear Cub Way would provide more direct connections to currently designated bicycle routes at Jennings on the west and Pacific Avenue on the east side.

For alignments connecting to Bear Cub Way, if SMART is located at Guerneville, Alignment F-1 is preferable to G. Alignment F-1 connects directly to the Jennings Avenue bike route, and from there to the Guerneville SMART station location along the future SMART multiuse pathway. Compared to Alignment G, Alignment F would be less costly to construct due to a shorter main span. Alignment F offers an opportunity to integrate the west bridge ramping and touch-down area with a small urban park proposed to accompany future development in this area.

While several families of ramp and bridge alignments are possible for connections to Elliott Avenue, they all involve some combination of compromises to adjacent uses, project delivery and cost, the functional design, and aesthetics. With the exception of an alignment that runs down Elliott Avenue eastward past Illinois Street, and bisects the former “Los Robles” parcel<sup>7</sup>, all alignment alternatives at this location will not meet Class 1 bikeway criteria for design speed and curves. Most alternatives at this location present significant structural design challenges if construction within the Caltrans right-of-way is to be avoided.<sup>8</sup>

Alignment A-1 allows for adequate touchdown areas on each side, has gentle ramp slopes and ample widths, does not require relocation of overhead utilities crossing the freeway, and has larger traveled way curves than other alternatives at this location<sup>9</sup>. A-1 also has touchdown areas with ample area for bike/pedestrian mode mixing before this traffic mixes with automobiles. Alignment A-1 requires acquisition and demolition of an existing residence and an existing commercial building, and would visually impact the SRJC Pedroncelli Center. It also requires loss of parking and trees, and relocation of above-ground utilities along the Pedroncelli Center parking lot.

Alignment B-1 has fewer impacts on the Pedroncelli Center building. B-1 has more compromised path of travel on the east side; a tight turn near the bottom of the east ramp and it spills bicycle traffic directly onto Elliott Street. B-1’s western touchdown is not at an intersection, so traffic calming measures, the addition of bike lanes on Edwards Avenue, and enough land acquisition to provide a small touchdown ‘plaza’ would be desirable for this Alignment alternative. Alternative B-2 avoids these issues at its western touchdown, and would also lead more directly to Coddington, however in order to do so it bisects the former “Los Robles” parcel.

<sup>7</sup> See for example, the design concept submitted by Architect Paul Harris to the February 2010 American Institute of Architects SMART ideas design charette and competition.

<sup>8</sup> See Chapter 4 for more detailed alignment alternatives assessments.

<sup>9</sup> A-1 has path of travel curves radius of about 50 feet. Caltrans design guidelines prescribe a radius of 261 feet for a design speed of 30 mph for a Class 1 bikeway.

## Comparison of Alignments A-1, B-1, B-2, and F-1

Distances and Costs	A-1	B-1	B-2	F-1
<b>Bailey Hall SRJC to Guerneville SMART</b>	1.0 miles	1.0 miles	1.0 miles	1.2 miles
<b>Bailey Hall to Northside Transfer Center at Coddington</b>	0.89 miles	0.88 miles	0.88 miles	1.1 miles
<b>Total length of bridge with ramps<sup>10</sup></b>	1,143 feet	1,121 feet	1,118 feet	980 feet
<b>Estimated total project cost<sup>11</sup></b>	\$13.3 million	\$13.4 million	\$14.1 million	\$10.0 million

Table 1 Quantitative comparison of Alignments A-1, B-1, and F-1

### Cost Estimates Notes:

- Construction cost estimates are based on linear feet of main span, side spans, ramps on fill, at-grade trail.
- Unit costs for construction were developed based on review of costs for similar projects in the Bay Area, adjusted to 2010 dollars using Caltrans costs escalation criteria.
- Unit costs used are considered conservative.
- A and B have longer main spans due to the width of the freeway at that location.
- A and B have longer ramps due to the elevated freeway and sloping topography to the west.
- F does not include costs for possible improvements along Bear Cub Way to the east of the touchdown (these are considered a separate project already identified in SRJC transportation plan.)
- B requires more extensive utilities relocation.
- Right-of-way acquisition costs for ramping and trail on the west side of F not included (assumed to be part of separate project developing small urban park already identified by City as a condition for housing development on a 19 acre area)
- Soft costs were generated as a percentage of construction cost based on a review of costs for similar projects in the Bay Area, adjusted to 2010 dollars using Caltrans costs escalation criteria.
- A higher percentage was used for soft costs for A and B because these alternatives a) may require Caltrans right-of-way acquisition and certification, b) will involve more agency process and utilities engineering, c) will require ROW from more than one private owner, d) may require separate Caltrans project study (PSR) and project (PR) reports, rather than a combined PSR-PR, e) have more constraints requiring greater engineering design efforts for civil and structural design.
- Refer to Section 4 and Appendix D for more cost information.

<sup>10</sup> Assuming 1:20 ramp slopes and above-deck structure for main span. A below-deck structural system, such as a concrete box girder, would result in approximately 160' greater total length.

<sup>11</sup> Total Project Cost includes Construction Costs and Soft Costs (e.g. Design & engineering fees, construction administration/inspection, environmental studies, City staff project management, fundraising costs, grant proposal preparation, utility relocation planning, permitting, etc.)

	A-1	B-1	B-2	F-1
<b>Co-development Opportunity</b>	In tandem with commercial development.	In tandem with commercial development.	In tandem with commercial development.	In tandem with an urban park.
<b>Impacts on Existing Uses</b>	Demolition of a residence and a commercial building. Visual impact and loss of at existing police building. Loss of parking on both sides. End of Illinois Street blocked to automobiles.	Possible conflict with heritage trees. Demolition of a residence. Closure of portion of Elliott Avenue.	Possible conflict with heritage trees. Demolition of a residence. Divides commercial property. Closure of portion of Elliott Avenue.	Loss of parking in Bear Cub Way lot. Visual impacts to building signage on west side. No loss of existing trees.
<b>Project Delivery</b>	Greater complexity and additional coordination may require longer project schedule and higher soft costs.	Greater complexity and additional coordination may require longer project schedule and higher soft costs.	Greater complexity and additional coordination may require longer project schedule and higher soft costs.	Fewer constructability, utilities, and environmental or adjacency issues may mean faster delivery and lower soft costs.
<b>Travel Path</b>	Curve radii do not meet Caltrans Design Guidelines.	Curve radii do not meet Caltrans Design Guidelines.	Curve radii do not meet Caltrans Design Guidelines.	Location is ideal for accommodating ideal pathway geometry.
<b>Touchdown Areas</b>	West Excellent, East Adequate. West touchdown associated with increasingly pedestrian-oriented retail, has plenty of space, and virtually no vehicular traffic. East side has bike/ped mixing area before mixing with autos.	West Poor, East Adequate. West side touchdown is mid-block, adjacent to residences, and mixing area constrained by lot development goals and sidewalk. East touchdown splits for eastbound and westbound users.	West Excellent, East Adequate. West touchdown associated with increasingly pedestrian-oriented retail, has plenty of space, and virtually no vehicular traffic. East touchdown splits for eastbound and westbound users.	West Excellent, East Good. West side touchdown would be in park, east in ample landscape-delineated area. Curves in accordance with agency guidelines provide greater safety and quality of user. Open sightlines.
<b>Bikeway Connections</b>	West: Coddington Ctr would need to be designated as a bikeway. Connects to Range Ave. East: Elliott Ave to Mendocino Ave.	West: Edwards would need to be designated as a bikeway. Connects to Range Ave. East: Elliott Ave. to Mendocino Ave.	West: Coddington Ctr connects to Range (Coddington Ctr would need to be designated as a bikeway.) East: Elliott Ave to Mendocino.	West: Jennings Avenue connects to Range Ave. and SMART bikeway. East: Bear Cub Way connects to Mendocino Ave.
<b>Character of Bridge as seen from freeway</b>	Structural options are limited and pragmatics or economics more likely to overrule aesthetic options.	Structural options are limited and pragmatics or economics more likely to overrule aesthetic options.	Structural options are limited and pragmatics or economics more likely to overrule aesthetic options.	Signature bridge structure is more feasible.

Table 2 Qualitative comparison of Alignments A-1, B-1, and F-1



Figure 5 Oblique aerial view of Alignments A-1 and F-1