

#### 4.0 ANALYSIS OF DEMAND

The objective of this section is to identify existing bicycle ridership levels and travel patterns, along with projected future use and possible methods for stimulating additional ridership. It also examines the needs of both commuter and recreational bicyclists in relation to the demand for specific facilities.

The beginning of the section focuses on the amount of existing and future bicycle travel demand while subsequent discussion concentrates on information about the location of existing and future population and employment as well as major attractors such as employment centers, schools, and residential areas in order to determine where bicycle activity occurs today and where it will occur in the future. In addition, this section contains the results of a needs and attitude survey conducted for this study.

#### 4.1 Existing Bicycle Ridership Levels

According to a recent Lou Harris Public Opinion Poll, nearly 3 million adults, or about one in 60, already commute by bike. This number could rise to 35 million if more bicycle friendly transportation systems existed (USDOT, 1994). The concept of "demand" for bicycle facilities is difficult to measure. Unlike automobile use, where historical trip generation studies for different types of land uses allows an estimate of future "demand" for travel, no such methodology exists for bicycles.

A common term used in describing demand for bicycle facilities is "mode split." Mode split refers to the form of transportation a person chooses to take, be that walking, bicycling, using public transit, or driving. Mode split is often used in evaluating commuter alternatives such as bicycling, where the objective is to increase the "split" or percentage of people selecting an alternative means of transportation. From the 1990 Census, mode split information is available for the journey-to-work. This information is presented in Table 5 for Yuba and Sutter Counties.

| Mode (Home-based work trips): | Yuba County | Sutter County |
|-------------------------------|-------------|---------------|
| Drive Alone                   | 74.5%       | 76.5%         |
| Carpool                       | 15.5%       | 14.0%         |
| Public Transportation         | 0.3%        | 0.4%          |
| Bicycle                       | 0.8%        | 1.1%          |
| Walk                          | 3.4%        | 3.1%          |
| Other                         | 0.9%        | 0.5%          |

The 0.8 percent mode share for bicycle trips in Yuba County equates to about 175 bicycle trips on an average day. Sutter County's somewhat higher mode split of 1.14 percent represents about 285 bicycle trips on an average day. It should also be noted that a 1991 Household Travel Survey conducted by SACOG, contained a 1.9 percent and a 0.8 percent mode split for all other trips by bicycle in Sutter and Yuba Counties, respectively.

Based on the current mode split information, it was estimated that bicycle travel represents about 1.7 percent of all daily person trips in Sutter County and 0.8 percent in Yuba County. These percentages represent about 3,960 daily bicycle trips in Sutter County and 1,390 daily bicycle trips in Yuba County.

#### 4.2 Future Bicycle Ridership Levels

Future bicycle ridership levels will depend on a number of factors such as demographics, the availability of bikeway facilities, and the location, density and type of future land development. According to the projections from the Yuba-Sutter Travel Demand Model developed by Caltrans District 3, home-based-work and total daily person-trips for Yuba and Sutter Counties are expected to increase by about 77 percent and 63 percent, respectively, between 1992 and 2015. The specific increase in commuter and daily bicycle trips would be expected to increase by a greater percentage if the bikeway master plan is implemented.

The future daily mode split for commuter bicycle travel could range from about one percent (its current level) to about four percent by 2015 with implementation of the YSBMP. The resulting bicycle travel demand in Yuba and Sutter Counties is shown in Table 6.

| Scenario                 | Total Daily Person Trips | Total Home-Based-Work Trips | Bicycle Mode Split | Commuter Bicycle Trips | Daily Bicycle Trips |
|--------------------------|--------------------------|-----------------------------|--------------------|------------------------|---------------------|
| 2015 w/o BMP             | 382,710                  | 99,310                      | 1 %                | 990                    | 3,830               |
| 2015 w/ BMP <sup>1</sup> | 382,710                  | 99,310                      | 4 %                | 3,970                  | 15,310              |

Notes: <sup>1</sup> This scenario assumes the BMP is implemented resulting in an increase in the bicycle mode split from one percent to four percent.

Assuming a mode split of four percent is reached, it would represent a substantial reduction in Vehicle Miles Traveled (VMT), as well as a reduction in air pollutants, which combined form an important argument supporting increased future investment in bicycle facilities. The difference in daily bicycle trips with and without the BMP represents about 28,700 miles of travel assuming an average trip length of 2.5 miles. Many of these trips would be replacing automobile trips, which could save over 1,000 gallons of gasoline per day.

### 4.3 Existing Population and Employment

For Yuba and Sutter Counties, most of the existing population and employment is contained within the urbanized area around Yuba City and Marysville. Population centers, however, also include the incorporated cities of Live Oak and Wheatland, and to a lesser degree, numerous unincorporated communities.

According to the 1990 Census, Yuba and Sutter Counties have a combined population of 122,643 persons. Table 7 shows the population and demographics for both incorporated and unincorporated areas within Yuba and Sutter Counties.

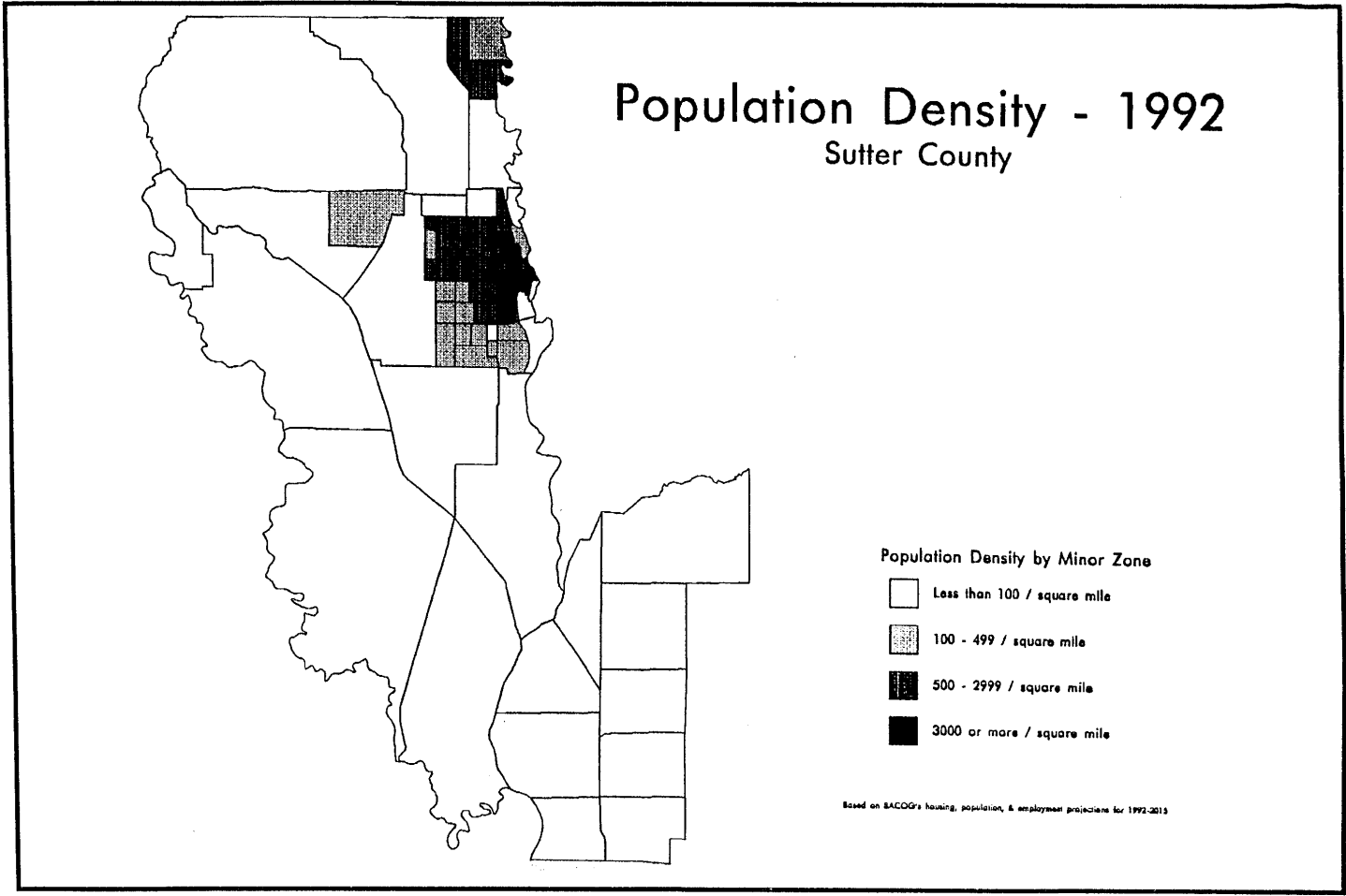
| City/Jurisdiction | 1990 Population | 1990 Employment | Median Age | Median Income |
|-------------------|-----------------|-----------------|------------|---------------|
| Yuba County       | 58,228          | 20,689          | 29.2       | \$21,523      |
| Marysville        | 12,324          | 4,748           | 31.7       | \$21,529      |
| Wheatland         | 1,880           | 520             | 33.6       | \$26,591      |
| Unincorp. Areas   | 44,024          | 15,409          | 28.4       | \$21,392      |
| Sutter County     | 64,415          | 26,137          | 32.4       | \$31,842      |
| Yuba City         | 27,437          | 11,091          | 29.9       | \$23,491      |
| Live Oak          | 4,320           | 1,222           | 29.3       | \$16,366      |
| Unincorp. Areas   | 32,658          | 13,824          | 35.3       | \$33,402      |

Source: 1990 Census and Sacramento Area Council of Governments (SACOG).

The four incorporated cities, Yuba City, Marysville, Live Oak, and Wheatland, constitute 38 percent of the population of the two counties. This percentage would increase substantially if the entire urbanized area around Yuba City and Marysville were included in the estimate. A key indicator supporting this statement is the level of population density within the urbanized area, which is shown in Figures 6 and 7.

### 4.4 Future Population and Employment

Future growth and changes in population and employment are important to bikeway planning for two reasons. First, new developments will require new and upgraded roadways which would provide bike lanes as part of the standards recommended for this plan. Much of the cost of the proposed system, therefore, could be borne as part of the cost of developing new or widening existing roadways.



**FIGURE 6**

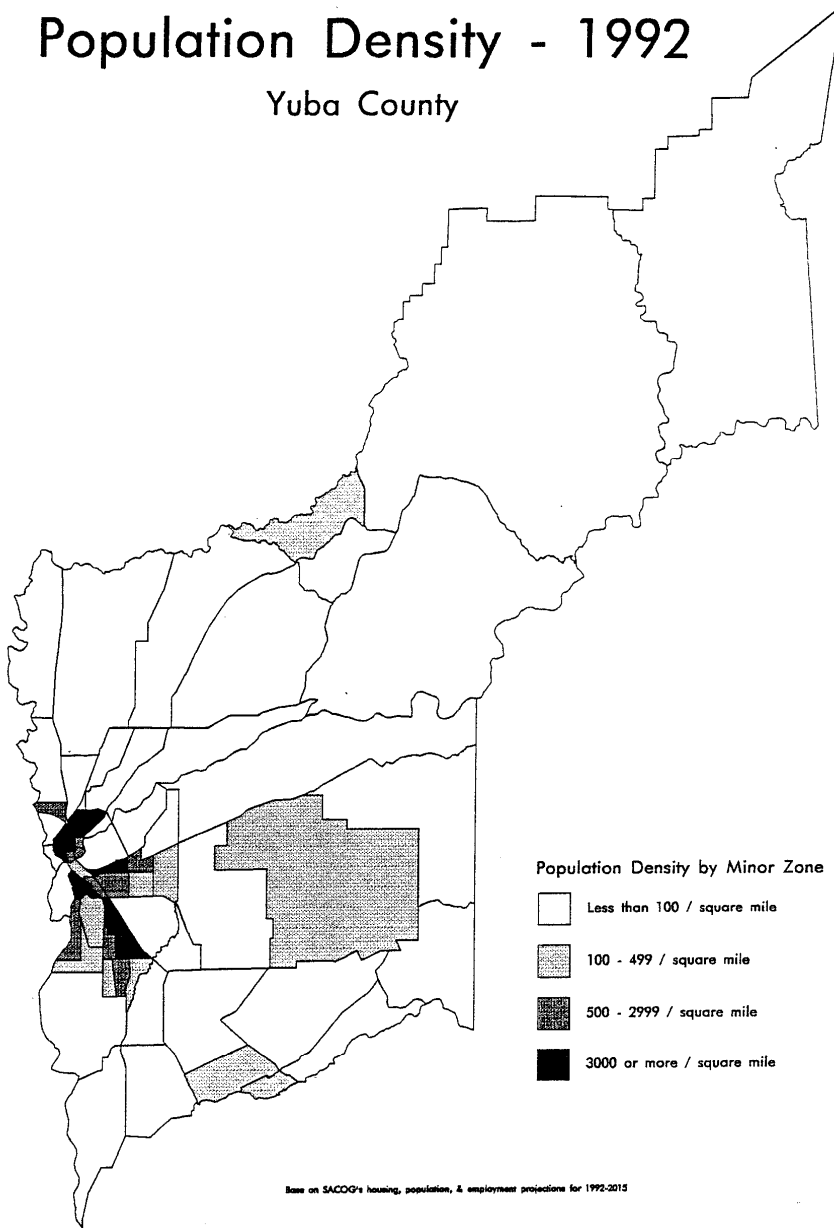
**EXISTING SUTTER COUNTY POPULATION DENSITY**

**fp** Fehr & Peers Associates, Inc.  
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# Population Density - 1992

Yuba County



**FIGURE 7**

**EXISTING YUBA COUNTY  
POPULATION DENSITY**

**F&P** Fehr & Peers Associates, Inc.  
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Almost all communities in Yuba and Sutter Counties are projected to experience at least moderate growth, which implies that there will be additional demand placed on the area's roadway system. The resulting need for enhanced capacity of the roadway system may also present opportunities for the expansion of the regional bikeway system.

Second, changes in land use patterns, as they pertain to employment areas, impact average commute distance, which in turn affects the attractiveness of bicycling as a commute mode. From a bicycling perspective, any policy which encourages a balance between residential and employment activities, higher land use densities, and an increase in local employment is a very favorable step.

As stated above, Yuba and Sutter Counties are expected to experience at least moderate levels of growth over the next 20 to 25 years. Table 8 compares the growth in population and employment to forecasts for surrounding counties.

| Jurisdiction         | Population     | Percent Growth | Employment    | Percent Growth |
|----------------------|----------------|----------------|---------------|----------------|
| <b>Sutter County</b> | <b>177,087</b> | <b>157 %</b>   | <b>62,343</b> | <b>181 %</b>   |
| <b>Yuba County</b>   | <b>132,961</b> | <b>118 %</b>   | <b>47,988</b> | <b>110 %</b>   |
| South Placer County  | 201,011        | 131 %          | 124,223       | 171 %          |
| Sacramento County    | 1,791,843      | 63 %           | 921,182       | 89 %           |
| Yolo County          | 263,719        | 77 %           | 147,377       | 131 %          |

Source: *Regional Bikeway and Pedestrian Study*, SACOG, June 1994.

As Table 8 shows, population is expected to grow by about 118 percent and 157 percent in Yuba and Sutter Counties, respectively. Similar levels of employment growth are also expected within both Counties. Yuba County is expecting an employment increase of about 110 percent while Sutter County is expecting an increase of about 181 percent. These growth rates are similar if not slightly higher than those in surrounding counties.

According to the General Plans for both counties and the incorporated cities, most new population and employment growth is expected to occur within or near existing urbanized areas. Two potential exceptions to the local General Plans include the Loma Rica area in northwestern Yuba County and the southern portion of Sutter County. Projections from the Sacramento Area Council of Governments (SACOG) show the Loma Rica area almost tripling in population over the next 20 years and south Sutter County growing from a population of about 3,000 to over 60,000 by 2015. It should be noted that the *County of Sutter General Plan, 1994* does not assume this level of development in south Sutter County. Instead, it shows and describes the area continuing to support agricultural uses.

These future population and employment projections have the following key implications for the Yuba-Sutter Bikeway Master Plan:

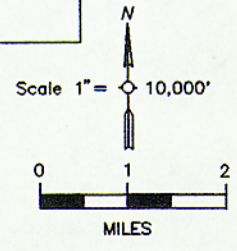
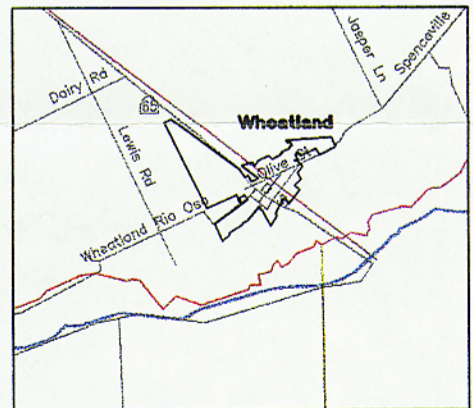
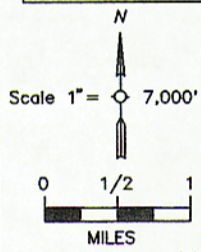
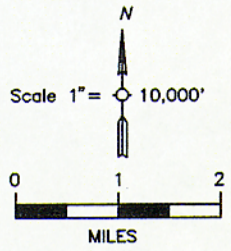
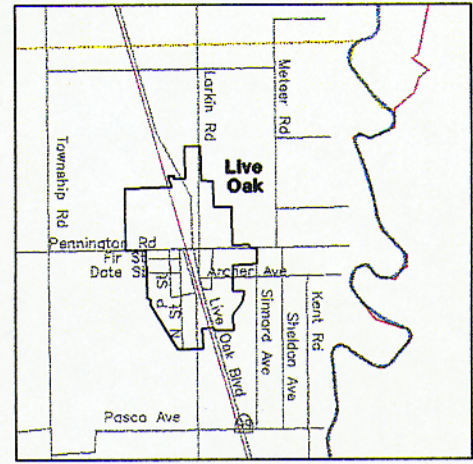
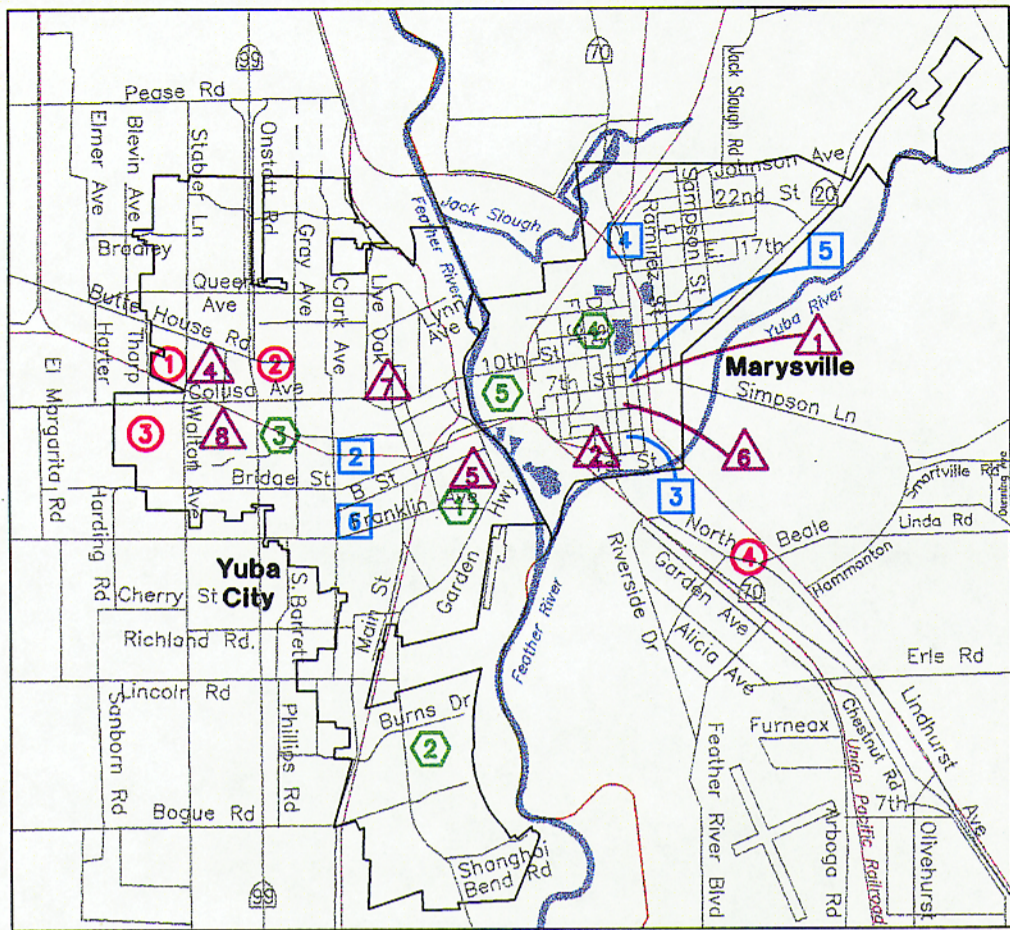
- Focus on the development of bikeway facilities in existing urbanized areas; and
- Consider the extension of bikeway facilities to growth areas such as Loma Rica.

#### 4.5 Existing Major Attractors

One purpose of a bikeway master plan is to provide improved linkages from residential areas to employment, commercial, educational, and recreational areas. These linkages support both commuter and recreational trip purposes. Major activity centers in Yuba and Sutter Counties include regional commercial areas, employment and educational centers, and regional parks. These activity centers are used as one of the major criteria for planning and selecting new routes. These activity centers are listed in the Table 9 below, and shown in Figure 8.

| Location   | Activity Type | Map Location Number |
|--|---------------|---------------------|
| California Department of Transportation            |               | 1                   |
| Marysville Medical Center/Fremont-Rideout Hospital |               | 2                   |
| Beale Air Force Base                               |               | 3                   |
| Department of Motor Vehicles                       | Employment    | 4                   |
| Sutter County Courthouse                           |               | 5                   |
| Yuba County Courthouse                             |               | 6                   |
| Fremont Hospital                                   |               | 7                   |
| Sunsweet Growers                                   |               | 8                   |
| Feather Downs Shopping Center                      | Commercial    | 1                   |
| Yuba City Mall                                     |               | 2                   |
| Wal-Mart/Sam's Club                                |               | 3                   |
| Peachtree Mall                                     |               | 4                   |
| Yuba College                                       | Educational   | 1                   |
| Sutter County Library                              |               | 2                   |
| Yuba County Library                                |               | 3                   |
| Marysville High School                             |               | 4                   |
| Notre Dame High School                             |               | 5                   |
| Yuba City High School                              |               | 6                   |
| Lindhurst High School                              |               | 7                   |
| Yuba-Sutter Fairgrounds                            | Recreational  | 1                   |
| Blackburn-Talley Park (softball)                   |               | 2                   |
| Sam Brannan Park (pool)                            |               | 3                   |
| Ellis Lake   |               | 4                   |
| Beckworth-Riverfront Park                          |               | 5                   |





- LEGEND**
- EMPLOYMENT SITE
  - COMMERCIAL SITE
  - EDUCATIONAL SITE
  - RECREATIONAL SITE

**YUBA-SUTTER BIKEWAY MASTER PLAN  
MAJOR ACTIVITY CENTERS**



The locations listed in Table 9 and shown in Figure 8 represent both commuter and recreational destinations. In developing specific routes to serve these locations, it is important to realize that the needs of a recreational bicyclist differ substantially from those of a bicycle commuter. Therefore, the following section, which analyzes the demand for bikeway facilities, also contains separate discussions regarding the specific needs of commuter and recreational bicyclists in Yuba and Sutter Counties.

#### **4.6 Commuter Needs**

Commuter bicyclists span all age groups, from elementary school children, to working professional adults. For their daily commutes, these bicyclists select the most direct routes possible. School children, for example, often use residential streets with minimal crossings of major arterials. For those commuting to work or college, the commutes are generally under 5 miles, but may be as long as 10 to 15 miles, forcing bicyclists to use major arterials.

In order to provide for the needs of the commuter bicyclist in Yuba and Sutter Counties, an enhanced regional bicycle network should include an integrated network of bike lanes along major arterials throughout the study area. The proposed bikeway system, which is presented in Section 5.0 of this document, responds to these needs by providing bicycle connections through the urbanized areas of Yuba City and Marysville, as well as to key destinations such as Yuba College and Beale Air Force Base.

#### **4.7 Recreational Needs**

Recreational bicycling also spans all age groups. Their trips vary from leisurely rides to organized excursions. A common attribute among these riders is that often the ride itself is of equal or greater importance than the destination.

Recreational bicyclists can be generally categorized in two different groups. The first group consists of casual bicyclists who typically have short trips and often include less experienced bicyclists, including younger children and the elderly. The second group includes more experienced and athletic riders for whom riding is part of their regular exercise routines. It is important to understand these distinct types of bicyclists because the proposed regional system must provide opportunities for both groups.

The Yuba and Sutter County areas offer several excellent recreational riding opportunities for bicyclists. These include a loop route around the Sutter Buttes, various levee routes such as the levee route along the regional Beckworth-Riverfront Park, and low volume rural roadways that follow major rivers such as the Feather River and Sacramento River. Although these routes currently exist, they are not formal bikeway facilities. For example, levee routes are not always paved and none of the existing levee routes meets Caltrans standards for a Class I bike path. Further, the levee routes do not connect to an integrated system of bikeways. Therefore, the most important recreational needs are to improve existing recreational routes by upgrading the routes to meet Caltrans standards and connecting the routes to an integrated bikeway system for the region.

#### 4.8 Needs and Attitude Survey Results

As part of this study, surveys were distributed to Yuba and Sutter County residents at five major destinations. Surveys elicited responses on current bicycle usage, reasons for not riding more often, and potential improvements to increase ridership. Some key observations from the survey data are outlined below. It is important to note that the results are somewhat biased towards bicyclists and do not represent a true "cross section" of the residents of Yuba and Sutter Counties.

1. The vast majority of respondents (89 percent) reported having one or more bicycles in their household. More than one-third of households (40 percent) owned three or more bicycles. Similar surveys in other communities in California show that between 60 and 70 percent of all households own at least one bicycle.
2. The most common type of bicycling activity in Yuba and Sutter Counties is casual recreational riding (67 percent), followed by mountain biking (33 percent). About five percent of respondents indicated that they commute regularly by bicycle.
3. The greatest factor for not riding more often was lack of time (56 percent), followed by weather (17 percent), and safety (16 percent).
4. The majority of respondents had one-way commute distances of five miles or less. However, 17 percent have commutes of more than ten miles.
5. Respondents were asked what improvements would convince them to ride a bicycle more often. A ranking of their preferences is given below along with the overall ranking of importance (1 being most important, 5 being least important):
  1. Comprehensive bike lane network (1.26)
  2. Safety improvements (1.62)
  3. Secure, covered bicycle parking (2.55)
  4. Guaranteed ride home (2.79)
  5. Showers/lockers at work (3.06)
  6. Half hour off of work day (3.33)
  7. \$10 per week incentive (3.47)

In addition to the survey questions, respondents were asked to indicate on a map the locations which they currently bicycle. Most frequently selected bicycling locations included: Butte House Road, West Butte Road, North and South Beale Road, and areas (especially levees) adjacent to the Yuba and Feather Rivers.

Key findings from the survey data include the following:

- Time is the most important factor affecting the decision to ride more often;
- Developing a comprehensive bikeway network is a key factor in convincing the respondents to ride more often; and
- Recreational bikeway facilities should be considered for the route around the Sutter Buttes and for the various levee routes along the Feather and Yuba Rivers.

This information was considered during the development of the proposed bikeway system discussed in the next section.

## 5.0 PROPOSED BIKEWAY SYSTEM

The specific purpose of this section is to describe the proposed bikeway system for Yuba and Sutter Counties including the incorporated cities of Yuba City, Marysville, Live Oak, and Wheatland. As part of this description, there is a discussion of the process used to develop the proposed system followed by independent sections discussing how the system interfaces with other travel modes and support facilities.

### 5.1 Bikeway Facility Planning Criteria

The criteria used to develop the proposed Yuba-Sutter bikeway system consists of both local policies and programs along with commonly accepted planning methodology. The planning criteria is described below.

#### Coverage

The system should provide balanced access from all portions of Yuba and Sutter Counties' population centers for both commuting and recreation routes.

#### Connectivity

The system should provide bikeway connections to major activity centers throughout the region and to routes that provide access to neighboring counties. Activity centers include, schools, regional parks, shopping centers (malls), employment centers, government centers, transit centers, and other recreational opportunities.

#### On-Street Designations

Class II bike lanes should be provided as the preferred on-street bikeway facility especially when traffic volumes reach 5,000 vehicles per day. Class III bike routes should be used for lower volume roadways and where existing constraints prohibit the construction of Class II bike lanes due to cost or other considerations.

#### Grade-Separated Bikeways

Where feasible, Class I bikeways on grade separated rights-of-way should be implemented. These bikeways provide a higher degree of safety and recreational benefit than bikeways located on streets. They can also become linear parks, adding to the range of amenities for neighborhoods.

#### Local Input

Consider local information in the bikeway planning process, including input from bicycle club members, bike shop owners, current riders, and the general public.



This criteria was applied during the planning process for the proposed bikeway system. In addition, the planning process relied heavily on the input of local government officials and citizens. For the YSBMP, the proposed system described below was developed with input from the YSBMP Technical Advisory Committee (TAC) through regular meetings and from other interested persons or groups at two public workshops.

## 5.2 Proposed Routes

Figure 9 displays the Yuba-Sutter Proposed Bikeway System, which delineates existing and proposed bikeway routes. The proposed system includes a total of about 395 miles (635 km) of bikeway facilities. The system not only connects each city in Yuba and Sutter Counties, but it provides regional connections to six other counties including Butte County, Colusa County, Nevada County, Placer County, Sacramento County, and Yolo County. Planning of the system concentrated on connectivity with local and regional bikeway plans to ensure that bikeway facilities were consistent through each city and with regional facilities.

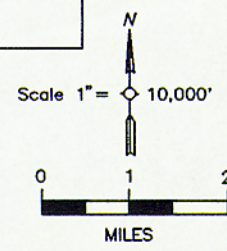
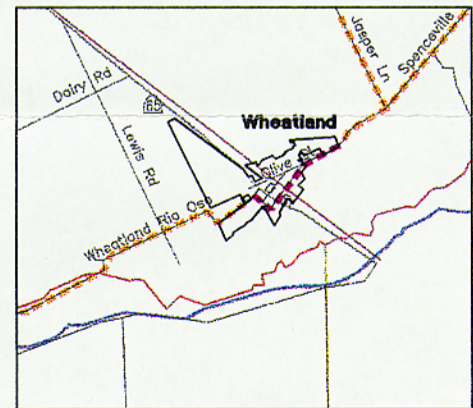
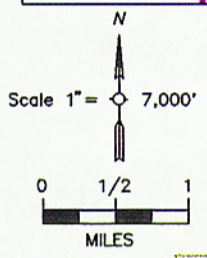
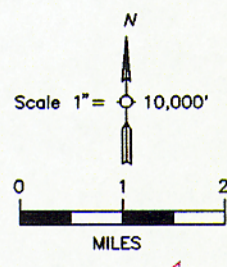
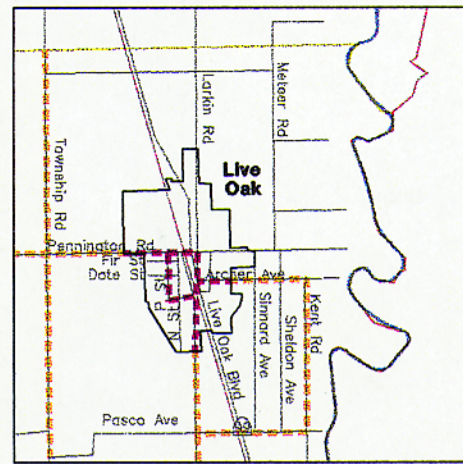
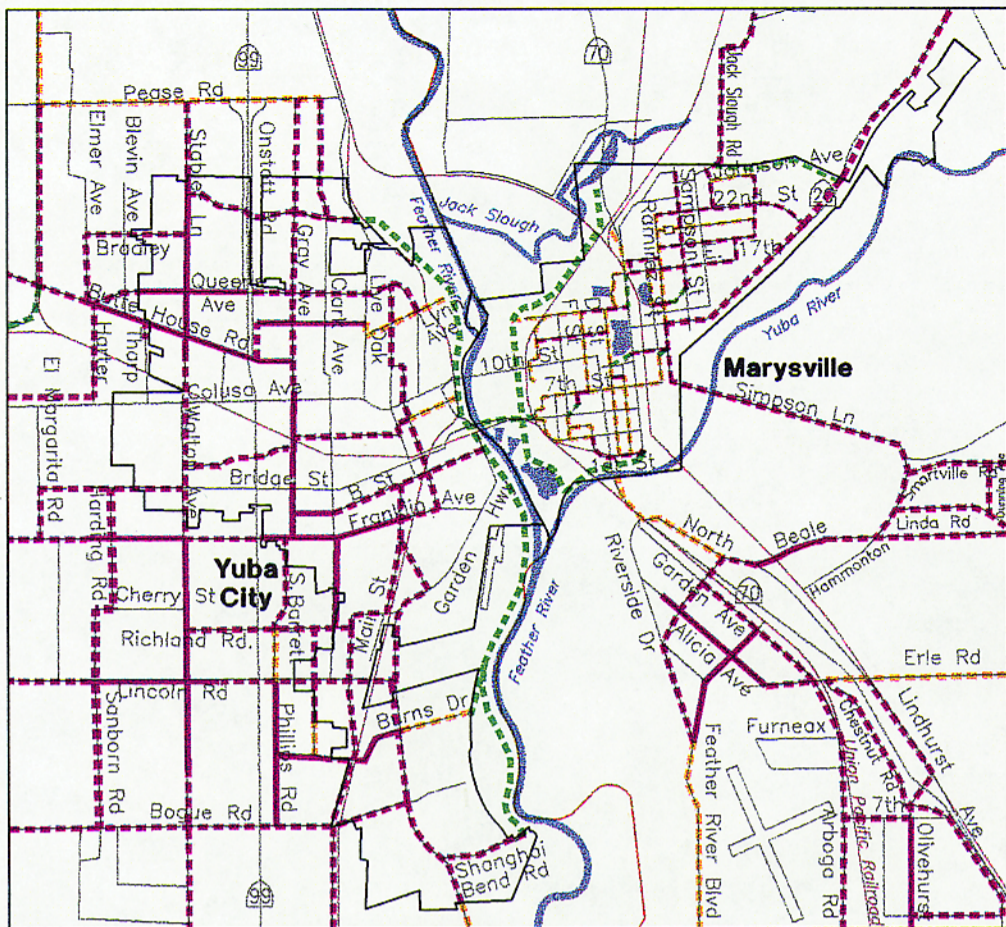
Each route is classified according to standards defined in Chapter 1000: Bikeway Planning and Design of the Highway Design Manual (California Department of Transportation, 1990). The Caltrans standards include the three classifications shown in Figure 10. The specific identification of the bikeway classifications for the Yuba-Sutter bikeway system was based on the following criteria:

- Existing bikeway classifications for overlapping routes;
- Planning criteria described above; and
- Information from the existing conditions analysis, which identified roadway conditions and the relative cost and feasibility of improving potential routes.

Table 10 shows the number of existing and proposed miles for each bikeway classification.

| Status   | Class I - Bike Path |      | Class II - Bike Lane |       | Class III - Bike Route |       | Total |       |
|----------|---------------------|------|----------------------|-------|------------------------|-------|-------|-------|
|          | Miles               | KM   | Miles                | KM    | Miles                  | KM    | Miles | KM    |
| Existing | 0.0                 | 0.0  | 18.9                 | 30.5  | 0.4                    | 0.7   | 19.3  | 31.2  |
| Proposed | 16.9                | 27.2 | 99.2                 | 159.6 | 278.4                  | 447.9 | 394.5 | 634.7 |
| Total    | 16.9                | 27.2 | 118.1                | 190.1 | 278.8                  | 448.6 | 413.8 | 665.9 |



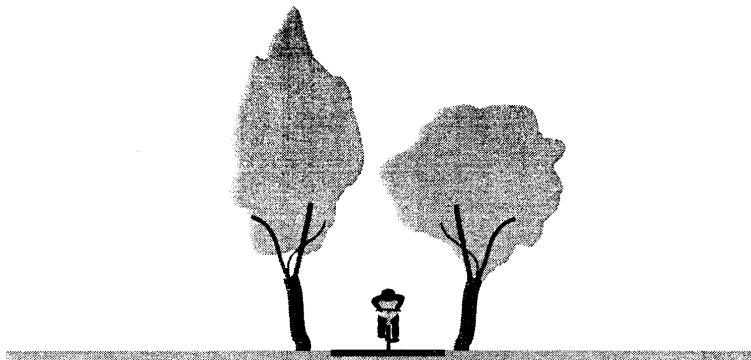


**LEGEND**

| EXISTING               | PROPOSED               |
|------------------------|------------------------|
| CLASS I (Bike Path)    | CLASS I (Bike Path)    |
| CLASS II (Bike Lane)   | CLASS II (Bike Lane)   |
| CLASS III (Bike Route) | CLASS III (Bike Route) |

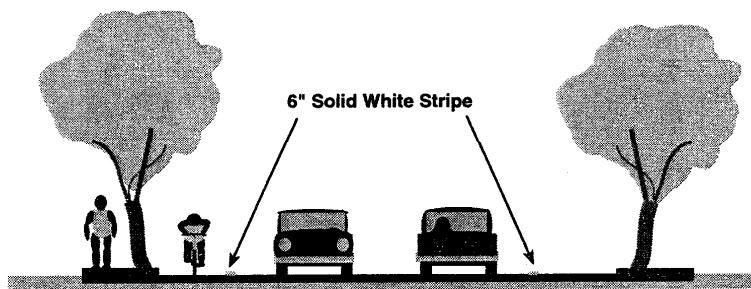
**YUBA-SUTTER BIKEWAY MASTER PLAN  
PROPOSED BIKEWAY SYSTEM**





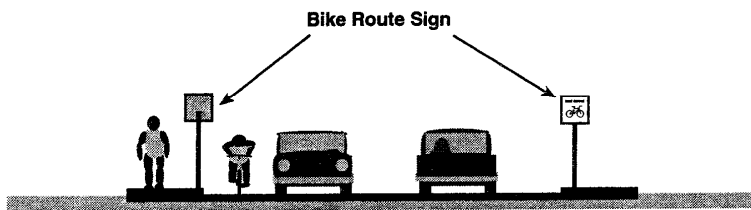
**Class I Bikeway (Bike Path)**

Provides a completely separated right of way for the exclusive use of bicycles and pedestrians with crossflow minimized.



**Class II Bikeway (Bike Lane)**

Provides a striped lane for one-way bike travel on a street or highway.



**Class III Bikeway (Bike Route)**

Provides for shared use with pedestrian or motor vehicle traffic.

**FIGURE 10**

**GENERAL BIKEWAY CLASSIFICATIONS**

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Transportation Consultants

The majority of the system consists of Class II and III facilities, although almost 17 new miles of Class I bike paths are proposed. In general, Class II bike lanes were designated in urban areas on collectors and arterials, especially where the average daily traffic volumes exceed 5,000. Outside the urban areas, Class III bike routes were the primary designation given that most of these roads have low traffic volumes.

Table 11 summarizes the total length of the existing bikeway system for each incorporated city and the unincorporated portions of both counties.

| Jurisdiction                   | Class I     |             | Class II    |              | Class III    |              |
|--------------------------------|-------------|-------------|-------------|--------------|--------------|--------------|
|                                | Miles       | Kilometers  | Miles       | Kilometers   | Miles        | Kilometers   |
| Sutter County (unincorporated) | 8.3         | 13.4        | 29.6        | 47.6         | 172.2        | 277.1        |
| Yuba County (unincorporated)   | 1.3         | 2.1         | 40.4        | 65.0         | 96.7         | 155.6        |
| Yuba City                      | 2.2         | 3.5         | 17.5        | 28.2         | 1.5          | 2.4          |
| Marysville                     | 5.1         | 8.2         | 8.0         | 12.9         | 8.0          | 12.9         |
| Live Oak                       | 0.0         | 0.0         | 2.7         | 4.3          | 0.0          | 0.0          |
| Wheatland                      | 0.0         | 0.0         | 1.0         | 1.6          | 0.0          | 0.0          |
| <b>System Total</b>            | <b>16.9</b> | <b>27.2</b> | <b>99.2</b> | <b>159.6</b> | <b>278.4</b> | <b>447.9</b> |

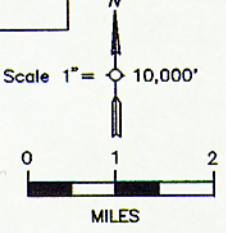
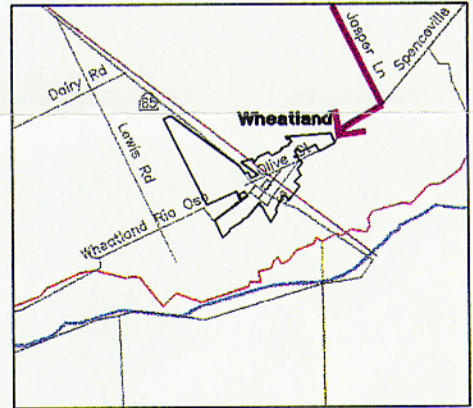
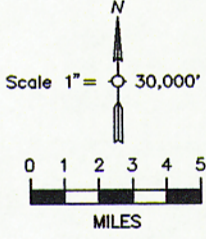
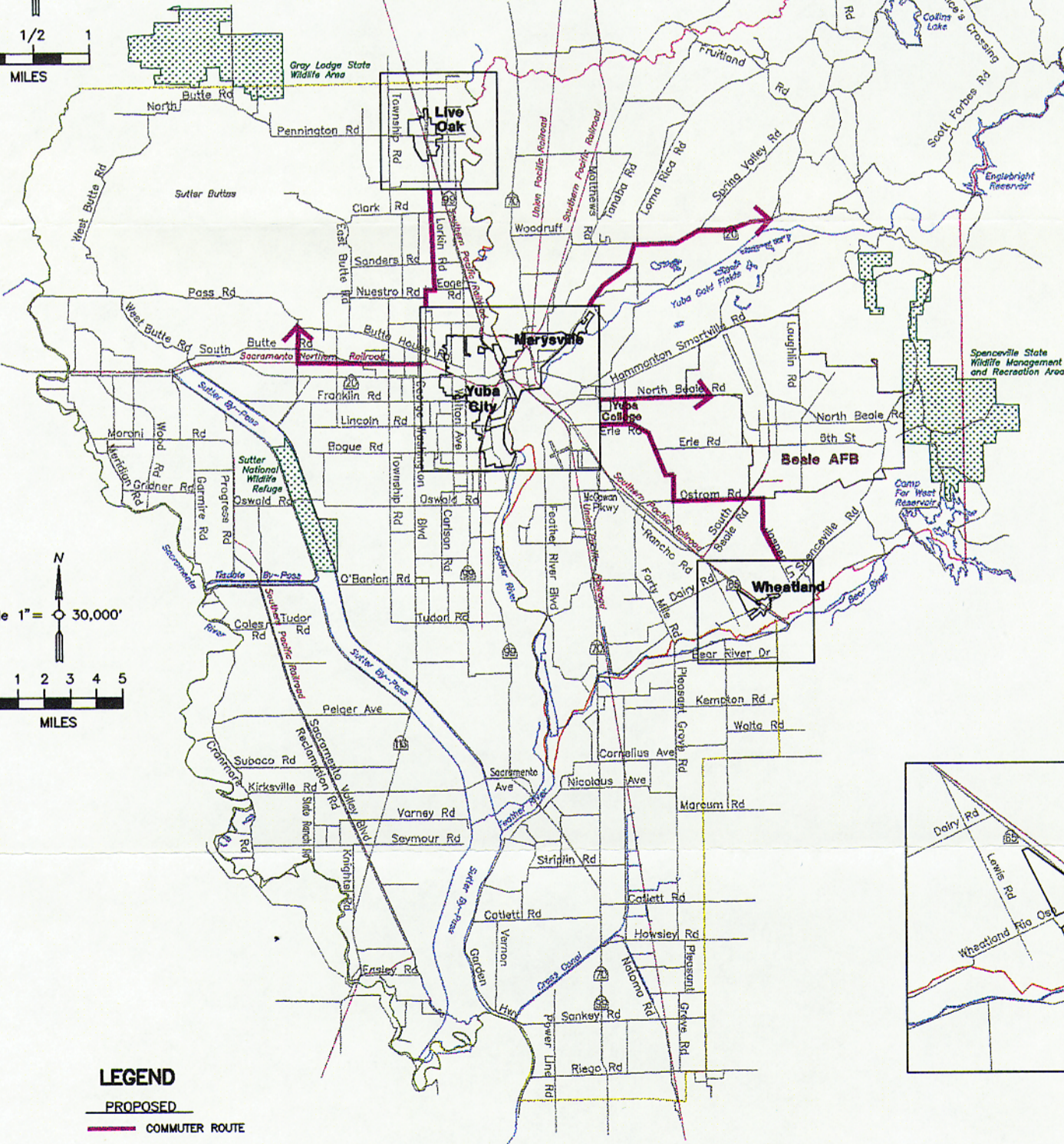
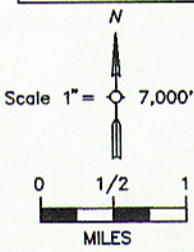
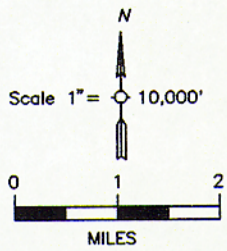
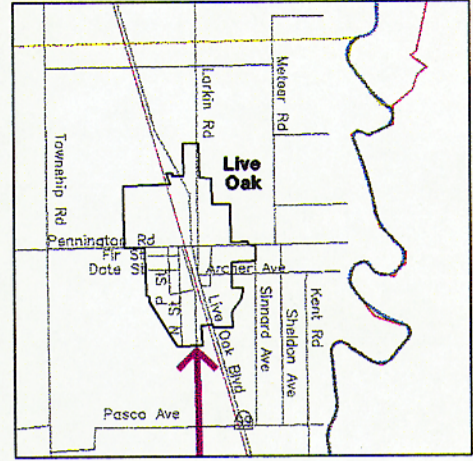
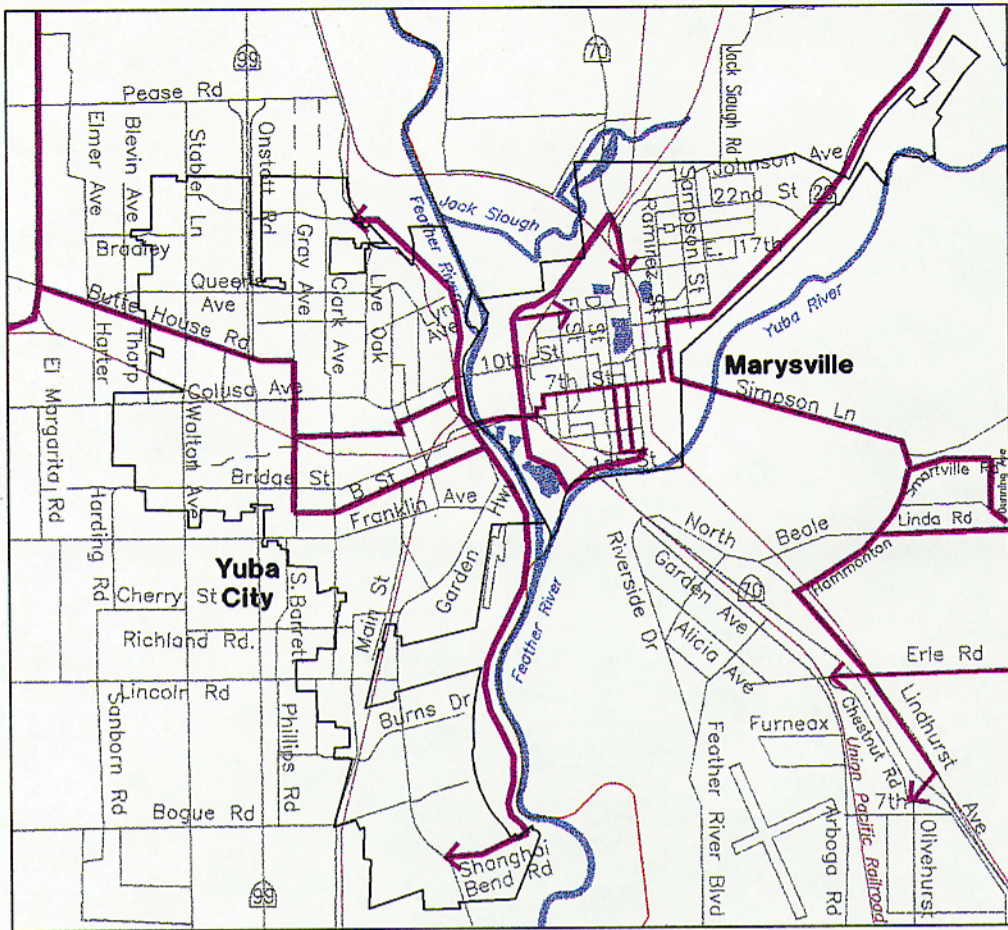
### 5.3 Proposed Route Descriptions

Within the scope of this study, specific routes for commuter and recreational travel were identified based on input from the needs and attitude survey, TAC members, and interested persons during the public workshops. These routes are shown in Figures 11 and 12, respectively. The discussion below describes both types of routes.

#### Commuter Routes

As shown in Figure 11 the commuter routes provide direct connections between the cities in Yuba and Sutter Counties. In some instances these routes also connect neighboring jurisdictions such as Placer, Sacramento, and Yolo Counties. The purpose of the commuter routes is to serve bicycle commuters with the most direct connection possible between major activity centers in each city. The entire commuter route system meets this objective through a combination of on-street and off-street bikeway facilities, which are described below.

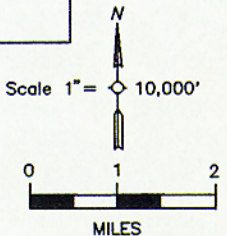
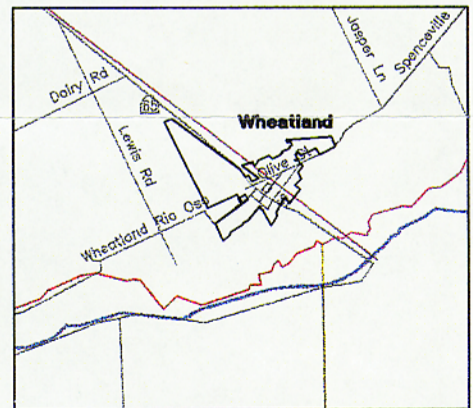
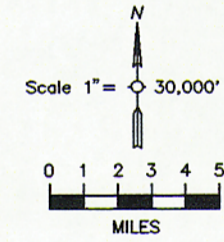
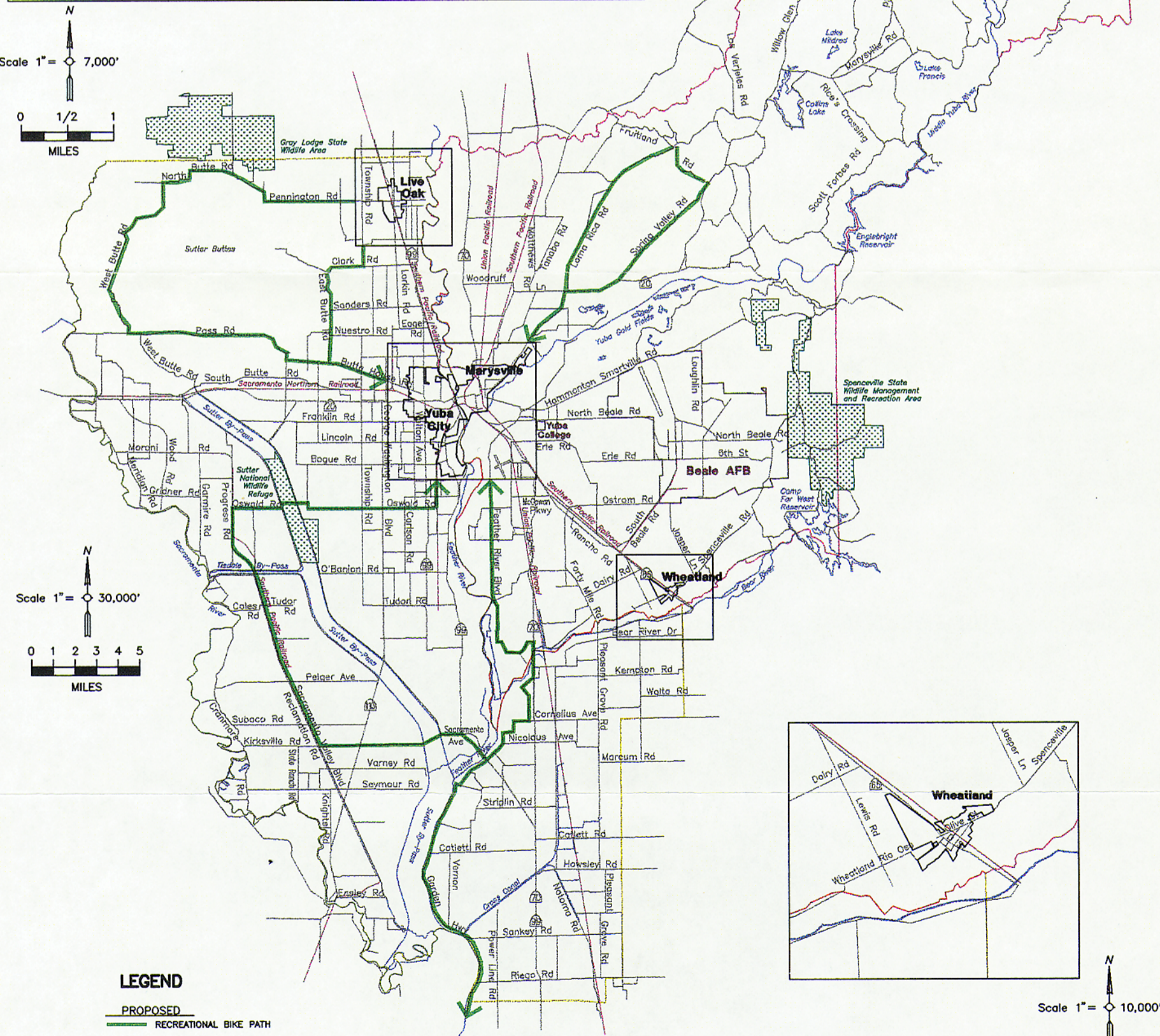
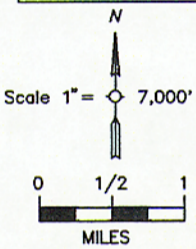
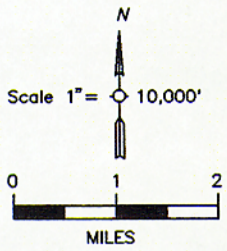
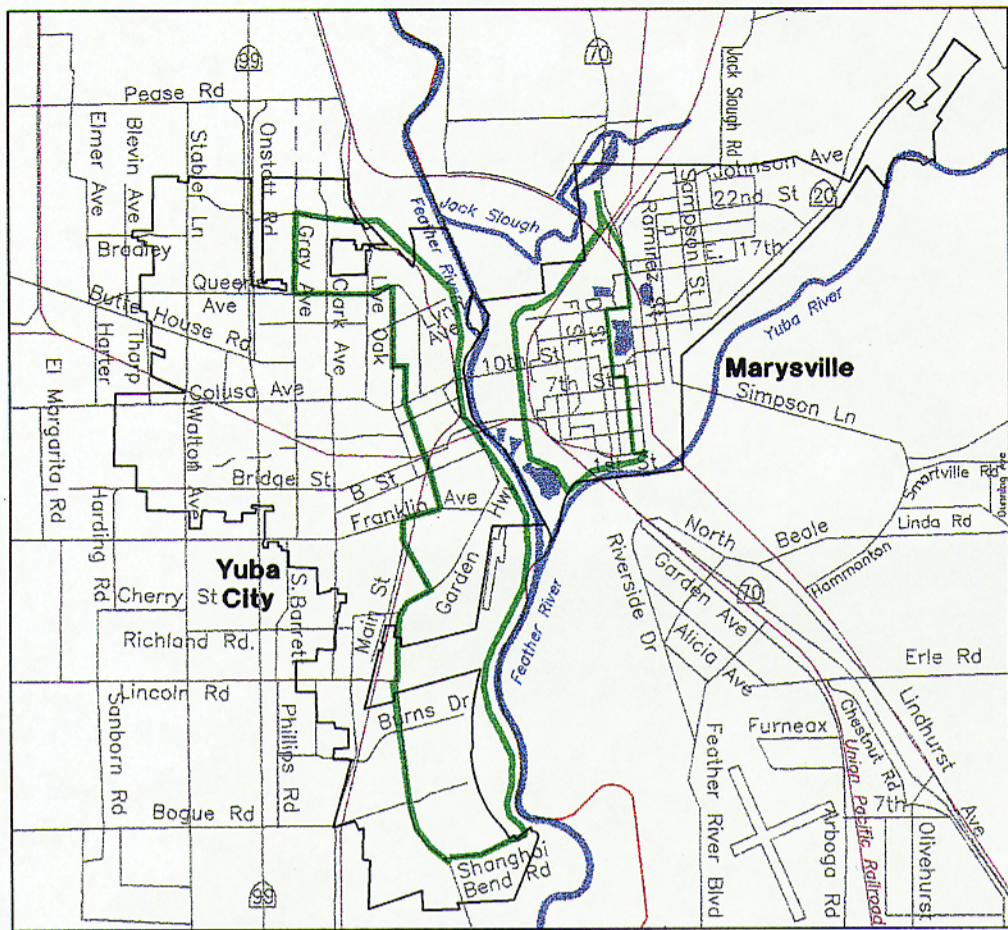




**LEGEND**  
 PROPOSED  
 COMMUTER ROUTE

**YUBA-SUTTER BIKEWAY MASTER PLAN**  
**COMMUTER ROUTES**





**LEGEND**  
PROPOSED  
RECREATIONAL BIKE PATH

**YUBA-SUTTER BIKEWAY MASTER PLAN  
RECREATIONAL ROUTES**



### Marysville to Yuba City

Today, there are no bikeway facilities across the Feather River linking Yuba City and Marysville. Bicyclists are currently forced to share the roadway with vehicle traffic or walk their bicycles across narrow sidewalks on the 5th or 10th Street bridges. As part of the proposed system, a Class I bike path is shown linking the two cities. This path will be an addition to the 5th Street bridge. On either side of the bridge, on-street facilities are recommended that connect to major trip attractors described earlier in Section 2.3.

### Yuba College to Marysville/Yuba City and Wheatland

Yuba College is an important commuter bicycle destination that will be served by Class II on-street bike lanes from the Yuba City/Marysville area and a Class III bike route from Wheatland. The Class II route from the Yuba City/Marysville area will follow Simpson Lane to North Beale Road. From Wheatland, a Class III bike route will follow Jasper Lane to Ostrom Road before turning northward on Virginia Road and then Erle Road and continuing to Griffith Road, which intersects North Beale Road near the College. The combination of these routes is also the recommended travel path between Wheatland and Marysville/Yuba City.

### Olivehurst to Yuba College

Olivehurst residents destined for Yuba College will be served by a combination of Class II and III on-street bikeways via crossings of SR 70 at Lindhurst Drive and Hammonton-Smartville Road to Erle Road and North Beale Road.

### Beale Air Force Base to Marysville/Yuba City and Wheatland

Commuters will access Beale Air Force Base using the same routes described for trips to Yuba College. The only difference will be the continuation of the route on North Beale Road to the base.

### Live Oak to Marysville/Yuba City

Intercity travel between Live Oak and the Marysville/Yuba City area will follow a Class III route on Larkin Road south to Pease Road where the bike route will transition to a Class II bike lane before intersecting Butte House Road. Once on Butte House Road, bicyclists have a number of options for traveling through Yuba City. If continuing to destinations east of the Feather River, bicyclists should follow Butte House Road to Gray Avenue. At Gray Avenue, Class II bike lanes are either existing or proposed along its entire length. By traveling south on Gray Avenue, bicyclists can access the proposed Class I bike path on the Feather River West Levee via the combination of Forbes Avenue and Teegarden Avenue or B Street. Once on the levee path, it is short distance to reach the 5th Street bridge and the proposed Class I path that will parallel the bridge.

## **Recreation Routes**

Recreation routes are intended to provide users with recreational loops that can be used for exercise and general riding pleasure while at the same time providing users with a relatively direct connection to the commuter route system. The four most important recreation routes for this plan according to survey results and input from the TAC are described below.

### Sutter Butte Loop Route

This route is very popular for recreational riders in Yuba and Sutter Counties. Bicyclists can travel from the Marysville/Yuba City area via a combination of Class II and Class III bikeways on Butte House Road to reach Pass Road. Bicyclists will follow Pass Road, a proposed Class III bike route, to West Butte Road. At West Butte Road, bicyclists will turn north following West Butte Road to North Butte Road, which transitions into Pennington Road. Bicyclists will complete the loop route by turning south from Pennington Road to Township Road and then continuing south to Clark Road and finally to East Butte Road.

### Feather River

Within the urbanized area of Yuba City and Marysville, recreational bicyclists can take advantage of short loop routes that use a combination of on-street and off-street facilities. The key components of each loop are the Class I bike paths following the Feather River levees.

### Garden Highway

The Garden Highway offers a recreational route that extends into Sacramento County for long distance riders. This particular route splits at the State Route 99 bridge over the Feather River. Bicyclists coming from or going to the Marysville area are directed to use Feather River Boulevard and then cross the Bear River at State Route 70 before using local roads to reach the Garden Highway. From Yuba City, bicyclists can follow the Garden Highway directly south.

### Loma Rica

One of the more challenging recreational routes is a loop route to Loma Rica via State Route 20, Spring Valley Road and Loma Rica Road. Changing topography results in a number of grade changes along this route, which transitions from the grasslands of the Valley to the rolling foothills of the Sierra Nevada.

## **5.4 Regional and Multimodal Bikeway Connections**

This section addresses regional bikeway connections to surrounding counties and key multimodal transfer locations. Regional connections include those bikeway facilities that connect urban areas in Yuba and Sutter Counties with urban areas in surrounding counties. Multimodal connections allow bicyclists to transfer to other modes such as buses.



## Regional Connections

In the development of the proposed bikeway routes, an effort was made to assess the potential connectivity of Yuba and Sutter county bikeways with existing or planned bikeways in surrounding counties. Yuba and Sutter Counties are surrounded by Butte, Colusa, Nevada, Placer, Sacramento and Yolo Counties.

At present, no existing bikeways connect Yuba and Sutter Counties to these surrounding Counties. The most promising potential connection would link Yolo and Sutter Counties. According to Yolo County officials, a Class II bikeway extends along County Road 102 north from Davis through Knights Landing to the County line. This lane is both striped and signed. This bikeway is well-suited to connect with Cranmore Road in Sutter County where a Class III bikeway facility is proposed.

Another viable connection exists between Nevada and Yuba Counties along State Route 20 and Hammonton-Smartville Road. According to Nevada County officials, a Class II bike lane is provided on State Route 20 from Grass Valley to the County line. West of the County line, no bikeway facilities are present but a Class III bike route is proposed.

A potential connection also exists between Sacramento and Sutter Counties via the Garden Highway, where Sacramento County is proposing an on-street bikeway (classification not determined) that could transition to the proposed Class III bike route through south Sutter County.

Other connections to Butte County, Colusa County, and Placer County are possible along existing roadways. According to survey respondents, Ramirez Road and Township Road provide relatively direct connections to Butte County and the Oroville area. These roadways were designated as having proposed Class III bike routes in the plan although similar facilities are not planned in Butte County at this time. A direct connection is also possible to Colusa County via the proposed Class II bike routes on Pass Road. It should be mentioned that a similar facility is not proposed in Colusa County, at this time. Riego Road provides a direct connection to Placer County and the City of Roseville, although no bikeway facilities are currently planned along this route.

## Multi-modal Connections

The proposed bikeway system includes numerous routes that overlap with existing transit routes and stations. Since the buses operated by Yuba-Sutter Transit offer bicycle racks, transfer to the transit system is very convenient. Key transit stations that are accessible by the proposed system include the following:

- Sutter County Library;
- Yuba County Library;
- Yuba College;
- Fremont-Rideout Hospital;
- Marysville Medical Center;
- Sunsweet Growers;
- Wal-Mart and Sam's Club;
- Yuba City Mall;
- Fremont Hospital;
- Sam Brannan Park (Pool); and
- Feather Downs Shopping Center.

A bike route along 7th Street in Marysville also provides a connection to the AMTRAK station, where intercity bus and rail service is available.

### **5.5 Support Facilities and Programs**

Support facilities and educational programs are an important part of the planned Yuba-Sutter bikeway system. User surveys indicated that the lack of bicycle facilities was an important reason why some people did not ride bicycles to work. The review of bicycle safety in the study area showed that educational programs could benefit children (and adults) in learning basic bicycle safety. This section, therefore, contains recommendations for developing bicycle parking, shower and locker facilities, improved intersection crossing protection, and establishing educational programs.

#### **Bicycle Parking, Shower, and Locker Facilities**

Support facilities such as bicycle parking, shower and locker facilities can encourage bicycling by reducing the threat of theft and making riding more convenient. Properly designed bike racks should be available at bicycle destinations in Yuba and Sutter Counties. For the most part, these facilities should be required for new developments that are likely to experience a demand for bicycle parking such as commercial areas, parks, libraries, schools, major employers, and other facilities. In some cases, though, existing activity centers should add bicycle parking facilities. The type of parking facility (bike rack or bicycle locker) should be selected based on (a) cost, (b) ease of use, and (c) ability to prevent theft.

Access to shower and locker facilities may help encourage people to commute by bicycle, particularly in the summer months. Many jobs require employees to wear specific uniforms or formal attire such as suits and ties. By having shower and locker facilities, employees have the option to shower and dress at work. This is an important consideration for bicycle commuters since they cannot control their travel environment and are much more dependent on support facilities located at the workplace.

The following action is recommended for increasing the number of locations with bicycle parking, shower, and locker facilities:

- Require the installation of bicycle parking, shower, and locker facilities as conditions of approval for major new developments. This requirement could be incorporated into the trip reduction ordinance that each jurisdiction in Yuba and Sutter Counties is required to adopt as part of the Bi-County Congestion Management Program, which is being updated this year.

#### **Crossing Protection**

These improvements should be targeted for major intersections on the proposed bikeway network, and at locations where school children cross a busy street to gain access to their school. The following steps are recommended to build upon this effort.

- Consider the use of signing, striping, crossing guards, flashing beacons, and pedestrian actuated signals at street crossings with high levels of pedestrian and bicycle demand when warranted by engineering standards.
- Consider the installation of detectors at signalized intersections along the bikeway system as intersections are upgraded. Detectors should be located within the striped bike lane either along the curb or between the right-turn lane and through lane. Detectors should be installed so as to be triggered by bicycles: location of trigger point should be identified by a stenciled emblem. Where possible, four foot pockets should be provided at intersections between the right turn only lane and the through lane. Signal detectors should be provided at major signalized intersections unless pre-timed signal coordination is in effect.

### **Educational Programs**

Programs to teach existing and potential bicyclists, young and old, about the fundamentals of bicycle riding are important to establishing good riding habits. Currently, elementary school children are given bicycle-riding safety presentations by law enforcement officials in many Yuba and Sutter County communities. The following steps are recommended to build upon this effort:

- Continue and expand the current bicycle education program for school children in Yuba and Sutter Counties by (a) ensuring the program receives adequate funding and (b) expanding the curriculum to include "bicycle rodeos," where children are given actual riding lessons on school property.
- Establish an adult bicycle education program through Yuba College, parks and recreation departments, or other city departments that (a) teaches adults how to ride defensively, and (b) encourages people to ride to work. This program may include the use of volunteers from local bicycle clubs, and possibly sponsorship of bicycle tours and races.
- Educate drivers about the rights of bicyclists through a variety of means including (a) making bicycle safety a part of traffic school curriculum in Yuba and Sutter Counties, (b) producing a brochure for public distribution on bicycle safety and rights, (c) enforcing existing laws regarding both motorists and bicycles, (d) encouraging the state to include questions about bicycle safety and operations on drivers license exams, and (e) providing signs at strategic locations advising motorists to share the roadway with bicyclists.
- Develop and market a bicycle/pedestrian safety education kit to be available for businesses, employers, and schools. Establish and regularly update any resource guides, videos, maps, books, etc. that are developed as part of the kit.

## 5.6 Air Quality Benefits

Bicycle ridership is expected to increase as a percentage of overall travel in Yuba and Sutter Counties due to implementation of the bikeway master plan. Section 4.0 contained 2015 forecasts of daily bicycle trips assuming that the mode share for bicycle trips would increase to four percent. Each bicycle trip represents a potential reduction in air pollutant emissions, especially if it replaces a vehicle trip.

For the purposes of this study, potential air quality benefits were measured using emission reduction calculations developed by the South Coast Air Quality Management District as part of the California Environmental Quality Act Air Quality Handbook. In general, the calculations consider the number of bicycle trips, the average length of a bicycle trip, and emission factors. The general form of the emissions equation is as follows:

$$\text{Emissions} = (\text{No. of trips} \times \text{Trip Length} \times \text{Emission Factor}) + (\text{No. of trips} \times \text{Percent Cold Starts} \times \text{Cold Start Emission Factor})$$

Emissions savings were calculated for the following pollutants:

- Carbon Monoxide (CO);
- Oxides of Nitrogen (NO<sub>x</sub>);
- Volatile Organic Compounds (VOC); and
- Fine Particulate Matter (PM10).

The number of bicycle trips used in the emission calculations is 15,310, which is the forecast number of bicycle trips in 2015 assuming the bikeway master plan is implemented. The resulting emission savings per day are as follows:

- CO = 3,408 lbs.
- NO<sub>x</sub> = 142 lbs.
- VOC = 279 lbs.
- PM10 = 9 lbs.

These daily emission savings would equate to over 700 tons of annual pollution reduction due to bicycle travel assuming each bicycle trip replaces a single occupant vehicle trip.