To Bike or Not to Bike: Bicycle Master Planning with GIS

Abstract: The ultimate goal with any bicycle master plan is to increase the number of persons who bicycle for transportation to work, school, errands, and for recreation. Sacramento County’s Bicycle Master Plan Update was intended to guide and influence bikeway policies, programs, and development standards to make bicycling in Sacramento County more safe, comfortable, convenient, and enjoyable for all bicyclists. In addition to extensive public participation, workshops, and data collection, a GIS suitability analysis was performed in order to determine which planned routes should be given higher priority based on factors such as origin/destination proximity, roadway traffic patterns, bicyclist comfort level, and bicycle/vehicle collisions. This paper will explore why GIS was an essential tool in the creation and analysis of the Sacramento County Bicycle Master Plan Update.

BACKGROUND INFORMATION
The existing County of Sacramento Bicycle Master Plan was adopted in 1993 and is a joint document with the City of Sacramento. The Bicycle Transportation Act requires that local agencies complete a Bicycle Master Plan in order to qualify for grant funds issued by the California Department of Transportation through the Bicycle Transportation Account. The Bicycle Transportation Act requires that Bicycle Master Plans contain a minimum of 11 key elements. The Bicycle Transportation Act further requires that Bicycle Master Plans be updated every four years.

GOALS
The goals of the project were to:
- Increase bicycle usage in Sacramento County by 100% for all trips by 2030.
- Reduce bicycle collisions and injuries from all causes by 50% of 2010 levels by 2030.
- Increase the total number of bicycle facilities by at least 5% each year.
• Ensure funding proportionate to mode share for County bicycle facilities, transportation programs and staff support.

ROUTE SELECTION CRITERIA
The development of the proposed system of bikeways took into account the broader goals for bikeway development. In particular, the plan emphasizes a comfortable, convenient, and well-connected bikeway system that meets the transportation and recreational needs of bicyclists. Factors considered during development of the proposed system include the following.

Needs Assessment – The needs assessment conducted by the project team included a review of existing plans and studies, a field survey of existing bikeways, and consideration of public input.

Anticipated Utilization – Priority bicycle facilities in the proposed system reflect use levels that are commensurate with the level of investment required for construction and maintenance.

System Coverage – The proposed system considers balanced access from the County’s population centers for both commuting and recreational purposes. Appropriate emphasis is placed on projects located in infill areas of the County due to the reduced level of existing facilities in these older areas.

Connectivity – The proposed system provides connections between existing bicycle facilities, residential areas, schools, parks, public transit stops, shopping centers, and employment centers. It also has an emphasis on connections to major activity centers and multimodal transfer locations.

Connections to Adjacent Jurisdictions – The proposed bikeway system connects the Sacramento County system to surrounding communities such as the City of Rancho Cordova, City of Elk Grove, City of Sacramento, City of Folsom, City of Galt, City of Roseville, City of Citrus Heights, West Sacramento, Sutter County, Yolo County, and Placer County.

Projects of Regional Significance – Projects that cross jurisdictional boundaries are potentially regionally significant bike facilities. This is important because a recurring theme throughout the planning process was a desire for bicyclists to access bikeways and use them for long, uninterrupted rides.

INVENTORY
Existing conditions were surveyed using GPS linked video data collection. This enabled the user to capture a large amount of data, and to capture information in both directions. This data collection allowed the team to create accurate cost estimates and in some cases enabled the County staff to fix the easiest deficiencies as data collection progressed. The information captured included:

• Bike related signage
- Stripe presence and paint quality
- Width of pavement between paint stripe and curb
- Pavement quality
- Number of lanes
- Type of parking

At the conclusion of the data collection, it was determined that there are 203.9 miles of Existing Class I bike paths, Class II bike lanes, and Class III bike routes.

**SUITABILITY ANALYSIS**
A composite suitability index was established to show where likely improvements were needed. Specific parameters can be broken down to two groups, proximity factors and roadway conditions.

**Proximity Factors**
Proximity was used to determine accessibility to nearby land uses such as regional parks, public facilities, schools, employment centers, residential and non-residential land uses.

**Roadway Conditions**
Roadway Conditions were used to determine the comfort level of the bicyclists and include number of lanes, capacity, average daily traffic volumes, type of parking, and speed.

**RESULTS**
The outcome of the suitability analysis was a prioritized list that could be arranged into short-term, mid-term and long-term time periods. The County can remove project from this list as they complete them, and other projects will rise in importance.

**THE IMPORTANCE OF GIS**
GIS plays a key role in this process as it:
- Enables the County to acquire an accurate inventory
- Enables the County to keep the records accurate by keeping the data updated
- Allows for real implementation across County departments with a common database system
• Interconnects with other jurisdictions
• Becomes a “living document” instead of a stagnant, disconnected paper document

SIMILAR APPLICATIONS
Fehr & Peers was able to utilize similar methodology on several additional projects including the City of Fresno Bicycle, Pedestrian Master Plan and the Nevada County Pedestrian Improvement Plan. Additionally, some data may be used in creating SACOG’s planned online bicycle trip planner, which would work similar to Google maps trip planner for driving. Finally, the report was created so that the maps can be printed in a “map book” format similar to the Thomas Guide style.