Summary Report

FHWA
Bicycle and Pedestrian
Safety Research Program

The FHWA's Bicycle and Pedestrian Safety Research Program is a multi-year program that seeks to improve bicycle and pedestrian safety, operations, and mobility through a comprehensive program of data collection and analysis, engineering and planning, countermeasure development and evaluation, public awareness and technology transfer. This research program is leading to improved bicycle and pedestrian programs, transportation planning and engineering tools and guidelines for use at the national, state, and local levels.

U.S. Department of Transportation
Federal Highway Administration
Research and Development

Estimating Non-Motorized Travel Demand

Introduction

The Federal Highway Administration has developed a two-volume "Guidebook on Methods to Estimate Non-Motorized Travel." The first volume, "Overview of Methods," provides an overview of available methods for predicting future levels of bicycle and pedestrian travel or travel demand while the second volume, "Supporting Documenta- tion," provides detailed information on the methods and includes a variety of reference materials.

The guidebook provides a means for practitioners to better understand and estimate bicycle and pedestrian travel, address transportation planning needs, and respond to several, related questions:

- If we build a new bicycle or pedestrian facility, how many people will use it?
- If we improve an existing facility or network, how many more people will choose to travel by bicycle or on foot?
- What kinds of improvements will have the greatest impact on increasing non-motorized travel?

Meeting the needs of all travelers, including pedestrians and bicyclists, requires better analytical tools for bicycle and pedestrian planning. This is becoming apparent as actual projects are being implemented and funding priorities are being established. The guidebook supports efforts to improve conditions for bicyclists and pedestrians that have evolved out of new opportunities created by Federal legislation, state and local initiatives, and increased public interest in bicycling and walking. The guidebook is designed to support transportation agencies at all levels of government that are focusing on multi-modal approaches to addressing community transportation needs.

In 1996, the Federal Highway Administration convened a meeting of leading practitioners and researchers to identify the state of the practice in non-motorized travel demand forecasting, discuss current methods of integrating bicycling and walking into regional travel models, and to determine high-priority needs in research and technology transfer. This guidebook helps address several of the

needs identified at the meeting.

The guidebook describes and compares some 19 methods and elements of non-motorized travel forecasting; three examples of the methods are presented in this summary. The methods range from relatively simple sketch planning techniques for estimating the impacts of specific facilities to integrative network analyses and complex regional travel models. In addition to methods to forecast demand, the guidebook also describes quantitative methods that support project prioritization. A summary of methods described in the guidebook is included below.

Available Methods to Estimate Non-Motorized Travel Demand

Purpose	Method	Description
Demand Estimation		Methods that can be used to derive quantitative estimates of demand.
	Comparison Studies	Methods that predict non-motorized travel on a facility by comparing it to usage and to surrounding population and land use characteristics of other similar facilities.
	Aggregate Behavior Studies	Methods that relate non-motorized travel in an area to its local population, land use, and other characteristics, usually through regression analysis.
	Sketch Plan Methods	Methods that predict non-motorized travel on a facility or in an area based on simple calculations and rules of thumb about trip lengths, mode shares, and other aspects of travel behavior.
	Discrete Choice Models	Models that predict an individuals travel decisions based on characteristics of the alternatives available to them.
	Regional Travel Models	Models that predict total trips by trip purpose, mode, and origin / destination and distribute these trips across a network of transportation facilities, based on land use characteristics such as population and employment and on characteristics of the transportation network.
Relative Demand Potential		Methods that do not predict actual demand levels, but which can be used to assess potential demand for or relative levels of non-motorized travel.
	Market Analysis	Methods that identify a likely or maximum number of bicycle or pedestrian trips which may be expected given an ideal network of facilities.
	Facility Demand Potential	Methods that use local population and land use characteristics to prioritize projects based on their relative potential for use.
Supply Quality Analysis		Methods that describe the quality of non-motorized facilities ("supply") rather than the demand for such facilities. These may be useful for estimating demand if demand can be related to the quality of available facilities.
	Bicycle and Pedestrian Compatibility Measures	Measures that relate characteristics of a specific facility such as safety to its overall attractiveness for bicycling or walking.
	Environment Factors	Measures of facility and environment characteristics at the area level that describe how attractive the area is to bicycling or walking.
Supporting Tools and Techniques		Analytical methods to support demand forecasting.

Geographic Information Systems	Emerging information management tools, with graphic or pictorial display capabilities, which can be used in many ways to evaluate both potential demand and supply quality.
Preference Surveys	Survey techniques that can be used on their own to determine factors which influence demand, and that also serve as the foundation for quantitative forecasting methods such as discrete choice modeling.

Discrete Choice Models: Access to Transit

A Discrete Choice Model predicts a decision made by an individual as a function of several variables. Widely used by regional travel demand forecasting experts, applications have been developed to predict choices that include non-motorized modes of travel.

In Chicago, a Discrete Choice Model was used to forecast the impacts of pedestrian and bicycle improvements on the mode of access to transit. Bicycle improvements tested included removal of debris, provision of parking, slowing of traffic, and installation of curb lanes, paths, and bicycle routes. Figure 1 illustrates the type of survey instrument used to develop the choice model.

Figure 1. Surveyors in Chicago used a touch screen survey like this one to determine transit rider preferences.

Facility Demand Potential: Latent Demand Scoring

The Latent Demand Scoring (LDS) technique provides a way to estimate the potential or "latent" demand for bicycle travel assuming that a bicycle facility exists on a road segment. Potential trips are estimated through analyzing the trip generation characteristics of activity centers and populations and their proximity to segments of the facility network. The LDS method can be used to compare and prioritize facility improvements to capture the greatest numbers of potential bicycling and walking trips.

Figure 2. A Latent Demand Scoring (LDS) system was used

to target areas for improvements, and to quantify the "market potential" for bicycling in the City of Vero Beach, Florida. The latent demand scores, represented here by lines of increasing thickness, were used to develop recommendations and priorities for bikeway network projects.

Geographic Information Systems: Analyzing Bicycle Travel Networks

Geographic information systems (GIS) refer to computer-based systems for managing and manipulating spatial data. GIS are used in transportation to manage information about transportation facility networks and provide analytic support for planning efforts. The guidebook provides several examples of uses of GIS in non-motorized travel demand forecasting, supply quality analysis and project prioritization.

In a study of the Warwick, RI bicycle network, street segments were analyzed for their proximity to area school locations using a GIS. Values were assigned to segments within school travel zones to reflect travel demand, and priority in planning physical improvements. Similar analyses were conducted for major employment sites and residential areas.

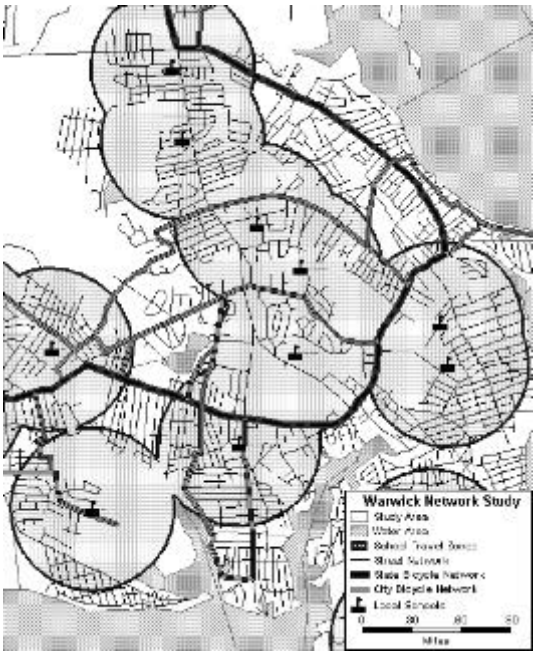

Figure 3. Another key function of GIS is converting spatial data into visual or printed map form. Planners, policy-makers and citizens alike can identify areas of the network needing improved bicycle access to schools, or similar analyses, using thematic maps like this one.

To Obtain the Guidebook

Contact Ann Do or Mike Culp at the addresses below.

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