GIS Tools for Improving Pedestrian And Bike Safety

Pedestrian & Bicycle Safety

The Pedestrian & Bicycle Safety Research Program focuses on identifying problem areas for pedestrians and bicycles, developing analysis tools that allow planners and engineers to better understand and target these problem areas, and evaluating counter-measures to reduce the number of crashes involving pedestrians and bicycles.

Geographic Information System (GIS) software turns statistical data such as accidents and geographic data such as roads and crash locations into meaningful information for spatial analysis and mapping. In this project, GIS–based analytical techniques have been applied to a series of pedestrian and bicycle safety issues:

- safe routes for walking to school
- selection of streets for bicycle routes
- high pedestrian crash zones

Also, tools were developed to make it easy for non-GIS specialists to perform similar analysis. The three safety analysis tools for pedestrian and bicycle applications will be available on a demonstration CD-ROM in late summer 2000. The CD-ROM will provide insight into how GIS can be used to improve pedestrian and bike safety, demonstrate the safety analysis tools using real-world data, and contain the software code that users can adapt to fit their particular needs. The minimum requirements to run the safety analysis tools include ArcView 3.0 or higher, Network Analyst extension, Spatial Analyst extension, and Windows 95,98, or NT.

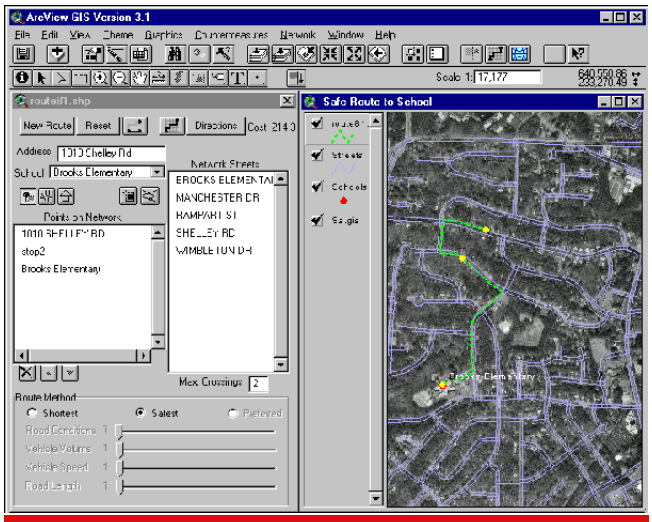

Figure 1. GIS generated safe walking route to school.

Users should be aware that many data items (sidewalk, curb lane width, crosswalk locations, etc.) needed for safe route to school and bicycle applications are not in traditional roadway inventory files maintained by state and local transportation agencies. This data should be collected along with other roadway inventory information during data base updates.

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Federal Highway Administration

Safe Route to School

This tool generates a walking route and associated directions for the 1) shortest route to school, 2) safest route based on hazard associated with various road and traffic elements, or 3) preferred route (based on preferences selected by the user). The potential users of this tool are parents, school transportation officials, planner, engineers, or others responsible for the safety of school children. The users will be able to choose routes with stops along the way (e.g. friends house) or routes that avoid certain locations. The application currently runs as a stand-alone program in the Windows operating environment and work has started on making the application run on the Internet.

Bicycle Compatible Routes

This tool provides two output options. The first option is similar to the safe route to school. This option generates a map and directions for the quickest or best bike route for an individual trip between user selected points. The best route is based on the bicycle compatibility index (BCI) which is a calculation of the comfort of each street segment based on roadway and traffic characteristics.[1] The comfort index is based on ratings by more than 200 bicyclists. The second output option is a color-coded map based on the bicycle compatibility index of all streets in a study area. This option can assist bicycle coordinators, planners, traffic engineers, and others in designating bike routes and identifying bicycle facilities that may need improvement.

High Pedestrian Crash Zones

This tool uses grid and map algebra to generate a contour map identifying areas of high crash occurrence, as determined by crash density, and clusters of crashes involving pedestrians or bicyclists. Summary statistics of selected zones can be generated and displayed in table or chart format.

Reference

1. D. Harkey et. al., *The Bicycle Compatibility Index: A Level of Service Concept*, TechBrief, Publication No. FHWA–RD–98–095, Federal Highway Administration, December 1998.

For More Information

The GIS safety analysis tools were developed by the North Carolina Center for Geographic Information and Analysis (CGIA) in cooperation with the North Carolina Department of Transportation and Wake County Public School System with financial support from the Federal Highway Administration. The University of North Carolina Highway Safety Research Center assisted in the development of the tools and database.

For more information about this effort or to obtain a copy of the demonstration CD-ROM to be available in late Summer 2000, contact either: Davey Warren, Federal Highway Administration, 202.493.3318, *davey.warren@fhwa.dot.gov* or Tim Johnson, Center for Geographic Information & Analysis, 919-733-2090 *tim@cgia.state.nc.us*

Figure 2. Color coded map indicating the compatibility of each street link for bike riding.

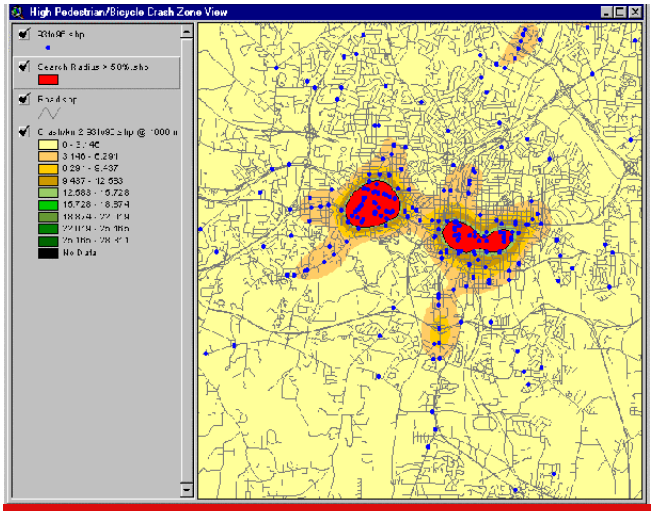

Figure 3. High pedestrian crash zones generated using GIS.

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FHWA-RD-00-153
July 2000