

## Priority, Market-Ready Technologies and Innovations

### Improved Decisionmaking Using Geographic Information Systems

**Problem: Geographic information systems (GIS) are underutilized in the transportation decisionmaking process**

Transportation planners must incorporate a diversity of information into the planning process; however, this information often takes time to collect, is not centralized, and is not easily presentable. An accessible information tool would be useful in the planning, scoping, permitting, and evaluating processes associated with transportation decisionmaking.

**Putting It in Perspective**

By using GIS to more efficiently bring information together, transportation planners are in a better position to review, analyze, and understand the problems they are addressing. This efficiency can save time and money, and can lead to improved decisionmaking.

**Solution: GIS can inform transportation planning**

*What is GIS?*

GIS is a system of computer hardware and software that collects, stores, analyzes, and disseminates information about areas of the earth. While GIS often helps users create maps, the true power of GIS allows the user to maximize the quality and use of spatial data to answer questions of where, how far, how many, what size, and within what area.

*Why is GIS useful?*

GIS offers significant advantages over conventional computer programs and can be used in a wide range of transportation applications. In addition, GIS enables users to visualize

the spatial relationships between various geographically referenced features, such as the location of clusters of highway crashes. GIS also facilitates the integration of different databases. Transportation planners, for example, could use GIS to integrate a database with information on the location of transportation projects with another database that includes information on local land characteristics to produce a map that identifies land parcels and environmentally sensitive areas that may be affected by a new highway corridor. GIS also helps transportation staff present findings to policymakers and the general public using visually attractive and understandable thematic maps.

**Benefits**

- Encourages partnerships and data sharing.
- Helps identify potential problems early in the planning process.
- Provides users with access to quality data.
- Improves feedback with maps and summary reports.

**Successful Applications: States get results from GIS**

*Arkansas*

The Arkansas State Highway and Transportation Department (AHTD) used GIS to streamline the transportation decisionmaking and permitting processes for the Southeast Arkansas I-69 Connector (I-69 SE-Connector) project. GIS enabled AHTD to share and consolidate environmental and engineering data, and refine and analyze large amounts of study area information. AHTD also used GIS to foster early coordination with resource agencies, the public, and Native American tribes while

simultaneously addressing the requirements of the environmental review process. Agencies partnering with AHTD supported the use of GIS because it enabled the project to move forward faster. In addition, AHTD produced maps and analyses using GIS that provided the partnering agencies and communities with tangible examples of how various project alternatives would impact environmental, cultural, and economic resources.

Through the use of GIS, AHTD reduced the amount of time from publication of the Notice of Intent for the I-69 SE-Connector project to the issuance of the Record of Decision by approximately 60 percent.

#### *Nevada*

The Nevada Department of Transportation (NDOT) developed the Safety Management System (SMS), a transportation GIS, to merge crash data with a roadway base map. To create the system, NDOT staff compiled partial datasets from several State and local offices into a single, consistent base map in a new database. SMS can locate crashes using a nearby address, the distance from an intersection, the distance from a milepost, or other methods that the police use. After locating the crashes, the system then can identify them on a roadway base map. The relationship between the location and the attributes of a crash and the roadway are maintained in the SMS.

With the new SMS, NDOT staff can perform numerous applications, such as corridor analyses and midblock analyses. Dataset merges help identify relationships between crashes and other factors, such as pavement conditions.

In the future, NDOT will incorporate other data and features into the SMS. NDOT plans to include global positioning system data in the system and make the system accessible from the agency's intranet.

### **Deployment Statement**

The Federal Highway Administration (FHWA) views GIS as an important tool in making better informed transportation decisions.

### **Deployment Goal**

FHWA aims to:

- Increasing 10 percent the number of GIS applications reported in American Association of State Highway and Transportation Officials' (AASHTO) annual GIS for Technology (GIS-T) survey.
- Increase the number of GIS applications designed to help agencies make planning, environmental streamlining, and right-of-way decisions.
- Enlist every State's participation in the 2006 AASHTO GIS-T survey.

### **Deployment Status**

FHWA is in the process of receiving results from the AASHTO annual GIS-T survey, which should be completed by April 2006.

### **Additional Resources**

FHWA's National Highway Institute (NHI) offers a training course titled, Applying GIS and Spatial Data Technologies to Transportation (NHI 151039). The goal of the course is to train and prepare participants in how to plan for and evaluate the implementation of a variety of transportation planning applications that rely on GIS and spatial data technologies. For more information on the course, visit <http://www.nhi.fhwa.dot.gov/coursedes.asp?courseenum=1064>.

In addition, FHWA's "GIS in Transportation" Web site, found at <http://gis.fhwa.dot.gov>, highlights innovative transportation-related applications of GIS across the country and serves as a portal to GIS activities sponsored by FHWA and its partners and customers. The site also is home to detailed descriptions of featured GIS applications, a searchable database of GIS applications, links to upcoming events, GIS data sources, publications, and FHWA contacts.

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