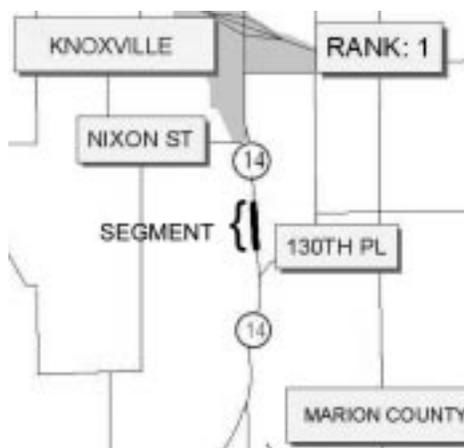# Tools developed to identify potential high crash locations

Most roadway crash mitigation programs are reactive—that is, roadway safety improvement decisions are based on crash history only *after* high crash rates have been observed. Now, new innovations in geographic information systems (GIS) have produced tools for transportation safety professionals to identify potentially hazardous roadway locations *before* more crashes occur.

These tools were developed as part of the *Systematic Identification of High Crash Locations* (TR-442) study sponsored by the Iowa Department of Transportation (Iowa DOT) and Iowa Highway Research Board. Reg Souleyrette, associate director for transportation planning and information systems at CTRE, led the effort to

This segment ranks No. 1 statewide in potential for head-on crashes.

1. develop innovative GIS database integration and crash data extraction techniques

2. create comprehensive statistical models of the relationships between crash rates and selected roadway design characteristics

3. produce lists of the top potentially high crash locations for each roadway design characteristic considered

4. develop models and procedures to analyze specific roadway characteristics and crash potentials

Database integration

Several data sources were integrated to produce a comprehensive and unprecedented database of Iowa roadway and crash data. The new database maps roadway characteristics such as lane width, surface and shoulder types, and traffic volume with vehicle, driver, roadway condition, and crash severity data. The innovative techniques used to integrate the two complex data sets may serve as a model for similar future efforts.

Statistical modeling

Using the integrated database, the relationships between crash rates and selected roadway design characteristics were identified. Examples include the following:

- Head-on crash rates are higher on local and farm-to-market highways than on US or Iowa highways. Head-on crash rates are also affected by speed limit, terrain, shoulder width and type, and pavement condition.

- Fixed-object crash rates are higher on local and farm-to-market highways than on interstates or US/Iowa highways. Fixed-object crash rates are also affected by terrain, pavement and shoulder types, surface width, and the absence of median barriers.

- The degree of curvature has a direct impact on crash rates on horizontal curves. Also, the crash rate on shorter curves is significantly higher than the crash rate on longer curves. This is probably because sharp curves are usually shorter than mild curves.

Advancing PCC pavement research

Iowa State University's new Portland Cement Concrete Pavement Research (PCC) Laboratory, currently under construction, will be one of the few university laboratories in the country (perhaps the only one) with an entire PCC research system under one roof. The new lab will further Iowa's national leadership role in PCC pavement research and innovation.

The new lab will have four major components:

- concrete processing/manufacturing

- mechanical testing of hardened concrete

- fresh concrete property measurement

- durability-related experiments

By simulating field conditions in the lab, university researchers and graduate students will be able to conduct accelerated and more cost-effective performance testing than traditional in-place field tests.

The lab is a project of the Center for Portland Cement Concrete Pavement Technology (the PCC center), which is administered through CTRE. The Iowa Concrete Paving Association is funding the majority of building remodeling and lab equipment costs. ISU's Department of Civil and Construction Engineering and Office of the Vice Provost for Research and Advanced Studies will contribute the balance.

For more information, contact Kejin Wang, assistant professor of civil and construction engineering, 515-294-2140, kejinw@iastate.edu, or Dale Harrington, director of the PCC center, 515-294-8103, pcconc@iasatate.edu. •
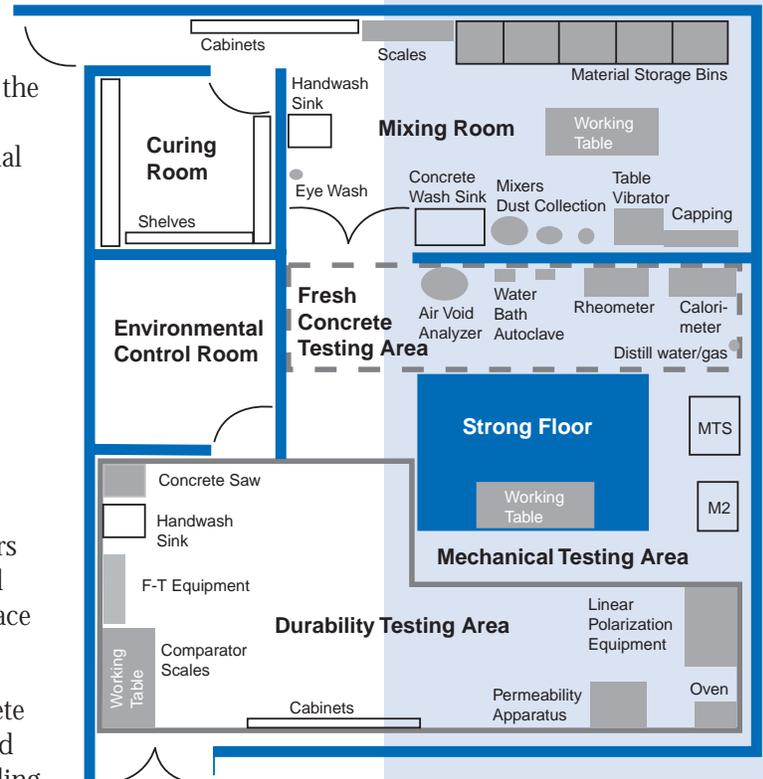
Design for Iowa State University's new PCC Pavement Research Laboratory.

Mapping potential high crash locations

The high crash location identification tools developed as part of this study will help the Iowa DOT identify appropriate future roadway safety improvement project locations. To demonstrate the utility of the project's tools, lists and maps of the top potentially high crash locations were generated for each design characteristic considered (see map on page 4 for example).

Other applications

The CTRE project team has also generated many other related tools and applications. One such application, a database of roadway curves, has already directly led to the deployment of measures to mitigate dangerous curves.

For more information about high crash locations

The report is online at www.ctre.iastate.edu/reports/hcl.pdf. For more information, contact Ali Kamyab, research scientist, 515-294-4303, kmb@iastate.edu. •