UTILIZING GIS TO IMPROVE SAFETY ON THE NATION'S HIGHWAYS

Craig Thor, Ph.D.

Geographic Information Systems (GIS) in Transportation Safety
December 4-5, 2012
GIS at FHWA

- Asset Management
- Planning
- Bridge Inventory
- Highway Performance Monitoring
- Operations
- SAFETY
GIS in the FHWA Safety Program

• Analysis Tools
  - GIS Safety Analysis Tools
  - PBCAT – Pedestrian and Bicycle Crash Analysis Tools
GIS Safety Analysis Tools

- Crash Reports
- Aerial Photography
- Video Logs
Intersection Analysis

• Evaluation of crashes at a specific location (intersection)
Strip Analysis

• Evaluation of crashes along a designated length of roadway
Sliding Scale Analysis

• Input Parameters
  – Starting length
  – Extension length
  – Maximum extensions without a crash
  – Exclusion distance (e)
  – Y-line distance (y)
  – Crash rate
  – Average crash rate
Corridor Analysis

- Evaluation of crashes within a corridor, which may include several connected roadways

**EXAMPLE:**
Truck crashes within Wake County, NC
Truck Route Network
Sliding Scale Analysis

**Input Parameters**
- Starting length: *(1.6 km)*
- Extension length: *(0.16 km)*
- Maximum extensions without a crash: *(5)*
- Exclusion distance (e): *(0)*
- Y-line distance (y): *(0)*
- Average crash rate (crashes / MVM):
  - Interstate: 0.104
  - US Routes: 0.088
  - NC Primary: 0.086
  - NC Secondary: 0.063
Sliding Scale Analysis Results
Critical Locations
Truck Route Network
Critical Locations Off Primary Routes

- STAA Routes
- High Crash Zones
- High Crash Zone / STAA Route Intersection Access Points

1. 2. 3. 4. 5. 6. 7. 8.
Pedestrian and Bicycle Safety
Roadway Safety Analysis

• FHWA supported projects for advanced data analysis
  – Highway Safety Manual (HSM)
    • Provides transportation professionals with knowledge, techniques, and methodologies to quantify the safety-related effects of transportation decisions
  – SafetyAnalyst
    • Incorporates state-of-the-art safety management approaches into analytical tools to identify safety improvement needs and to develop a systemwide program of site-specific improvement projects.
  – Interactive Highway Safety Design Model (IHSDM)
    • A suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on highways
  – CMF Clearing House
GIS in the FHWA Safety Program

- Roadway Safety Data Partnership (RSDP)
  - A collaborative effort between FHWA and States to ensure that they are able to develop robust data-driven safety decisions.
  - Capability Assessment
  - Peer Exchanges

- Model Minimum Uniform Crash Criteria (MMUCC)

- Model Inventory of Roadway Elements (MIRE)

http://www.mmucc.us/

http://www.mireinfo.org/
GIS at State DOTs

• States are moving towards or have created GIS-based data and analysis systems

• Everyday users of the data
  – What are the States doing?
  – What are the priorities?
  – What are the challenges and capability gaps?
  – **HOW CAN FHWA HELP?**
Assessing GIS Needs for State and Local Safety Programs

• October, 2012 – September, 2013
• Objectives
  – Assess the GIS practices, needs and challenges, and opportunities in safety programs.
  – Help guide future efforts to best support the needs of agencies as they develop and improve their GIS programs for safety.
Current Challenges

• **Existing Analytical Tools**
  – Available GIS software applications
  – Analytical/statistical techniques

• **Technical obstacles**
  – Warehousing the data
  – Data precision/accuracy
  – Availability of basemaps
  – Different geo-referencing systems
  – Incompatible data definitions/formats

• **Administrative obstacles**
  – Establishing a GIS Champion
  – Funding challenges
  – Identifying GIS as a priority
  – Determining the cost/benefit of GIS implementation
  – Data ownership
What is Needed?

• Research Topics
  – Identification of current state of practice
  – Emerging practices/tools, i.e. what will be available in the future?
  – Identification of research gaps that FHWA can help support filling.
  – What program support can FHWA provide?
  – What guidance can be developed to address known administrative challenges?
UTILIZING GIS TO IMPROVE SAFETY ON THE NATION'S HIGHWAYS

Craig Thor, Ph.D.

Craig.Thor@DOT.GOV