Integrating Multiple Linear Referencing Methods into a Web-Based GIS for Crash Mapping

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Introduction

Many DOTs use Geographic Information Systems (GIS) to map, manage, and analyze vehicle crashes.
Puerto Rico Traffic Safety Commission is developing a tool for crash mapping and analysis.
PR DOT is transitioning to the newly expanded Highway Performance Monitoring System (HPMS) requirement entitled the All Road Network of Linear Referenced Data (ARNOLD).
ARNOLD requires all public roads to be on one network, instead of only federally-aided routes.
Both agencies are coordinating to develop an enterprise GIS combining crash safety mapping with the HPMS initiative.

Objectives

Create a linear referenced roadway network capable of handling multiple LRMs on all public routes within Puerto Rico
Use GIS to:
Merge existing DTOP route networks
Create/transfer multiple linear referencing systems (LRSs)
Integrate multiple linear referencing methods (LRMs): route-kilometer, intersection, and link-section

Methodology

1. Merge existing DTOP route networks using edge-matching techniques
2. Linear Referencing Systems:
   - Cartographic Shape Length
   - Linear Referenced Roadway Network
   - Physical Kilometer Markers
   - HPMS Business Data

   • State Routes and Historic Data
   • Transfer HPMS data from DTOP state route layer to segmented network
   • QA/QC kilometer posts
   • Generate routes

3. Linear Referencing Methods:
   - State-state intersection
   - State-local intersection
   - Local-local intersection
   - State route w/kilometer
   - Road with section number
   - Road w/o kilometer or section
   - Unknown

Results and Conclusions

Both state routes and local roads are included in a linear referenced roadway network. Layer can be used for both the HPMS initiative and crash safety mapping.

Future Work

• Use web portal to map crashes and HPMS business data
• Use open source data to supplement missing road names
• Create topology to allow routing and improve data management and integrity

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