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Roadway Safety Data: Maryland's Future in GIS Mapping

Maryland Traffic Records Forum
June 16, 2015

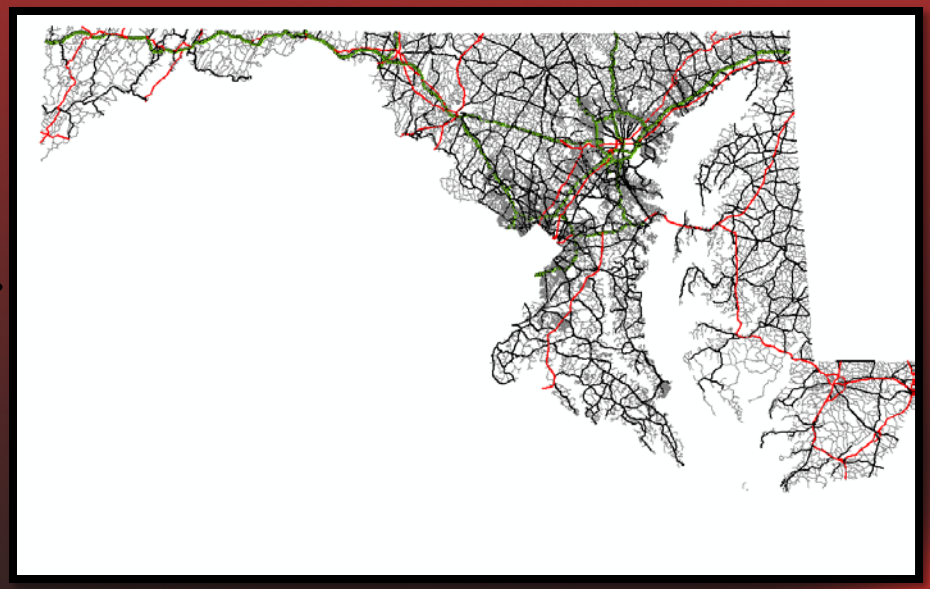
Marshall Stevenson, SHA/WBCM

One Maryland One Centerline (OMOC)

Municipality

County

State



Linear Referencing

Geocoding

Routing

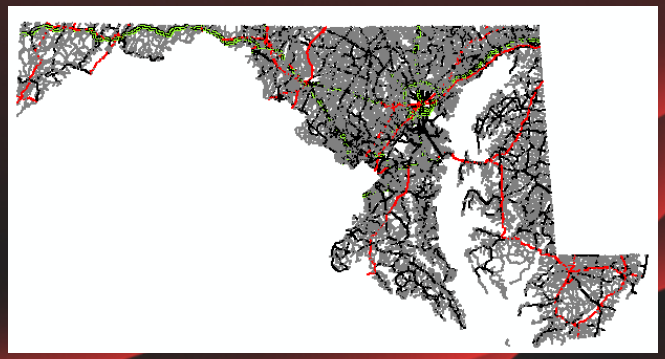
Authoritative Data

One Geometry Tied to Business Data

Supports Multiple Functionalities

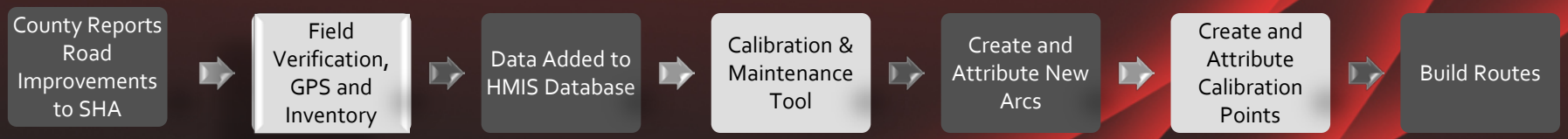
Current SHA Centerlines

- SHA maintains a seamless, statewide centerline
  - Represents state and local public roads
  - Supports the FHWA HPMS Program
    - Data used in the apportionment of Federal-Aid Highway Funds to the states
    - Yearly requirement to submit an inventory of publicly-maintained roads, including accurate mileage, lane mileage and travel information.
  - Supports Highway User Revenue Fund



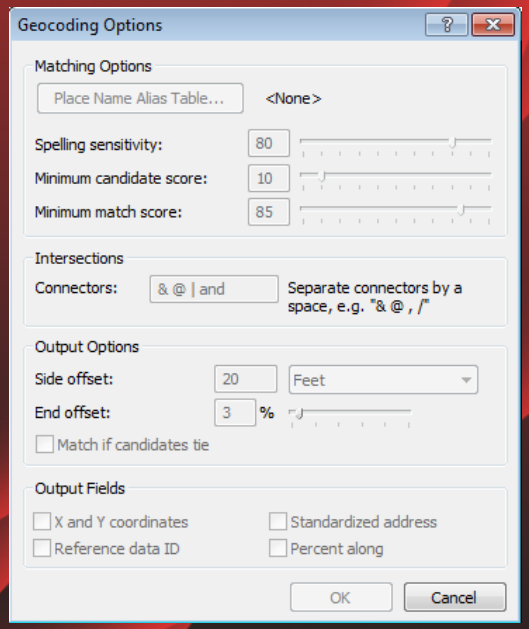
Current SHA Centerline Update Process for Publically-Maintained Roads

- SHA's Road Improvement Process
  - Paper-based submission to local jurisdictions
    - 23 counties plus Baltimore City
    - 159 incorporated municipalities
  - Paper-based submission of updates back to SHA
    - GIS updates added manually by SHA staff
    - Field verification and GPS capture



Other Current Centerlines in MD

- Local governments maintain jurisdiction centerlines
  - Represents state/local public and private roads
  - Supports local government operations
    - E-911
    - Addressing
    - Public Works
    - Planning
  - Compiled to create statewide geocoder maintain by MD DoIT



Why Change?

- 2012 MAP-21 Legislation, ARNOLD
  - States are required to include dual carriageways and all publicly maintained roads as part of their HPMS Submission
- Inefficient/dated maintenance processes within SHA
- Leverage authoritative centerline data
- Duplication of centerline maintenance in Maryland
- Centerline data needed on daily/weekly basis instead of yearly
- Statewide cartographic best practices
- Public Safety (e.g. mutual aid agreements)
- LRS for local governments
- One authoritative-based dataset can lead to more coordinated initiatives, e.g. state-wide road closure reporting

Outreach

- Met with every MD county and some larger municipalities
- Established partnerships

Educational Materials

LINEAR REFERENCING

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WHAT IS A LINEAR REFERENCING SYSTEM?

A linear referencing system (LRS) is a set of methods for specifying a location as a distance, or offset, along a linear feature (e.g. centerline) from a site with a known location. This ability is made possible through the use of route features that have unique identifiers and a measure system (e.g. distance, time, etc.). The concept is similar to a ruler, in which each tick mark represents a distance from another tick mark for a given unit of measurement.

MARYLAND STATE HIGHWAY LRS IMPLEMENTATION

The Maryland State Highway Administration's (SHA) LRS is based on county, route and milepoint and uses a distance-based measure system. Distances are measured in 1/1000ths of a mile along a route, beginning and ending at jurisdictional boundaries. For a more accurate measurement, SHA uses driven mileage to calculate the distance of a route.

HOW DOES MD SHA USE LINEAR REFERENCING?

SHA uses linear referencing to manage highway-related assets and roadway characteristics that do not have explicit x,y coordinates. Recording asset location in terms of relative distance along a line allows for multiple sets of overlapping attributes to be assigned roadway measurements without also requiring the roadway feature be segmented where an attribute value changes.

CONTACT US

Please contact us with questions at
1md1cline@sha.state.md.us

PROGRAM OVERVIEW

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BACKGROUND INFORMATION

The Maryland State Highway Administration (SHA) is responsible for maintaining a statewide road centerline dataset

PROGRAM GOALS

- ✓ Create a collaborative, state-wide, seamless centerline based on authoritative data.
- ✓ Meet MAP-21 requirements and enhance the HPMS reporting process.
- ✓ Coordinate roadway cartographic and data model recommendations.
- ✓ Provide mutual benefits to State and Local jurisdictions
- ✓ Support Transportation for the Nation (TFTN), which promotes a publically available, high quality road centerline that is coordinated across all levels of government.

SNAP-TO POINTS

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WHAT ARE SNAP-TO POINTS?

Snap-to points, also known as touch points, are used to help with edge-matching of roadway centerline geometry between neighboring jurisdictions to establish a seamless roadway network. These points are used to identify transition in authoritative centerline geometry between federal, state, county and municipal roadways.

The locations of snap-to points are reviewed and mutually agreed upon between representatives in neighboring jurisdictions to reflect where maintenance of authoritative road centerline geometry starts and stops. These points do not represent political boundaries, and may or may not represent jurisdictional responsibility for physical roadway maintenance.

Many local jurisdictions within central Maryland have completed a snap-to point spatial dataset as part of a project coordinated by the Baltimore Metropolitan Council (BMC). The Maryland State Highway Administration (SHA) will leverage these efforts into an edge-matched regional road centerline dataset through use of existing snap-to points and expansion of the collaborative process to the remaining Maryland counties, neighboring states, and the District of Columbia.

BENEFITS

- ✓ An edge-matched regional road centerline dataset.
- ✓ Streamlined data conflation, integration, and maintenance processes.
- ✓ A seamless cartographic product for visual representation or mapping.
- ✓ More accurate addressing and routing data.
- ✓ Continuous flow of address ranges between jurisdictions.

CREATION PROCESS

1. SHA uses existing centerlines to generate potential snap-to points along jurisdictional lines.
2. Local jurisdictions review, collaborate and provide revised point locations as needed.
3. Accepted statewide snap-to point dataset is distributed.
4. Data managers edit their respective centerlines to coincide at established snap-to points.

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CENTERLINES

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USES

- ✓ Mapping and visual representation
- ✓ Routing and driving directions
- ✓ Geo-locating address information, also known as geocoding
- ✓ Transportation planning, traffic studies and safety assessments
- ✓ Asset and maintenance management
- ✓ Analysis of driving times and distances
- ✓ Emergency planning, preparedness and response

DELAWARE
MARYLAND

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Centerline Cartographic Rendering Workshop

- Determine definitions for roadway features / configurations
- Determine level of granularity
- Inclusive list of use cases for cline rendering
- Identify industry best practices (MD) for each use case
- Acknowledge/understand implications for routing and linear referencing (may need individual meetings for these)
- Publish guide

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Maryland Centerline Cartographic Rendering Workshop
November 21, 2014

AGENDA

Registration—2nd Floor (parking garage entrance)	**7:30 a.m. – 8:30 a.m.**
Continental Breakfast and Networking – 5th Floor Loft	
Opening Session – 4th Floor, Room 4310	**8:30 a.m. – 9:45 a.m.**

Dean Terry Cooney, Towson University College of Liberal Arts
Kenny Miller, Deputy Geographic Information Officer, State of Maryland
Greg Slater, Director of Planning & Preliminary Engineering, Maryland State Highway Administration
Joe Hausman and Tom Roff, Federal Highway Administration
Gary Waters and Tom Brenneman, Esri

SME Presentations – 4th Floor, Room 4310	**9:45 a.m. – 11:30 p.m.**

Linear Referencing – Al Butler (MPzero)
Addressing & Next Generation911 - Patrick Melancon and Chris Knights (GeoComm)
Routing – Patrick Melancon (GeoComm)
Data Management & Conflation – Richard Sunderland and Duncan Guthrie (1Spatial)

Pre-Breakout Session - 4th Floor, Room 4310	**11:30 a.m. – 12:15 p.m.**
Lunch – 5th Floor Loft	**12:15 p.m. – 12:45 p.m.**

After retrieving your lunch, please arrive in your assigned room by 12:45 p.m! You may eat in your assigned room.

Breakout Sessions – Location Varies	**12:45 p.m. – 3:45 p.m.**
Closing Session – 4th Floor, Room 4310	**3:45 p.m. – 4:30 p.m.**

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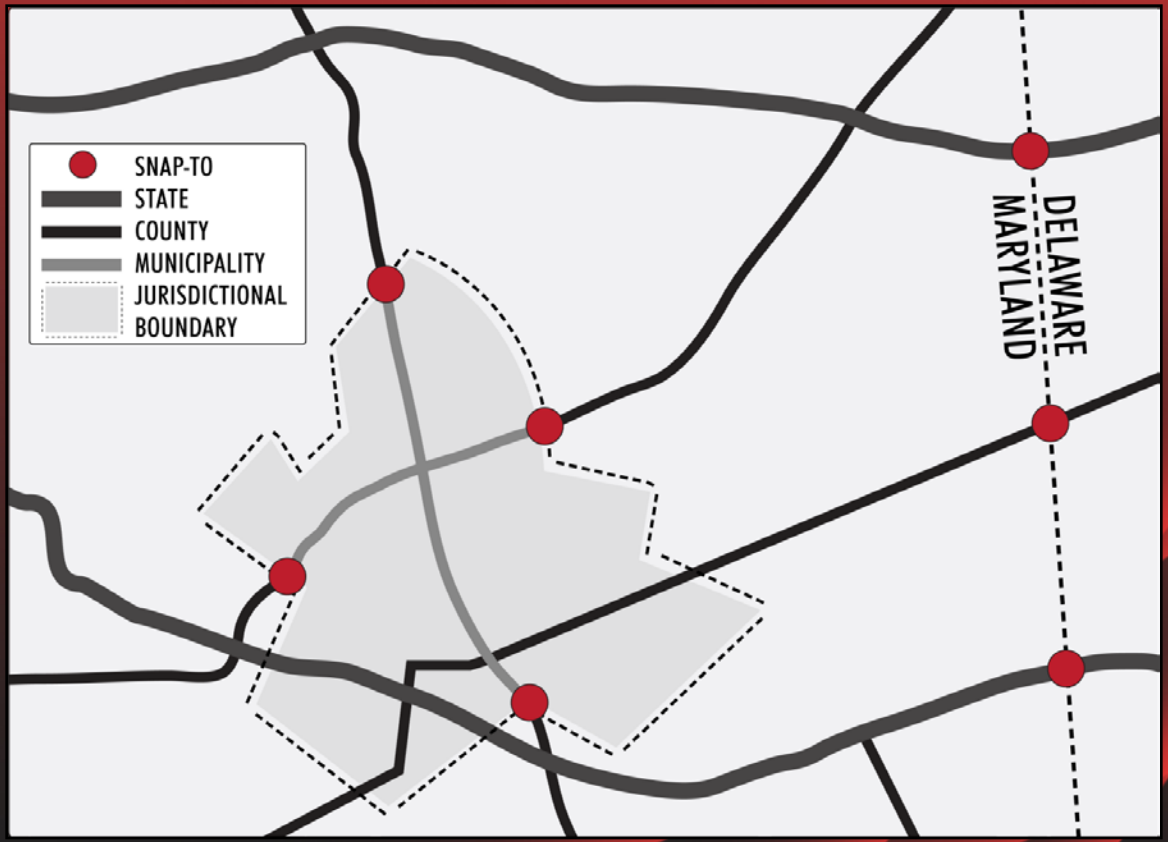
Snap-To-Points

- Edge-matching between neighboring jurisdictions



Snap-To-Point Example

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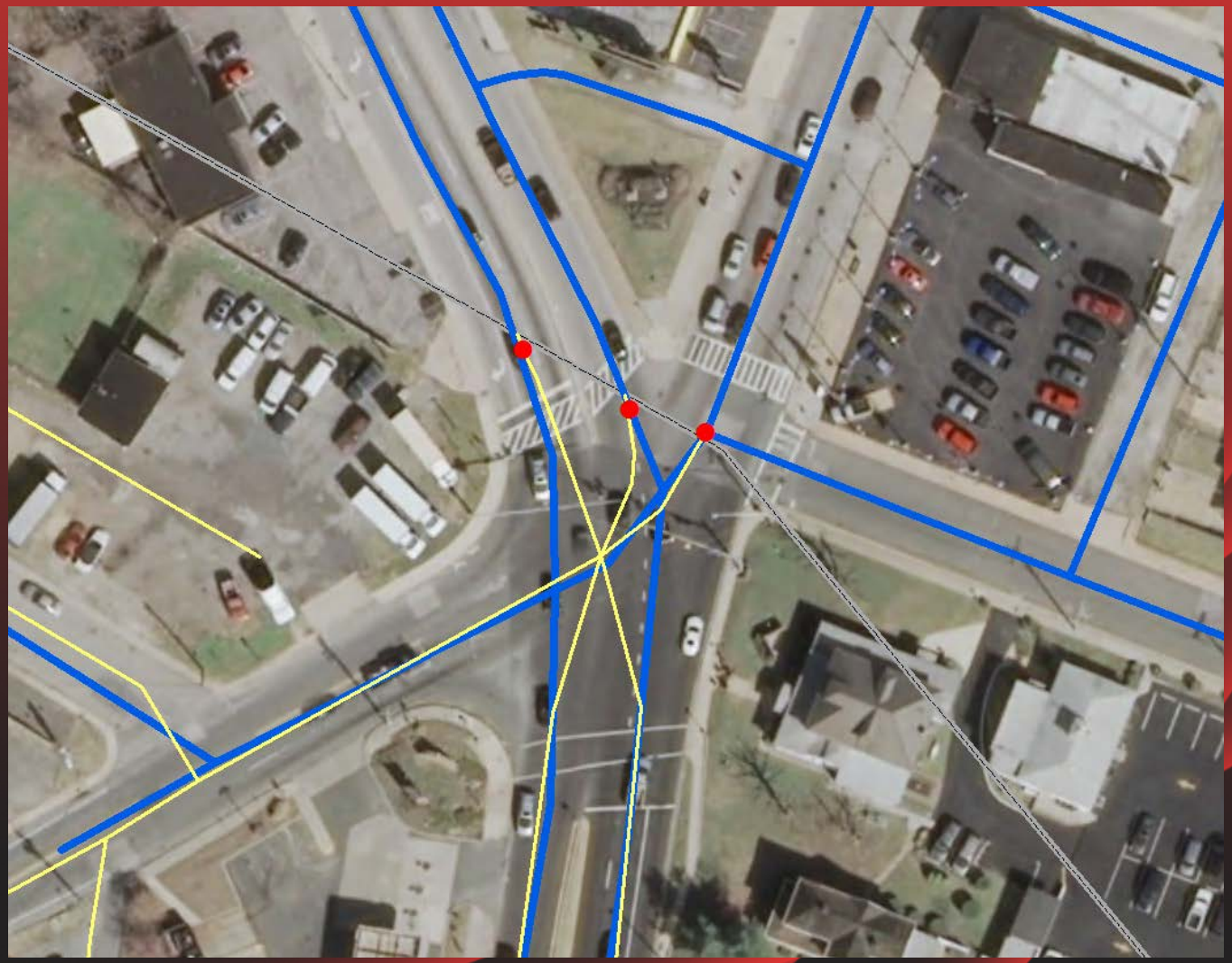
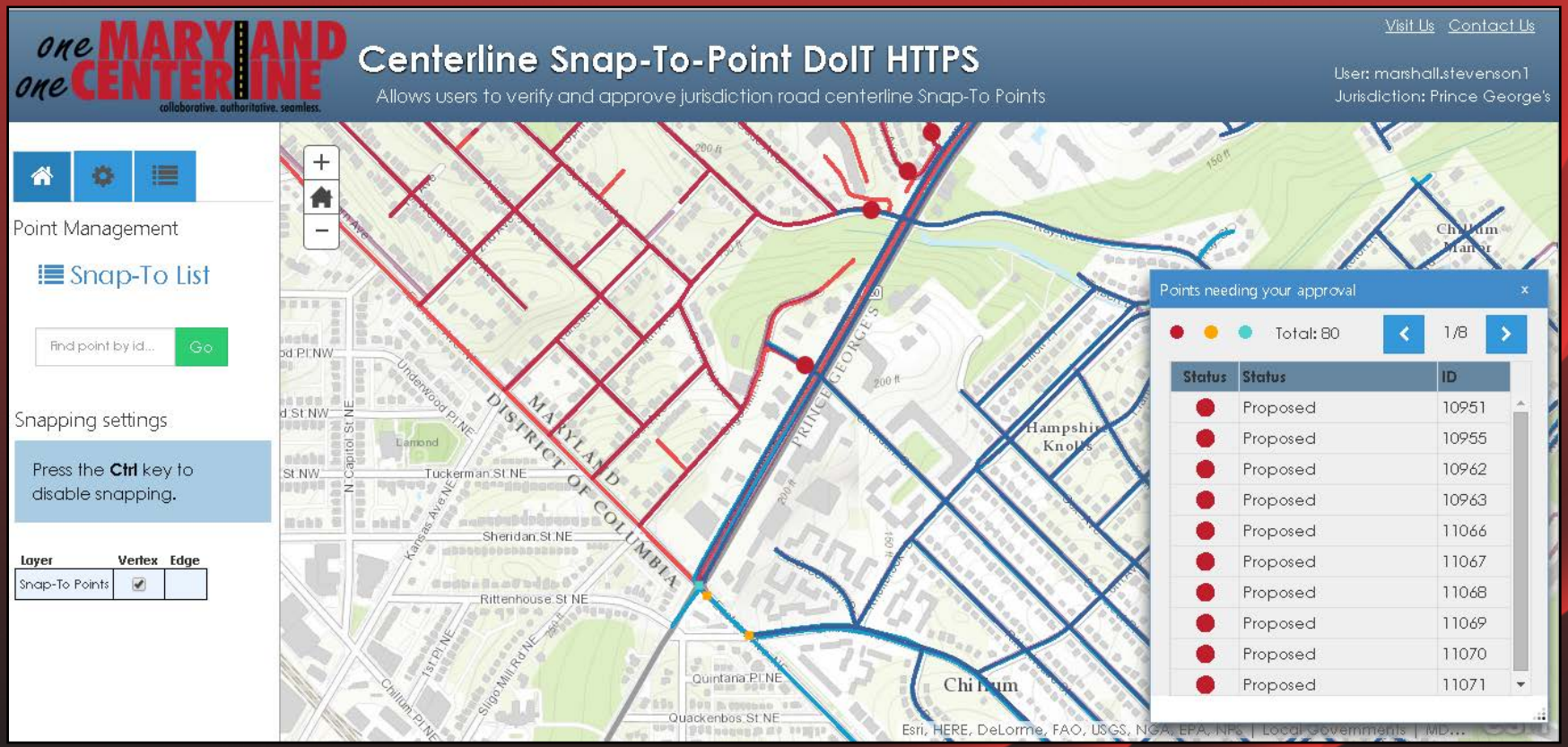
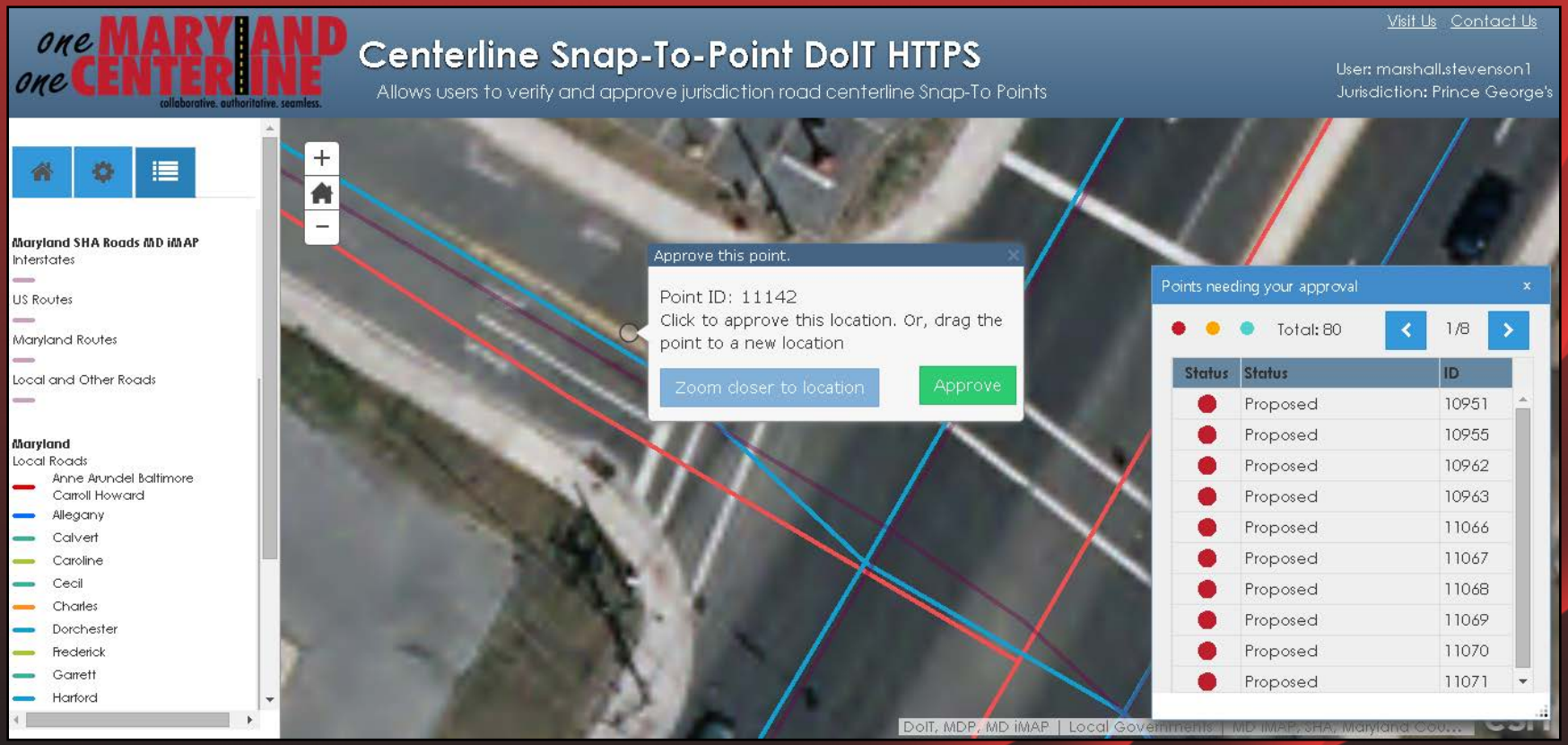


Snap-To-Point Reviewer

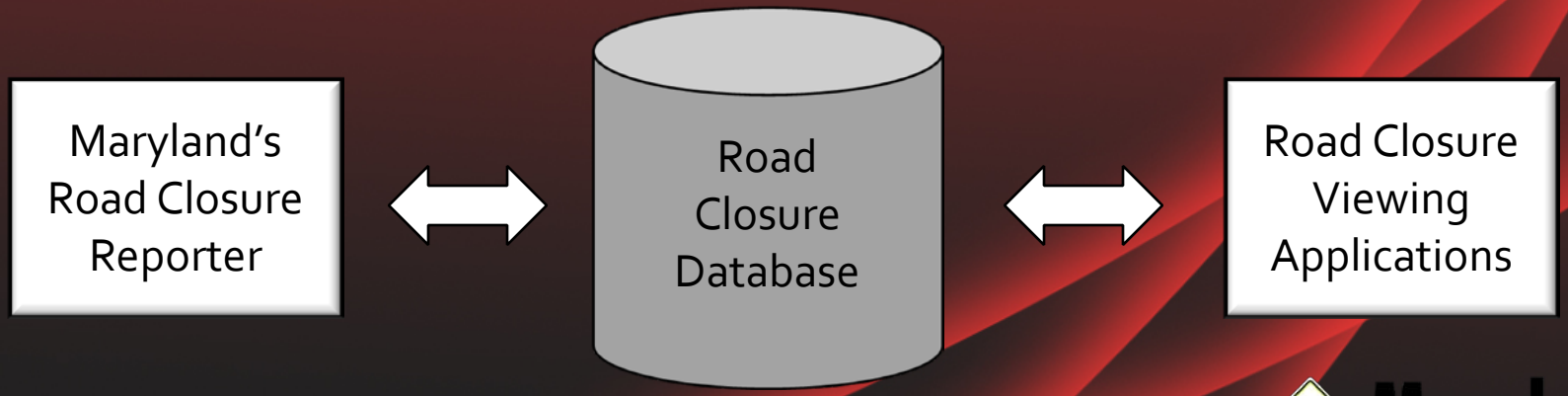


Snap-To-Point Reviewer



Maryland's Road Closure Reporter

- Data capture system
  - GIS Centric Back-End
  - Mobile and PC
- Common Data Model
- Data Publication System



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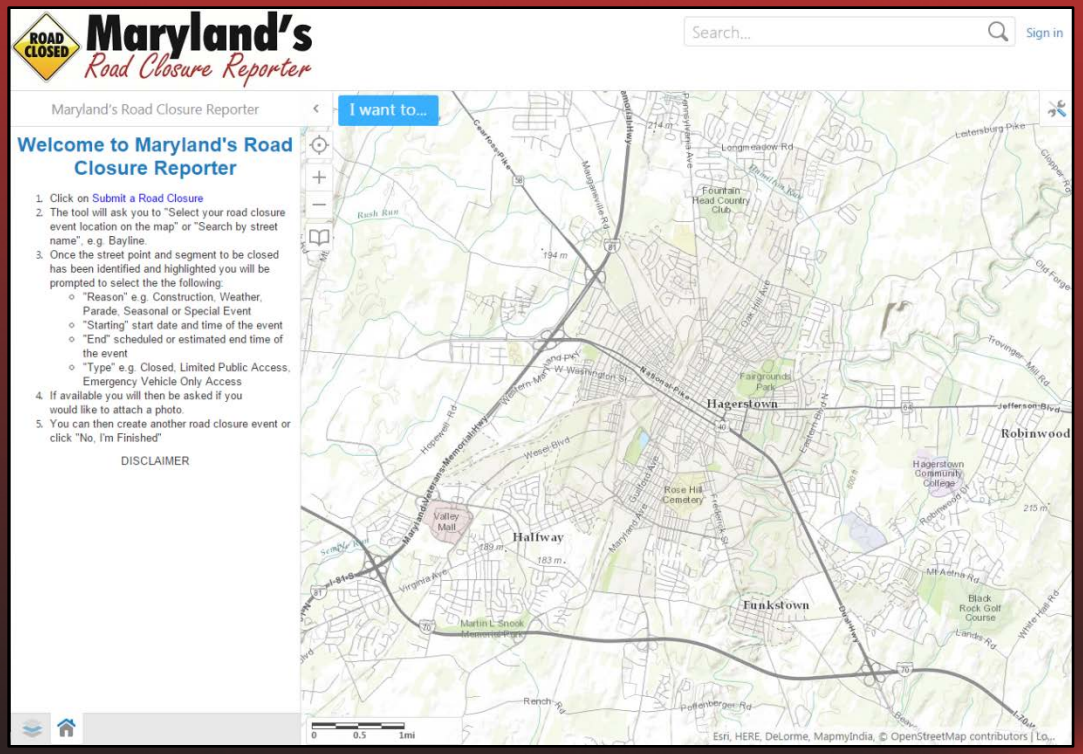

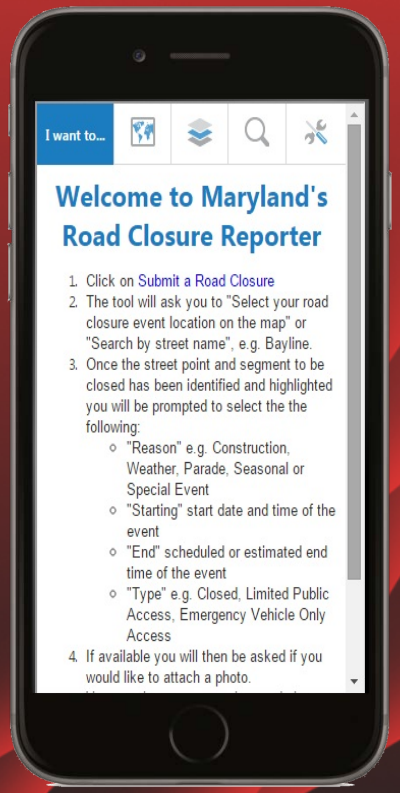

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ROAD CLOSED Maryland's Road Closure Reporter

Lessons Learned

- Leverage experience of others
- Everyone has an equal voice
- Acceptance of local geometry and attribution
- Collaboration goes a long way
- Top-down support

Thank You

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