

one **MARYLAND**
one **CENTERLINE**

collaborative. authoritative. seamless.

Roadway Safety Data: Maryland's Future in GIS Mapping

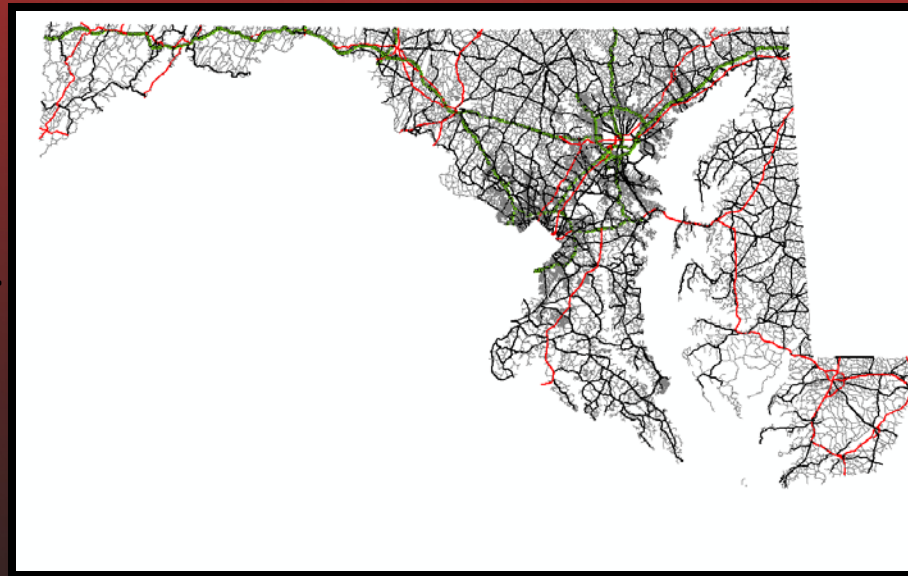
Maryland Traffic Records Forum
June 16, 2015



Marshall Stevenson, SHA/WBCM



One Maryland One Centerline (OMOC)



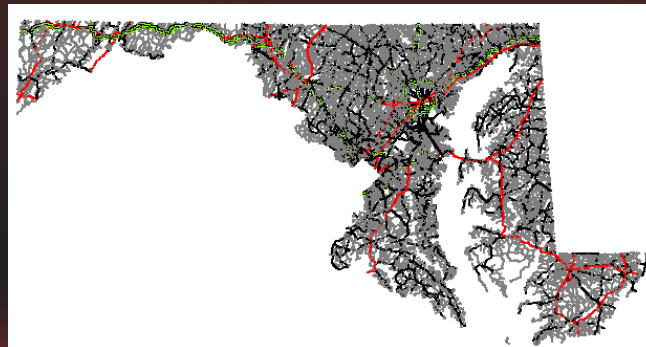
Authoritative Data

One Geometry Tied to Business Data

Supports Multiple Functionalities

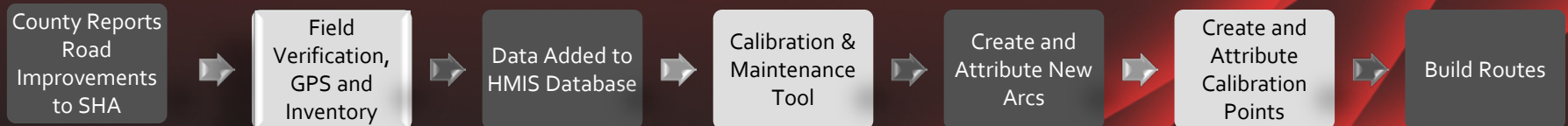
Current SHA Centerlines

- 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



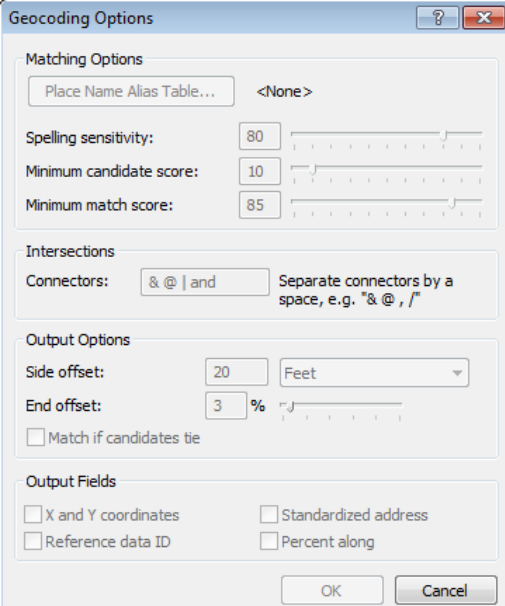
Current SHA Centerline Update Process for Publically-Maintained Roads

- 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



The image shows a screenshot of a software dialog box titled "Geocoding Options". The dialog is organized into several sections:

- Matching Options:** Includes a "Place Name Alias Table..." dropdown set to "<None>". Below are three sliders: "Spelling sensitivity" (set to 80), "Minimum candidate score" (set to 10), and "Minimum match score" (set to 85).
- Intersections:** Includes a "Connectors:" dropdown set to "& @ | and" and a checkbox "Separate connectors by a space, e.g. '& @ , /'".
- Output Options:** Includes "Side offset:" (set to 20) with a unit dropdown set to "Feet", and "End offset:" (set to 3) with a unit dropdown set to "%". There is also a checkbox "Match if candidates tie".
- Output Fields:** Includes four checkboxes: "X and Y coordinates", "Reference data ID", "Standardized address", and "Percent along".

At the bottom right of the dialog are "OK" and "Cancel" buttons.

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



The One Maryland One Centerline (OMOC) Program is a collaborative effort between federal, state, and local entities to create an authoritative, statewide roadway dataset that meets the needs of a diverse community.

WHAT IS A LINEAR REFERENCING SYSTEM?

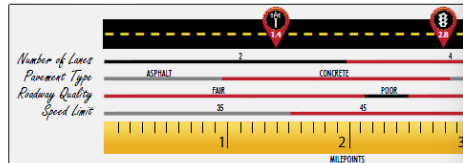
A linear referencing system (LRS) is a set of methods for specifying a location as a distance, or offset, along a linear feature (e.g. centerline) from a site with a known location. This ability is made possible through the use of route features that have unique identifiers and a measure system (e.g. 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 to be segmented where an attribute value changes.



CONTACT US

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



BENEFITS

Local Programs can maintain their own data and use the state data for jurisdictional boundaries.

DATA

The use of accurate characteristics for pavement, roadway quality, and speed limit data.



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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.

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PROGRAM OVERVIEW



The One Maryland One Centerline (OMOC) Program is a collaborative effort between federal, state, and local entities to create an authoritative, statewide roadway dataset that meets the needs of a diverse community.

BACKGROUND INFORMATION

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

SNAP-TO POINTS

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 (TTN), which promotes a publically available, high quality road centerline that is coordinated across all levels of government.

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.

Integration with safety and asset management systems in near real-time for Local applications



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CENTERLINES



The One Maryland One Centerline (OMOC) Program is a collaborative effort between federal, state, and local entities to create an authoritative, statewide roadway dataset that meets the needs of a diverse community.

Representation of the center of a road network connected at intersections to a roadway network. In addition, data tables, or attributes, that describe roadway such as: route number, prefix, etc) (lane limit, number of lanes, etc) (road maintainer, functional class, etc) (postal code, etc) (road rates, etc) (road finance records, etc) (road incident types, etc) (road lighting, etc) (road directions, etc)

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



The program is jointly owned, operated and maintained by the Maryland State Highway Administration (SHA), the Maryland Transportation Authority (MDTA), Baltimore and 159 incorporated municipalities. The One Maryland One Centerline is a sustainable, current, authoritative, and multi-use centerline dataset that meets the needs of a diverse community.



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



The image shows a printed agenda for the Maryland Centerline Cartographic Rendering Workshop. At the top left is the 'one MARYLAND one CENTERLINE' logo with the tagline 'collaborative. authoritative. seamless.' At the top right is the SHA State Highway Administration logo. The title 'Maryland Centerline Cartographic Rendering Workshop' and date 'November 21, 2014' are centered. The agenda items are listed in a two-column format with times. The items include: Registration (7:30 a.m. - 8:30 a.m.), Continental Breakfast and Networking (8:30 a.m. - 9:45 a.m.), Opening Session (8:30 a.m. - 9:45 a.m.) with speakers Dean Terry Cooney, Kenny Miller, Greg Slater, Joe Hausman, Tom Roff, Gary Waters, and Tom Brenneman; SME Presentations (9:45 a.m. - 11:30 p.m.) on Linear Referencing, Addressing & Next Generation 911, Routing, and Data Management & Conflation; Pre-Breakout Session (11:30 a.m. - 12:15 p.m.); Lunch (12:15 p.m. - 12:45 p.m.); Breakout Sessions (12:45 p.m. - 3:45 p.m.); and Closing Session (3:45 p.m. - 4:30 p.m.).

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SHA
State Highway Administration

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 Generation 911 - Patrick Melancon and Chris Knights (GeoComm) Routing – Patrick Melancon (GeoComm) Data Management & Conflation – Richard Sunderland and Duncan Guthrie (ISpatial)	
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.

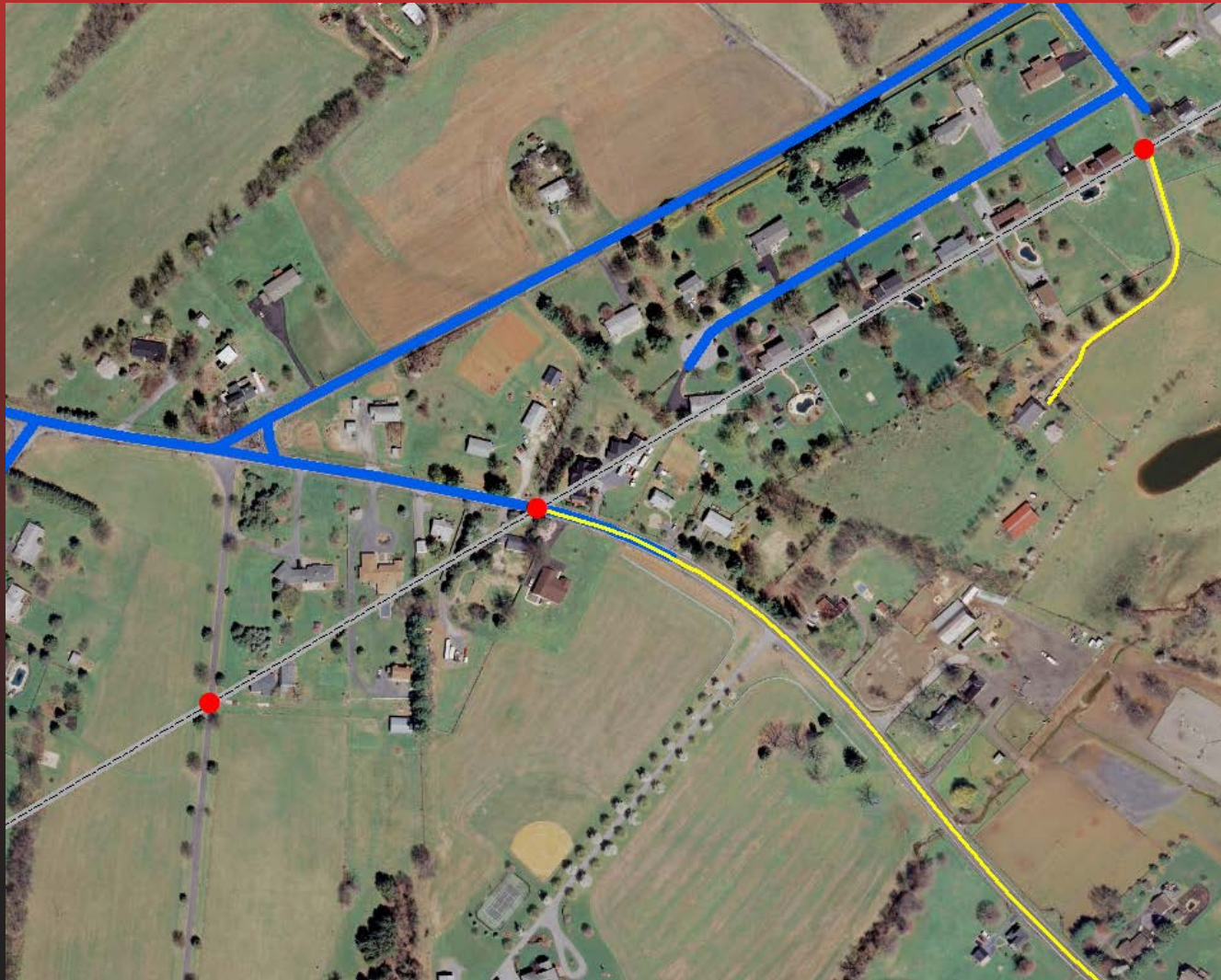
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Snap-To-Points

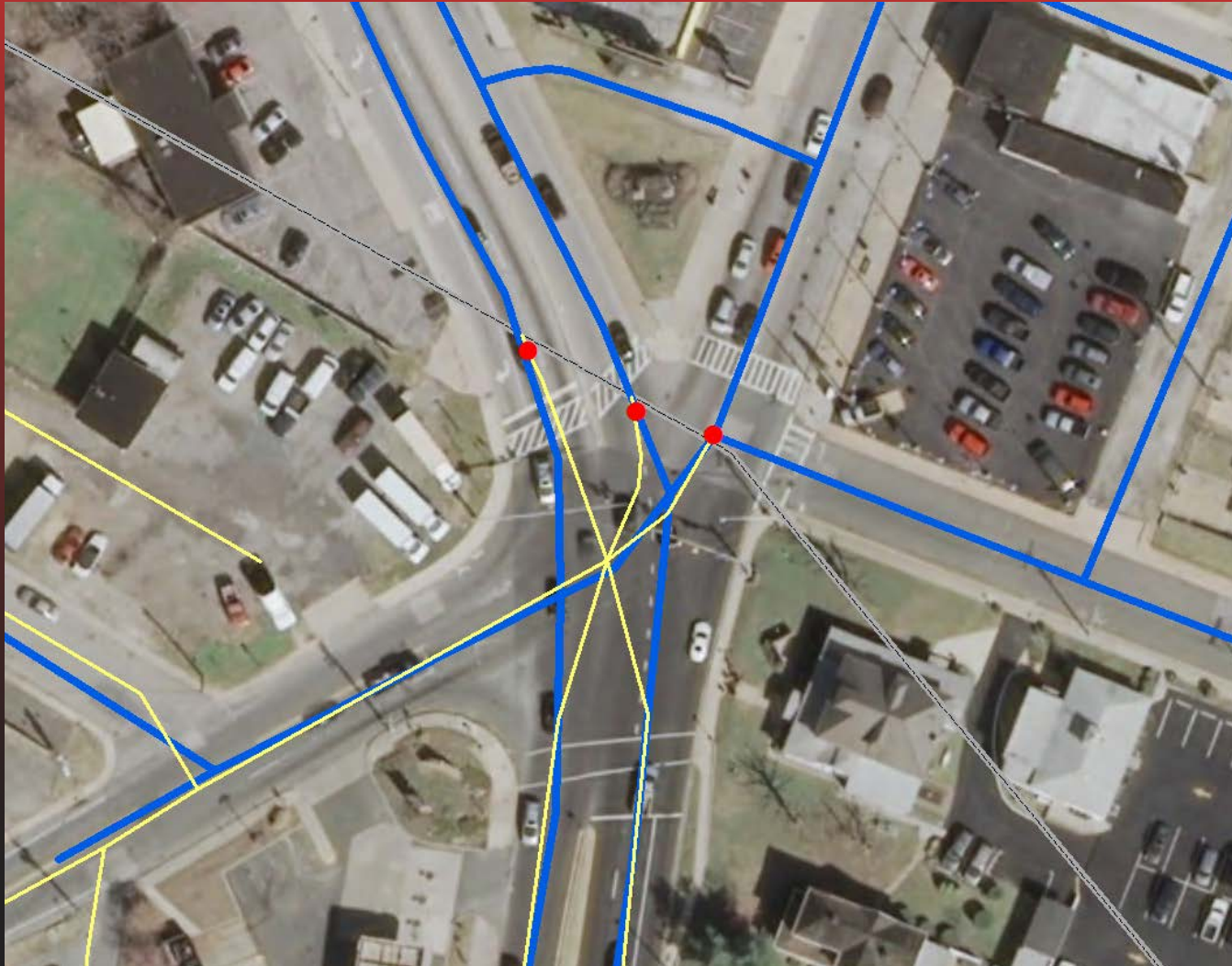
- Edge-matching between neighboring jurisdictions




Snap-To-Point Example



Snap-To-Point Example



Snap-To-Point Reviewer



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Centerline Snap-To-Point DoIT HTTPS

Allows users to verify and approve jurisdiction road centerline Snap-To Points

[Visit Us](#) [Contact Us](#)

User: marshall.stevenson1
Jurisdiction: Prince George's

Point Management

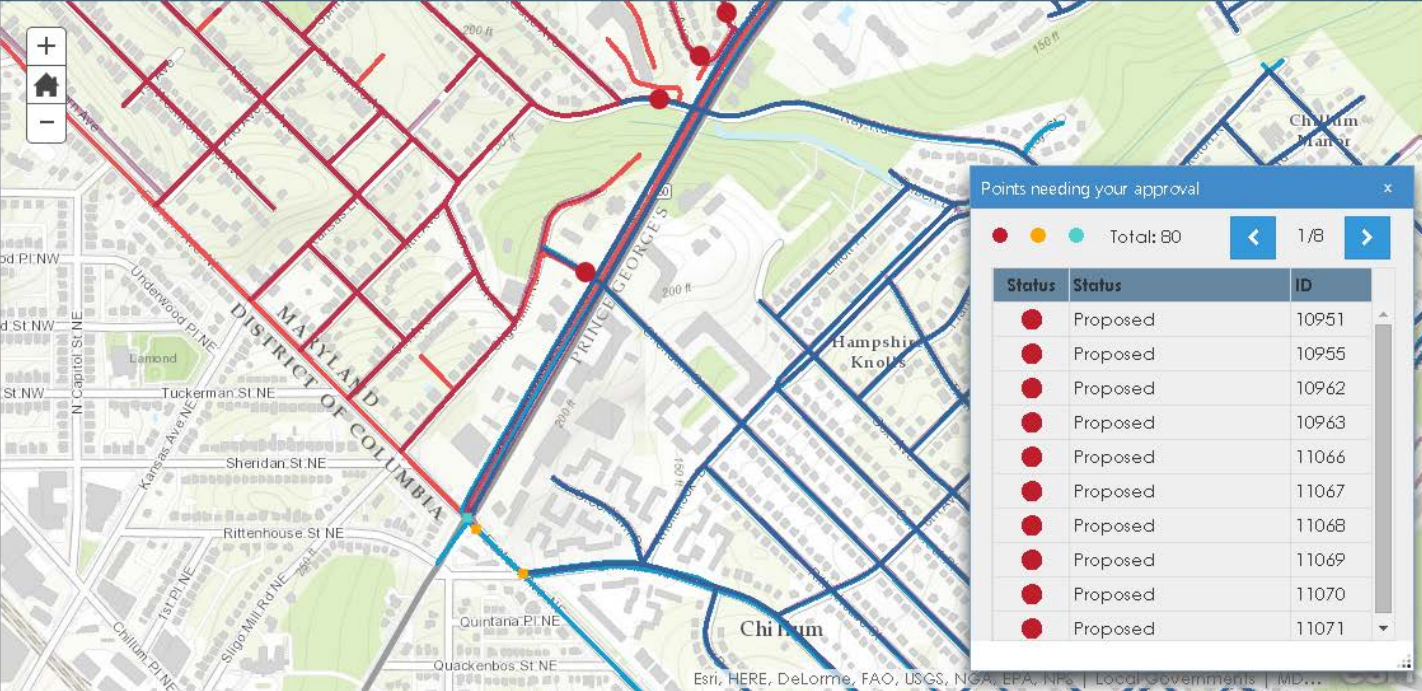
Snap-To List

Find point by id...

Snapping settings

Press the **Ctrl** key to disable snapping.

Layer	Vertex	Edge
Snap-To Points	<input checked="" type="checkbox"/>	<input type="checkbox"/>



Points needing your approval

Total: 80 1/8

Status	Status	ID
●	Proposed	10951
●	Proposed	10955
●	Proposed	10962
●	Proposed	10963
●	Proposed	11066
●	Proposed	11067
●	Proposed	11068
●	Proposed	11069
●	Proposed	11070
●	Proposed	11071

Esri, HERE, DeLorme, FAO, USGS, NOAA, EPA, NPS | Local Governments | MD...

Snap-To-Point Reviewer

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Centerline Snap-To-Point DoIT HTTPS

Allows users to verify and approve jurisdiction road centerline Snap-To Points

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User: marshall.stevenson1
Jurisdiction: Prince George's

Home | Settings | Menu

Maryland SHA Roads MD iMAP

- Interstates
- US Routes
- Maryland Routes
- Local and Other Roads

Maryland

- Local Roads
 - Anne Arundel Baltimore Carroll Howard
 - Allegany
 - Calvert
 - Caroline
 - Cecil
 - Charles
 - Dorchester
 - Frederick
 - Garrett
 - Harford

Approve this point.

Point ID: 11142
Click to approve this location. Or, drag the point to a new location

Zoom closer to location | Approve

Points needing your approval

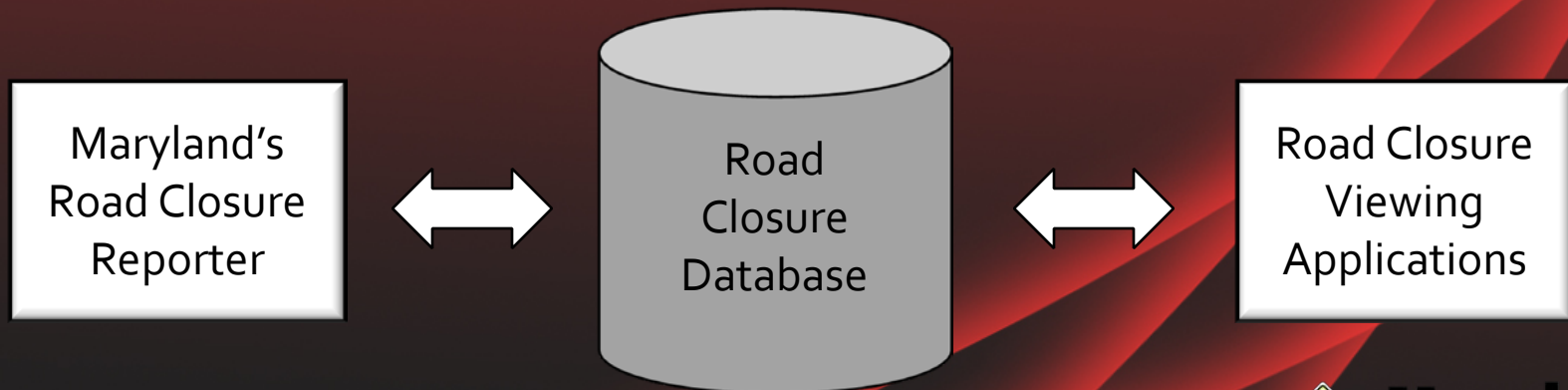
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DoIT, MDP, MD iMAP | Local Governments | MD iMAP, SHA, Maryland Co...

Maryland's Road Closure Reporter

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



Maryland's Road Closure Reporter

The screenshot shows the desktop version of the Maryland's Road Closure Reporter web application. At the top left is a yellow diamond logo with the text "ROAD CLOSED" and "Maryland's Road Closure Reporter". To the right is a search bar and a "Sign in" link. Below the header is a navigation bar with a "I want to..." dropdown menu. The main content area is divided into two columns. The left column contains a "Welcome to Maryland's Road Closure Reporter" message and a numbered list of instructions for using the tool. The right column displays a map of a region in Maryland, including areas like Hagerstown, Halfway, and Funkstown. The map shows various roads and landmarks. At the bottom of the map is a scale bar and copyright information.

ROAD CLOSED **Maryland's**
Road Closure Reporter

Maryland's Road Closure Reporter

Welcome to Maryland's Road Closure Reporter

1. Click on **Submit a Road Closure**
2. The tool will ask you to "Select your road closure event location on the map" or "Search by street name", e.g. Bayline.
3. Once the street point and segment to be closed has been identified and highlighted you will be prompted to select the the following:
 - o "Reason" e.g. Construction, Weather, Parade, Seasonal or Special Event
 - o "Starting" start date and time of the event
 - o "End" scheduled or estimated end time of the event
 - o "Type" e.g. Closed, Limited Public Access, Emergency Vehicle Only Access
4. If available you will then be asked if you would like to attach a photo
5. You can then create another road closure event or click "No, I'm Finished"

DISCLAIMER

0 0.5 1mi

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors | Lo...

The screenshot shows the mobile version of the Maryland's Road Closure Reporter web application. It features a similar layout to the desktop version but is adapted for a smaller screen. The "I want to..." dropdown menu is prominent at the top. The map is also visible, showing the same geographic area as the desktop version. The text and list are scaled appropriately for mobile viewing.

ROAD CLOSED **Maryland's**
Road Closure Reporter

Maryland's Road Closure Reporter

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 - o "End" scheduled or estimated end time of the event
 - o "Type" e.g. Closed, Limited Public Access, Emergency Vehicle Only Access
4. If available you will then be asked if you would like to attach a photo.

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

1md1cline@sha.state.md.us