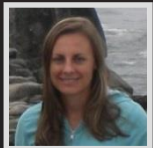


one **MARYLAND**
one **CENTERLINE**

collaborative. authoritative. seamless.

ESRI MUG Conference
December 2, 2014



Erin Lesh, SHA

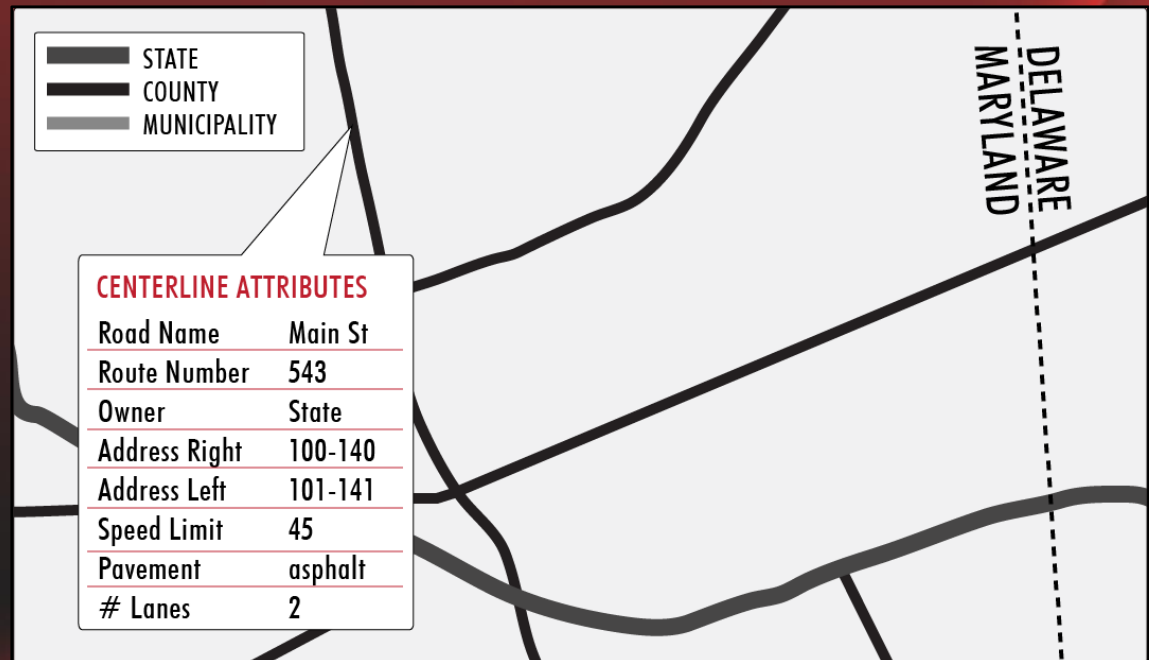


Marshall Stevenson, WBCM/SHA



What is a Centerline?

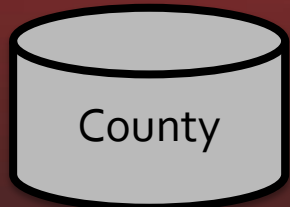
- Is a linear graphic representation of the center of a roadway.
- Centerline segments are linked to data tables, or attributes, that describe information about the roadway



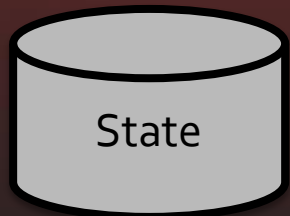
One Maryland One Centerline (OMOC)



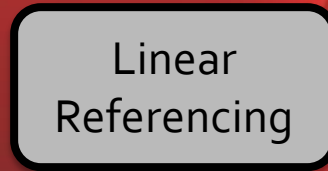
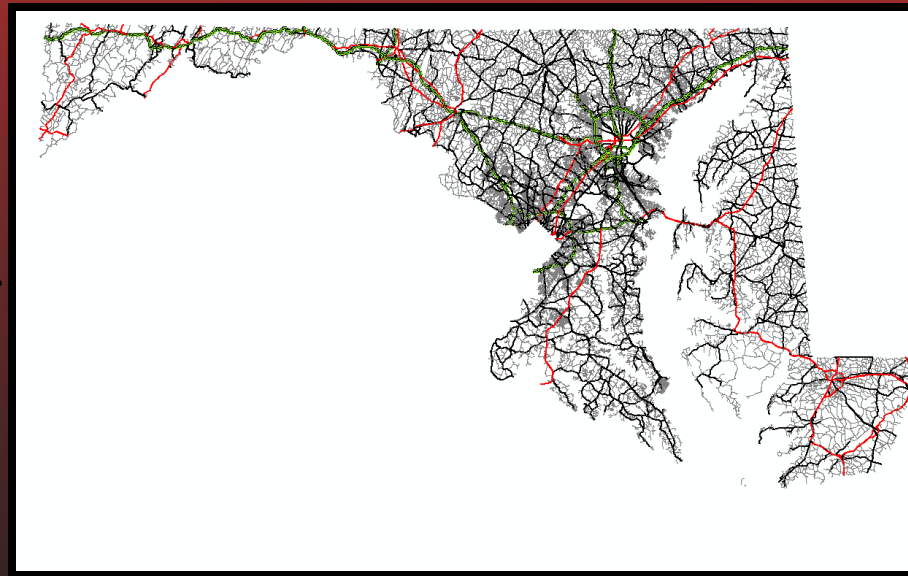
Municipality



County



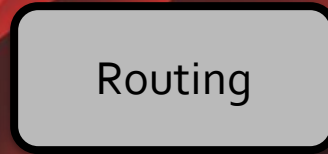
State



Linear Referencing



Geocoding



Routing

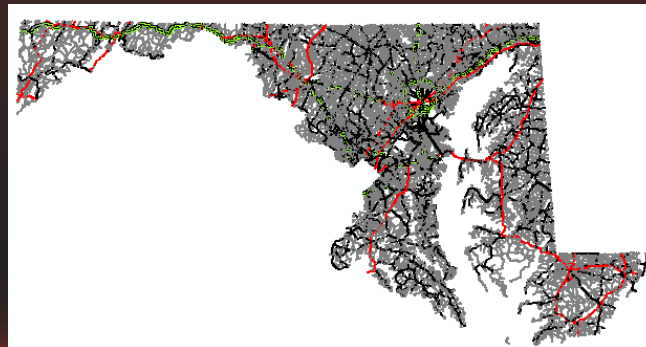
Authoritative Data

One Geometry Tied to Business Data

Supports Multiple Functionalities

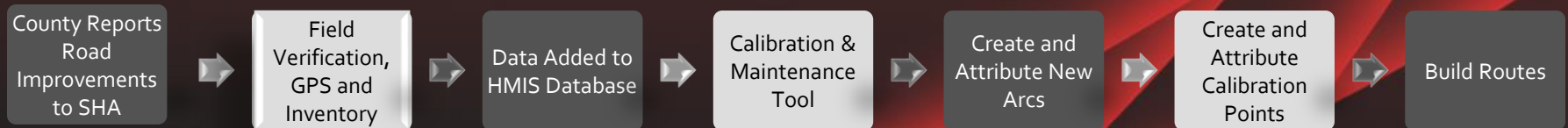
Current SHA Centerlines

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



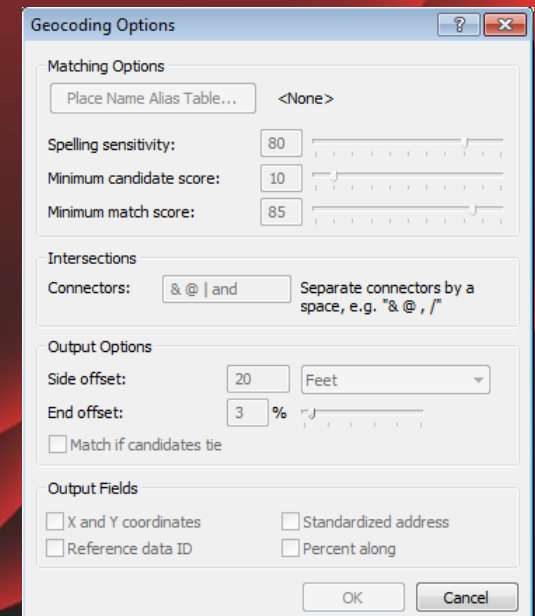
Current SHA Centerline Update Process for Publically-Maintained Roads

- 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.g. E-911, Addressing, DPW
- Compiled to create statewide geocoder



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
- 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?

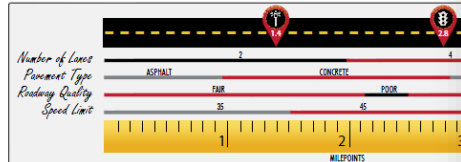
A linear referencing system (LRS) is a set of methods for specifying a location as a distance, or offset, along a linear feature (e.g. centerline) from a site with a known location. This ability is made possible through the use of route features that have unique identifiers and a measure system (e.g. 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 jurisdictions can use this information to manage their assets and improve their jurisdictional boundaries.

DATA

The use of linear referencing allows for the collection of data on roadway characteristics and assets along a route.



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 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.

CONTACT US

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

SNAP-TO POINTS

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.

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 publicly 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 existing safety and asset management systems in near real-time for Local applications



CONTACT US

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

CENTERLINES

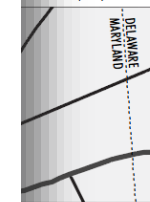


The One Maryland One Centerline (OMOC) Program is a collaborative effort between federal, state, and local entities to create an authoritative, statewide roadway dataset that meets the needs of a diverse community.

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

USES

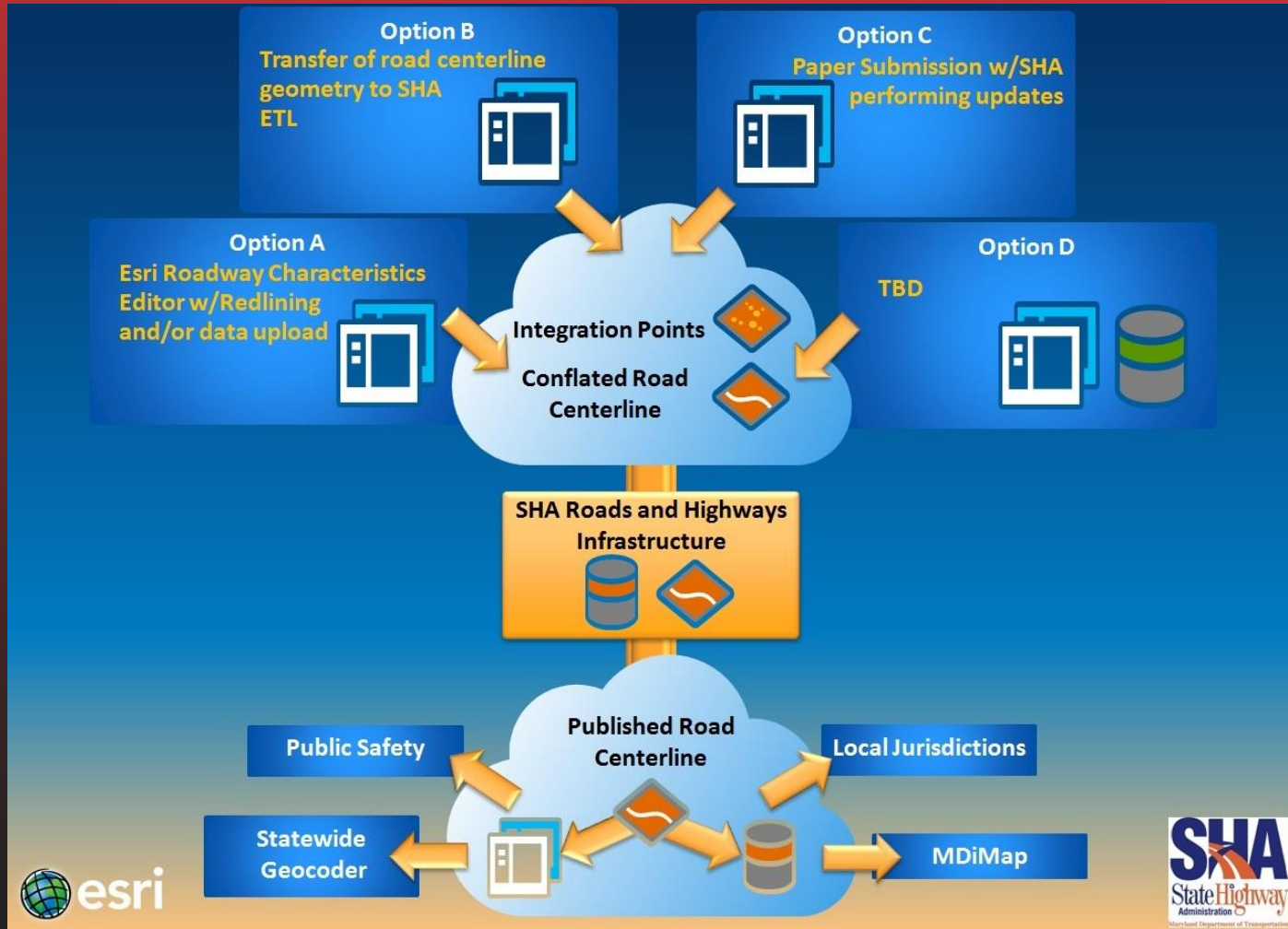
- ✓ Mapping and visual representation
- ✓ Routing and driving directions
- ✓ Geo-locating address information, also known as geocoding
- ✓ Transportation planning, traffic studies and safety assessments
- ✓ Asset and maintenance management
- ✓ Analysis of driving times and distances
- ✓ Emergency planning, 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 developed through partnerships between these entities.



Implementation Flexibility



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 is organized into sections: Registration (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.), SME Presentations (4th Floor, Room 4310, 9:45 a.m. - 11:30 p.m.), 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.), Breakout Sessions (Location Varies, 12:45 p.m. - 3:45 p.m.), and Closing Session (4th Floor, Room 4310, 3:45 p.m. - 4:30 p.m.). A list of speakers is provided for the Opening Session. At the bottom right, the email address '1md1cline@sha.state.md.us' is visible.

one MARYLAND one CENTERLINE
collaborative. authoritative. seamless.

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.

1md1cline@sha.state.md.us

Snap-To-Points

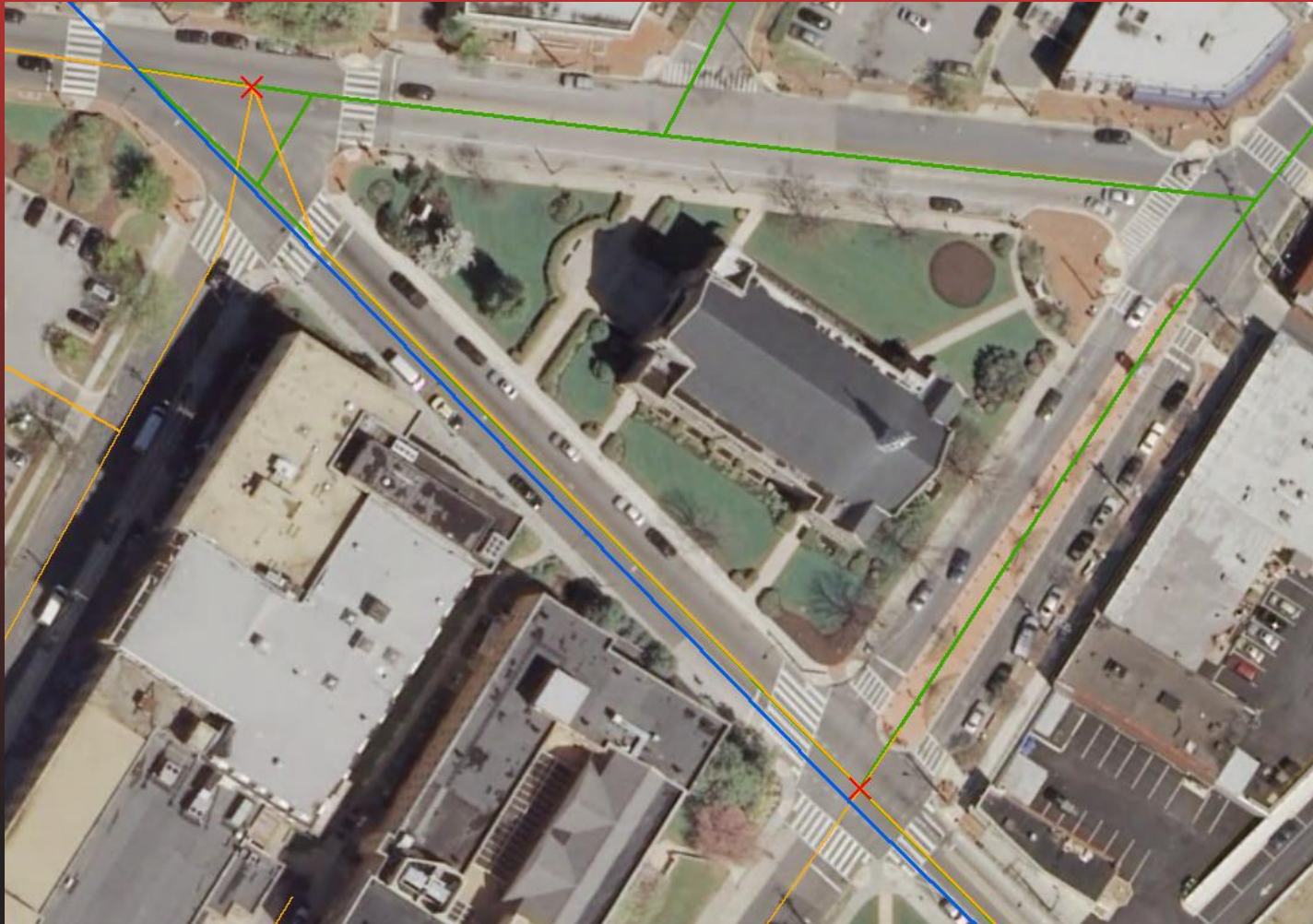
- Edge-matching between neighboring jurisdictions



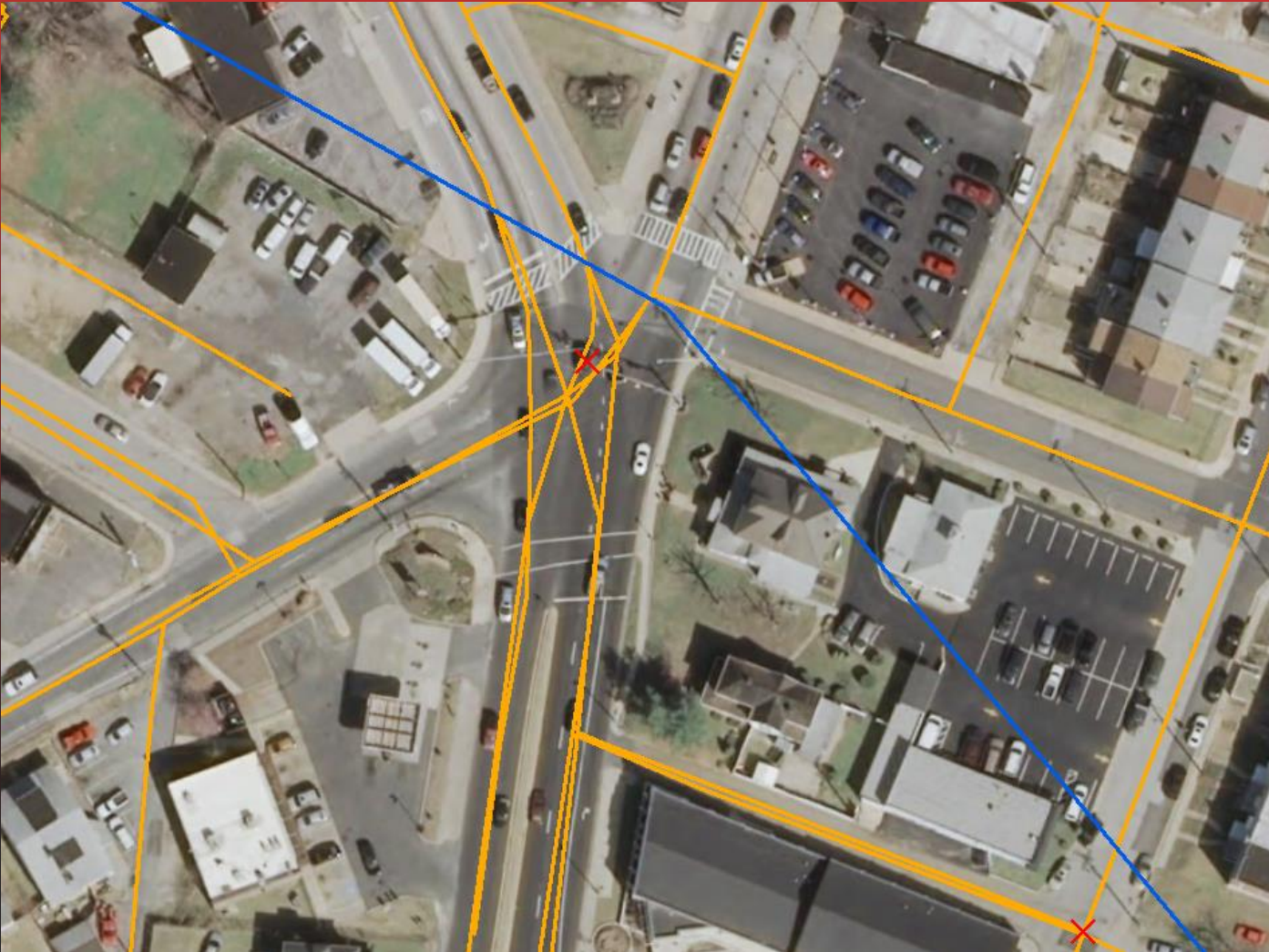
Snap-To-Point Example



Snap-To-Point Example



Snap-To-Point Example



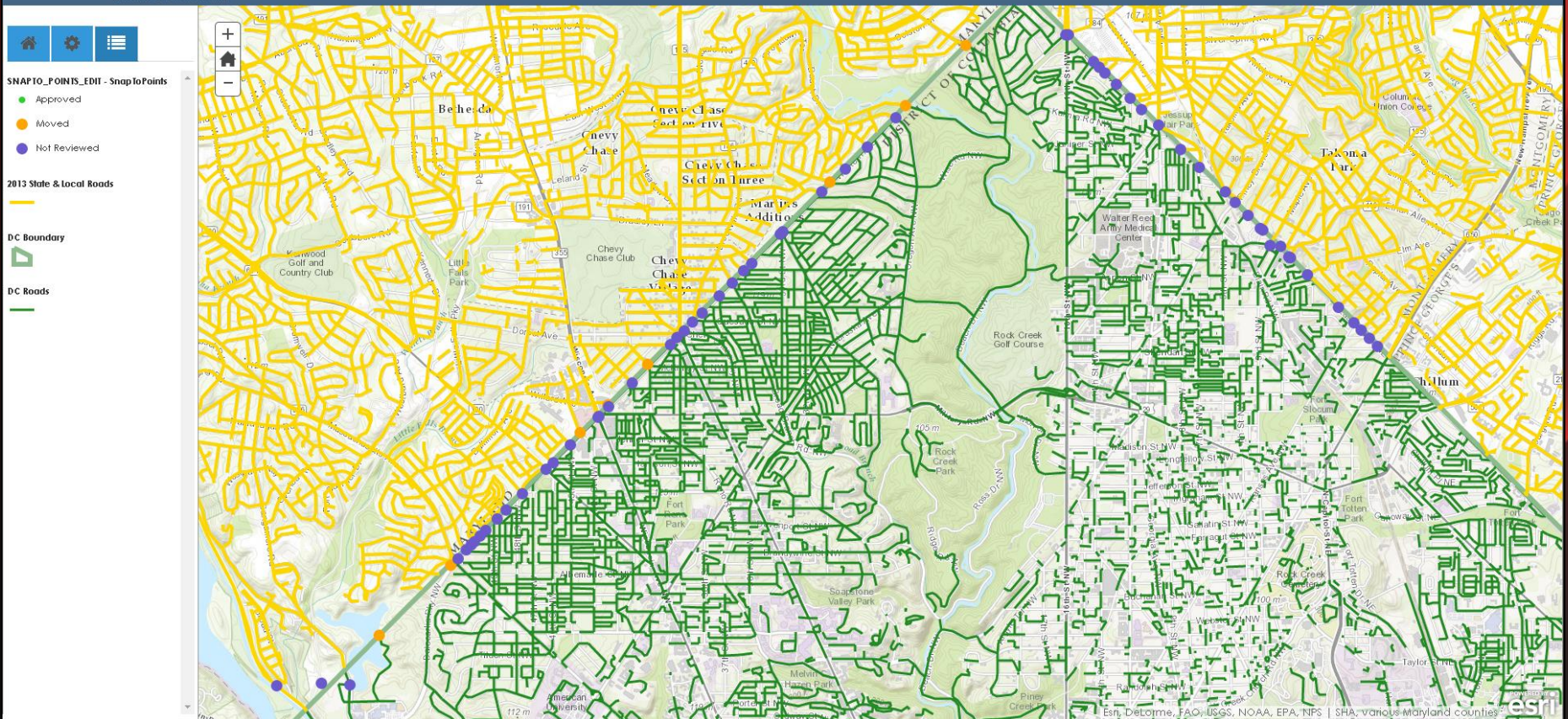
Snap-To-Point Reviewer



Centerline Snap-To Point Reviewer

Allows users to verify and approve jurisdiction centerline touchpoints.

User: erin.lesh
Jurisdiction: Montgomery



Snap-To-Point Reviewer



Centerline Snap-To Point Reviewer

Allows users to verify and approve jurisdiction centerline touchpoints.

User: erin.lesh
Jurisdiction: Montgomery

The screenshot displays the user interface of the Snap-To-Point Reviewer application. On the left side, there is a navigation pane with a home icon, a gear icon, and a list icon. Below these icons, the text 'SNAPTO_POINTS_EDIT - SnapToPoints' is displayed. Underneath, there are three status indicators: a green dot for 'Approved', an orange dot for 'Moved', and a purple dot for 'Not Reviewed'. Further down, there are three map layers: '2013 State & Local Roads' (represented by a yellow line), 'DC Boundary' (represented by a green line), and 'DC Roads' (represented by a green line). The main area of the interface is a satellite map of a residential neighborhood. Overlaid on the map are several yellow lines representing roads and green lines representing centerlines. A purple dot is visible on one of the centerlines, indicating a touchpoint that has not been reviewed. A yellow dot is visible on another road, indicating a touchpoint that has been moved. The map also shows a street grid, houses, trees, and a tennis court in the background.

Snap-To-Point Reviewer

The screenshot displays the 'Centerline Snap-To-Point Reviewer' web application. The interface includes a top navigation bar with the 'one MARYLAND CENTERLINE' logo and the text 'collaborative. authoritative. seamless.' The main title 'Centerline Snap-To-Point Reviewer' is followed by the description 'Allows users to verify and approve jurisdiction centerline touchpoints.' The user information 'User: erin.jesh' and 'Jurisdiction: Montgomery' is shown in the top right. A left sidebar contains navigation icons and a legend for 'SNAP TO POINTS_EDIT - Snap To Points' with categories: 'Approved' (green dot), 'Moved' (yellow dot), and 'Not Reviewed' (blue dot). Below the legend are layers for '2013 State & Local Roads' (yellow line), 'DC Boundary' (green line), and 'DC Roads' (green line). The main map area shows an aerial view of a residential neighborhood with yellow and green centerline lines. A pop-up dialog box is open over a yellow centerline point, containing the text 'Approve this point.', 'Click to approve this location Or, drag the point to a new location', and buttons for 'Approve' (green) and 'Zoom closer to location' (blue). The bottom right corner features the text 'POWERED BY esri' and a list of data providers: 'VITA, Esri, HERE, DeLorme, Intermap, iPC, TomTom, USGS, NGA, USDA, EPA, NPS | SHA, various Maryland counties'.

one MARYLAND CENTERLINE
collaborative. authoritative. seamless.

Centerline Snap-To-Point Reviewer

Allows users to verify and approve jurisdiction centerline touchpoints.

User: erin.jesh
Jurisdiction: Montgomery

SNAP TO POINTS_EDIT - Snap To Points

- Approved
- Moved
- Not Reviewed

2013 State & Local Roads

DC Boundary

DC Roads

Approve this point.
Click to approve this location
Or, drag the point to a new location

Approve

Zoom closer to location

POWERED BY esri

VITA, Esri, HERE, DeLorme, Intermap, iPC, TomTom, USGS, NGA, USDA, EPA, NPS | SHA, various Maryland counties

Snap-To-Point Reviewer

one MARYLAND one CENTERLINE
collaborative, authoritative, seamless.

Centerline Snap-To Point Reviewer

Allows users to verify and approve jurisdiction centerline touchpoints.

User: erin.lesh
Jurisdiction: Montgomer

Home Settings List Points

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

Snapping settings:

layer	Vertex	Edge
DC Roads	<input type="checkbox"/>	<input type="checkbox"/>
DC Boundary	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2013 State & Local Roads	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SNAPTO_POINTS_EDIT - SnapToPoints	<input type="checkbox"/>	<input type="checkbox"/>

Location Moved

You've moved the location of the point. Please provide a reason, or cancel

ex. 'Adjusting location so street ends at county boundary.'

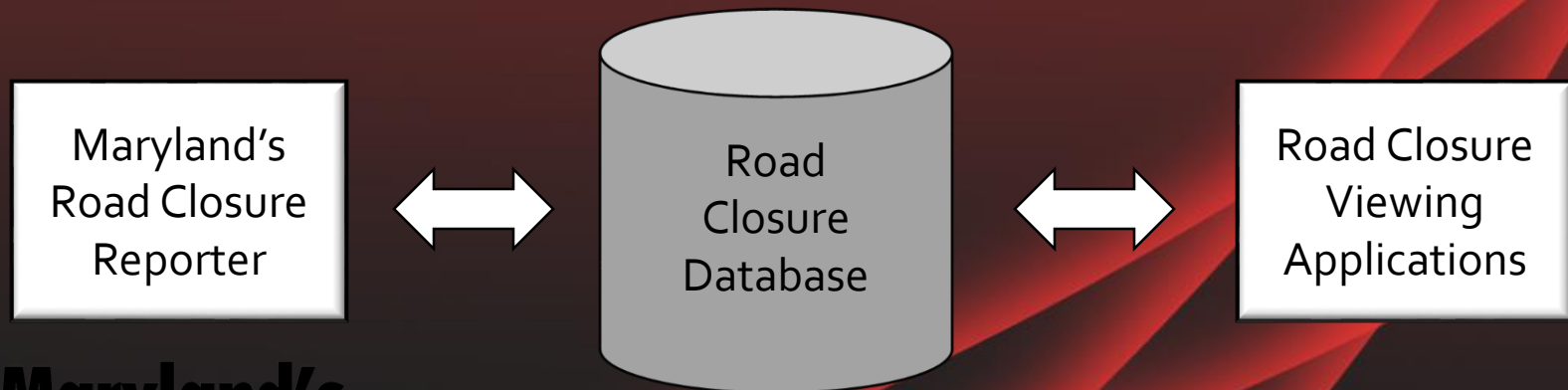
Cancel Save changes

VITA, Esri, HERE, DeLorme, Intermap, iPC, TomTom, USGS, NGA, USDA, EPA, NPS | SHA, various Maryland counties

POWERED BY **esri**

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 the logo, which consists of a yellow diamond with the words "ROAD CLOSED" in black, followed by the text "Maryland's Road Closure Reporter" in a mix of bold black and red fonts. To the right of the logo is a search bar with the placeholder text "Search..." and a magnifying glass icon, and a "Sign in" link. Below the logo and search bar is a navigation bar with a blue button labeled "I want to...". The main content area is divided into two columns. The left column contains a "Welcome to Maryland's Road Closure Reporter" heading followed by a numbered list of instructions: 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: Reason (e.g. Construction, Weather, Parade, Seasonal or Special Event), Starting (start date and time of the event), End (scheduled or estimated end time of the event), 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". Below the list is a "DISCLAIMER" section. The right column features a map of the Hagerstown, Maryland area, showing streets, parks, and landmarks like Valley Mall and Rose Hill Cemetery. A scale bar at the bottom indicates 0, 0.5, and 1 mile. At the very bottom, it says "Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors | Lo...".

The screenshot shows the mobile version of the Maryland's Road Closure Reporter web application. The layout is adapted for a smartphone screen. At the top, there is a blue bar with the text "I want to..." and four icons: a globe, a document, a magnifying glass, and a wrench. Below this is the heading "Welcome to Maryland's Road Closure Reporter" in blue. The main content is a numbered list of instructions: 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: Reason (e.g. Construction, Weather, Parade, Seasonal or Special Event), Starting (start date and time of the event), End (scheduled or estimated end time of the event), 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. The list is scrollable, as indicated by a downward arrow at the bottom.

Maryland's Road Closure Reporter



Maryland's Road Closure Reporter

Search... [Sign in](#)

← Road Closed (Point): Weather

I want to...

Actions

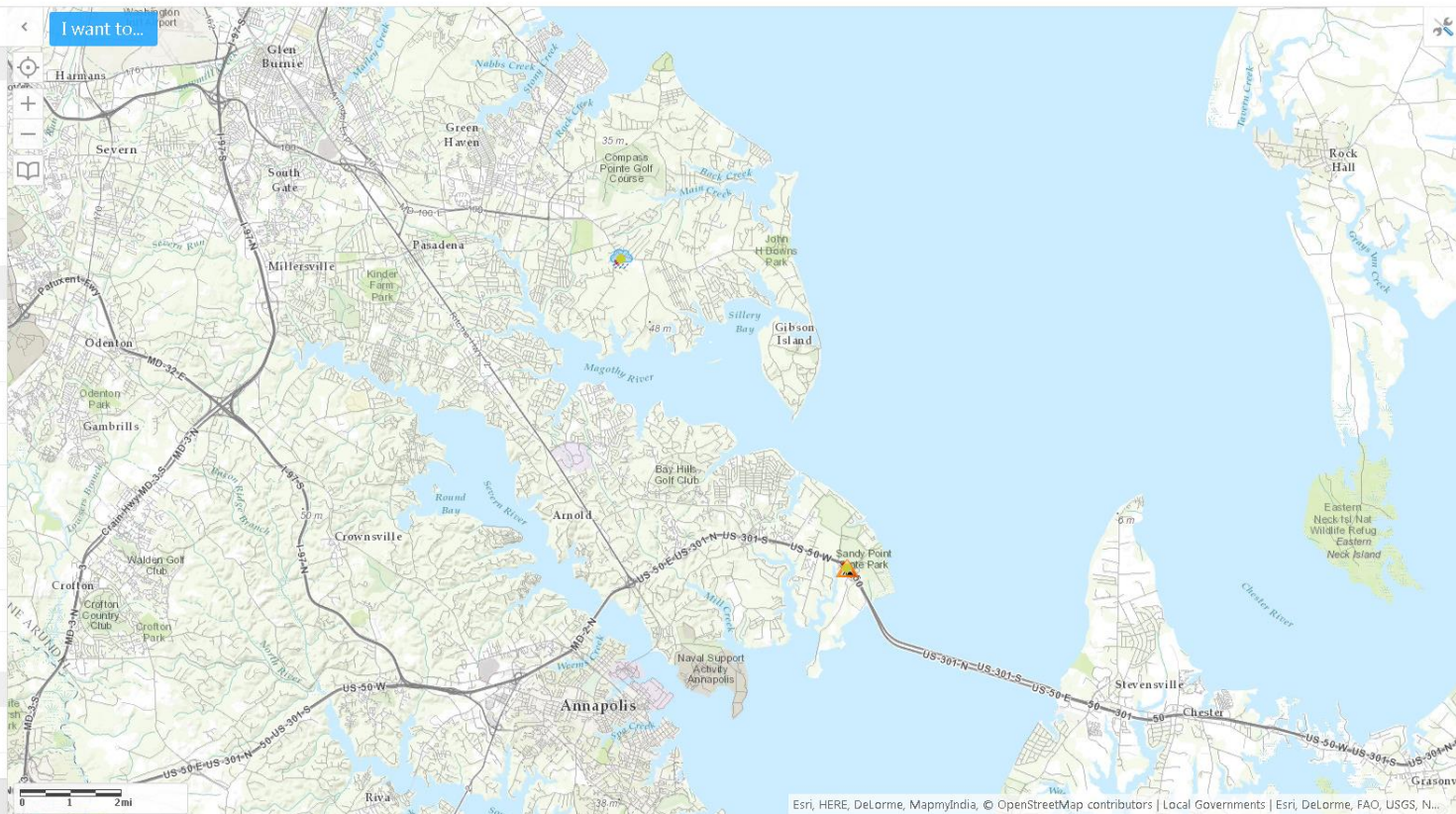
- Edit Feature
Edit the attributes of the feature.
- Attach a file or photo
Attach file or photo to feature.
- Zoom to Feature
Zoom to this feature on the map.
- Pan
Pan the map to center this feature.

Details

OBJECTID	235
Reason	Weather
Closure Start	11/13/2014, 7:36:04 PM
Closure End	11/20/2014, 7:36:04 PM
Closure Type	Closed
CreationDate	11/13/2014, 7:35:50 PM
Creator	N/A
EditDate	11/13/2014, 7:35:50 PM
Editor	N/A

Attachments

- images.jpg
13 KB



Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors | Local Governments | Esri, DeLorme, FAO, USGS, N...



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

E-mail: 1md1cline@sha.state.md.us

Web: <http://imap.maryland.gov/Pages/road-centerlines.aspx>