Esri Roads and Highways: An Introduction

Tom Brenneman
Matt Ziebarth
What is linear referencing?

A method of storing geographic locations by using relative positions along a measured linear feature.

...
Esri Roads and Highways Solution

Desktop
- LRS management tools
- Network editing
- Geoprocessing tools
- Internationalized

Enterprise
- LRS web services
- REST API samples
- Portal security and identity

Web Apps
- Event Editor
  - Event editing
  - Address management
- Roadway Reporter
  - Mileage reports
  - Road Log reports

Community
- GeoNet
- GitHub
- Esri Support Services
Building Blocks of a Linear Referencing System (LRS)

**Network**
A collection of routes, measured to a specific LRM: Milepost, Milepoint, State Routes

**Centerline**
Geometry and location of the routes

**Calibration Point**
Defines the measure for a specific location on a route

**Event**
Stores characteristics, incidents, and assets: Access Control, Speed Limit, Number of Lanes, Surface Type

**45 mph**

**0 Feet**

**100 Feet**

**5**
Event Behaviors
Configurable measure behavior rules are applied with a single click

**Stays Put**
- Preserves location
- From Measure: 5, To Measure: 15

**Moves**
- Preserves measures
- From Measure: 0, To Measure: 10

**Retires**
- Event gets retired
- From Measure: 0, To Measure: 15

**Covers**
- Covers route
- From Measure: 0, To Measure: 15

Edit a route…
Apply Edits

Route is extended
- From Measure: 5, To Measure: 15
Roads and Highways Desktop
LRS management and route editing
LRS Route Editing Tools

Create
- Route A

Retire
- Route B
  Route C Retired
- Route A

Extend
- Route A

Realign
- Route A
  Retired Portion

Reassign - Split
- Route A
  Route B

Reassign - Merge
- Route A
  Route B Retired

Reverse
- Route A

Cartorealign
- Route A
Geoprocessing Tools

Toolbox

- Append Events
- Calculate Route Concurrency
- Convert M-value Units Of Measure
- Convert Table to CSV File
- Detect Gaps For Linear Events
- Detect Measures Out Of Range
- Detect Non-monotonic Routes
- Detect Overlaps For Linear Events
- Generate Events
- Generate Routes
- **Overlay Route Events**
- Relocate Events
- Translate Events From LRM To LRM
- Update Calibration Points
- Update Intersection Points

Usage

Input

Output

Tool
Event Editor
Event editing web application
Event Editor
Versioned editing on the web

Launch

Explore
- Select By:
  - Route
  - Attribute
  - Geometry
  - Proximity

- View Results:
  - Single Layer
  - Attribute Set

Edit
- Line Events
- Point Events
- Event Attributes
- Attribute Set Results
- Related records

QA/QC
- Gaps
- Overlaps
- Invalid Measures
- Data Reviewer
- Batch Checks
Event Location Model
Flexibility in event location referencing

Route and Measure

Referent Offset

Stationing

Co-ordinate Offset

0 2 8 10

2 miles

0 250 ft

(34.054, 117.182)
# Attribute Set

Collection of fields from multiple events that can be edited together

## Access Control
- Speed Limit
- ShapeLength

## Toll Road
- Object ID
- Route ID
- Event ID
- FromMeasure
- ToMeasure
- FromDate
- ToDate
- TollRoad
- ShapeLength

## Surface Type
- Object ID
- Route ID
- Event ID
- FromMeasure
- ToMeasure
- FromDate
- ToDate
- SurfaceType
- ShapeLength

## IRI
- Object ID
- Route ID
- Event ID
- FromMeasure
- ToMeasure
- FromDate
- ToDate
- IRI
- IRIStatus
- IRIYear

## Functional Class
- Object ID
- Route ID
- Event ID
- FromMeasure
- ToMeasure
- FromDate
- ToDate
- Functional Class
- ShapeLength
Event Quality Checks
Detect gaps, overlaps, and invalid measures on the web
Roads and Highways Server
Enterprise solution
Roads and Highways Server
Linear Referencing capability for ArcGIS Enterprise

Capabilities

- Event editing
- Coordinate to measures
- Measure to coordinate
- Query attribute sets
- Measure translation
- Measure updates for external systems
- Check events for gaps, overlaps and invalid measures

ArcGIS Enterprise

- Mapping
- Query
- Geoprocessing
- Enterprise security
- Scalability
- Identity

Integrated with:
- ArcGIS Data Reviewer
- ArcGIS Workflow Manager
Roadway Reporter
LRS reporting capabilities on the web

**Mileage**
- Mileages for routes and events

**Segment**
- Dynamically segment event layers into one record set

**Road Log**
- Log events that occur when traversing a route
Address Management
Managing address information on the web

Manage

Edit
- Add/Edit Block Ranges
- Add/Edit Site Address Points
- Add Master Street Names

QA/QC
- Fishbone Diagrams
- Data Reviewer Batch Checks
Roads and Highways Community
Community

Resources
- HPMS Geoprocessing Tools
  https://goo.gl/tVkjsB
- Sample Web Application
  https://goo.gl/YGXczN
- GeoNet (transportation)
  https://goo.gl/zDoj2f

Data
- Sample Data
  https://goo.gl/t8Dko2
- Roadway Inventory Data Model
  https://goo.gl/Dbb8qE

GitHub
- Address Management
  https://goo.gl/SMFWKT
- Web App Builder sample widget
  https://goo.gl/bJrRRb

Esri Support Services
- Fully supported solution and extension – Desktop, Enterprise Server, and Web Apps - Domestic and Premium Support
Esri Roads and Highways “Roadmap”

Coming Soon

- Event Editor
  - Event replacement

- Desktop
  - Cover behavior for concurrent routes

Mid Term

- ArcGIS Pro Beta
  - REST-based LRS network editing

Long Term

- ArcGIS Pro full release including...
  - Elaborate gap support
  - Concurrency support
  - External system integration

Product releases, dates, and availability are estimates and subject to change.
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended

Scroll down to find the feedback section

Complete answers and select “Submit”
<table>
<thead>
<tr>
<th>WORKSHOP</th>
<th>DATE &amp; TIME</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Esri Roads and Highways: An Introduction</td>
<td>1:00 - 2:00</td>
<td>Room 29C</td>
</tr>
<tr>
<td>• Esri Roads and Highways: What's New</td>
<td>11:15 - 12:00</td>
<td>Demo Theater 3</td>
</tr>
<tr>
<td>• Esri Roads and Highways: Address Management</td>
<td>12:15 - 1:00</td>
<td>Demo Theater 3</td>
</tr>
<tr>
<td>• Esri Roads and Highways: Roadway Characteristics Management on the Web</td>
<td>12:15 - 1:00</td>
<td>Demo Theater 5</td>
</tr>
<tr>
<td>• Esri Roads and Highways: Best Practices, Tips, and Tricks</td>
<td>1:00 - 2:00</td>
<td>Room 8</td>
</tr>
</tbody>
</table>