Esri Roads and Highways
An Introduction
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Roadway Inventory

- Web event editing
- Quality checks
- Information model

GIS-enabled LRS platform
Roads and Highways
Linear Referencing for the Transportation Enterprise

HPMS
- Data product creation
- Quality checks and correction
- Information model

GIS-enabled LRS platform

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Roadway Inventory

HPMS

Roadway Reporting

- Mileage summary reports
- Location & segment reports
- Tabular, maps, data products
- Transformation tools

GIS-enabled LRS platform
Roads and Highways
Linear Referencing for the Transportation Enterprise

- Asset Management
- Straight Line Diagrams
- Strategic Planning
- Project Prioritization
- Field Data Collection
- Safety Analysis
- Pavement Management

…and more…

GIS-enabled LRS platform

Partner & Customer Solutions

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Product Overview

• **Desktop**
  - ArcMap LRS network editing toolbar
  - ArcCatalog management tools
  - Route & event feature class support
  - Geodatabase LRS dataset
  - Geoprocessing tools

• **Server**
  - LRS web services
  - Developer samples

• **Apps**
  - Roadway Characteristics Editor
  - Roadway Reporter
Roads and Highways for Desktop
Route Editing Activities

- Create Route
- Extend Route
- Realign Route
- Reassign Route
- Retire Route
- Calibration

Can also serve to **split** routes and **merge** routes.
Multi-LRM Support

- Route features are generated from centerline geometry and calibration point measures

- Two routes
- 4 Calibration points
- 3 centerlines

The two routes above are derived from three centerline lines.
Route features are generated from three feature classes and a table:

- **Routes**: Route features (polyline MZ)
- **Calibration points**: Point feature class that stores route measures.
- **Centerline**: Line feature class that stores route geometry.
- **Centerline sequence**: Key table for M-N relationship between Centerline and Route.
Event Feature Class
LRS Events with a shape, managed by Roads and Highways, driven by route and measure

- Persist shape column

- Shape managed

- Improved performance for …
  - Map navigation
  - Spatial query
Event Measure Behaviors
Automatically keep event measure behaviors in sync with route edits

- When the LRS routes are edited, measure behavior rules can be applied to events.
- Events can have a different behavior for each type of LRS edit
Time Aware LRS

- Date ranges applied to edits
- Event measure updates reflect date range of edits
- Historical event measures that change due to edits are “retired”
- Network and events can be visualized and queried for any moment in time
Intersection Support

• Tools to generate and manage

• Polyline to polyline
  - Example: Route to Route

• Polygon to polyline
  - Example: County to Route

• Support for event offsetting
Geoprocessing Tools
Roads and Highways toolbox

- Append Events
- Convert M-value Unit of Measure
- Detect Measures Out Of Range
- Detect Overlaps For Linear Events
- Detect Gaps For Linear Events
- Detect Measures Non-monotonic Routes
- Generate Routes
- Overlay Route Events
- Translate Events From LRM to LRM
- Update Calibration Points
- Update Intersections

…and growing.
Demo
LRS Editing
Roads and Highways
for Server
Roads and Highways for Server
Linear Referencing capability for the ArcGIS Server

- **ArcGIS for Server**
  - Mapping, Query, Geoprocessing

- **Roads and Highways for Server**
  - Event editing
  - Coordinate to measures
  - Measure to coordinate
  - Query attribute sets
  - Check events (*gaps, overlaps, invalid measures*)
  - Measure translation
  - Measure updates for external systems

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Demo

REST Services
Roadway Characteristics Editor
Event editing web application

- **Editing**
  - Line events
  - Points events
  - Event Attributes
  - Attribute set results

- **Selection**
  - Select by route, attribute, geometry, proximity
  - Single layer results or attribute sets

- **QC**
  - Gaps, overlaps, invalid measures
  - Data Reviewer batch checks
Event Location Model
Flexibility in event location referencing

- Route and measure
- Stationing
- Referent and offset
  - Intersections
  - Events
  - Features
- Coordinates and offset

Calibration Point: 1 mile
Station Event: 100+00.00
Event: 1.27 miles
Event: 456+25.00
Event: 300 feet from US Highway 10
Event: 45 feet from cell tower

Intersection Features
US Highway 10 crossing

Cell tower location:
34.0547,117.1825

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Demo
Roadway Characteristics Editor
Roadway Reporter
Reporting available across the enterprise from a web application

- **Report Types**
  - Road Mileage Reports
  - Road Segment Reports
  - Road Log Reports

- **File Types**
  - PDF
  - CSV

Notes:
1. Lane mileages in this report are indeed more accurate than those produced in the HPMS and no comparison should be attempted due to the FHWA rules for reporting "through" lanes in HPMS.
2. In 2013 more strides were made in accounting for mainline running lane mileage statewide. However, many lane values on ramp and frontage systems are still unknown and some are estimated.
3. As of EOY 2013, the ramp and frontage road systems have not been updated to reflect real conditions. The numbers still reflect the legacy Highway Log plus any changes that have resulted from new construction projects since 1953.
4. Photo Log imagery on the ramps and frontages has been collected but has not been reviewed to update the Highway Log. Additional right-of-way research (frontages, not ramps) is still critical in confirming the extent of the declared State Highway System.
5. Shoulder lane mileage had been experimental prior to 2005. In reports AV, XV, and XI after 2007, the equivalent 12-ft shoulder lane mileage includes shoulder areas on E-ramps.
Address Management
Managing address information using Roads and Highways

• Tools
  - Add Street Names
  - Add or Edit Block Ranges
  - Add or Edit Site Address
Thank you…

- Please fill out the session survey in your mobile app
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- Answer a few short questions and enter any comments
Additional Roads and Highways sessions

• Roads and Highways for Server: Web Services for Linear Referencing
  - Wednesday, 10:30 AM, Demo Theater 7

• Roads and Highways: Address Management on the LRS
  - Wednesday, 10:30 AM, Demo Theater 6

• Roads and Highways: Using Intersections for Locating Data
  - Wednesday, 11:30 AM, Demo Theater 6

• Roads and Highways: Building Infrastructure that lasts
  - Wednesday, 2:30 PM, Demo Theater 2