2019 GIS-T
Best of Both Worlds
Asset Location Presentation
Agenda

- Project Background
- Problem Statement
- Michigan Case Study
- Questions & Answers
Project Background
Project Background

- Transcend Spatial Solutions was a sub to Data Transfer Solutions on Michigan’s Transportation Asset Management System (TAMS) implementation.
- The project included implementing DTS’ VUEWorks asset management software on top of an Esri Roads and Highways configuration.
- Transcend’s scope of work was to implement Roads and Highways and migrate MDOT’s legacy route network and business data into Roads Highways.
- The initial set of assets to be modeled included Signs, Culverts, and Guardrails.
MDOT collected data in the field using GPS devices and Esri’s Collector for ArcGIS.

Transcend used Esri’s Locate Features Along Route (LFAR) geoprocessing (GP) tool to assign a Route and Measure to each feature.

For each asset, this GP tool finds the closest route and computes a single measure for point events (Signs and Culverts) and begin and end measures for linear events (Guardrail) along that route.
Trouble Ahead

Transcend uses an iterative approach to Roads and Highways implementation.

Multiple iterations are used allowing the data model to be refined after reviewing each iteration.

During the review of the first iteration, MDOT noted that information was lost in converting features from their GPS location to the LRS location.

Having the actual location of each asset was important to MDOT.
Problem Statement

Once the data was loaded into Roads and Highways event classes, the actual location of the asset was lost.

MDOT needed the actual location of the feature for map display and asset management.

The LRS representation was needed as well for analysis and Straight Line Diagramming.

So which way did MDOT want to model their asset geometry?

BOTH!
The database needed to be designed so that MDOT didn’t have to maintain the data twice.

We considered storing the Longitude, Latitude coordinates as attributes. This would work for point events, but not for linear events.

The actual asset data would need to be stored in a normal Esri Feature Class.

The LRS location would be maintained in a Roads and Highways Event Class.
MDOT Case Study

- MDOT would continue to collect data using ArcGIS Collector.
- The feature class would be the authoritative source for the data.
- Two geoprocessing scripts were created to incrementally transact the data from the Feature Class to the Event Class calling LFAR to obtain the Route ID and Measure.
  - **Locate Features** – Populate Route ID and Measure attributes on actual-location asset features
  - **Update Asset Lrses** – Propagate updates from asset feature classes to the asset events
- Users would not directly edit the R&H Event classes.
MDOT Case Study

Data Flow Diagram

1. Locate Features
2. Asset Feature Class
3. Update Asset Lrse
4. R&H Event Class (No Edit)
Locate Features

- Can either be run as a tool within ArcGIS or a Python script
  - Could also be run as a scheduled process
- Inputs
  - Roads and Highways Transactional Database including version to be updated.
  - Asset Feature Class(es)
  - Run against all features checkbox
  - Date Field
  - Last Updated Date
  - Update Method (we’ll revisit this in a bit)
  - Network Feature Class
  - Route ID Field
  - Search Tolerance
- The tool updates measures and/or Route ID fields for asset features along the route network where the Date Field is more recent than the Last Updated Date.
Update Asset Lrses

- Can either be run as a tool within ArcGIS or a Python script
  - Could also be run as a scheduled process

- Inputs
  - Roads and Highways Transactional Database including version to be updated.
  - Asset Feature Class(es)
  - Date Field
  - Last Updated Date

- The tool updates the events for any feature from the given Asset Feature Class in which the Date Field is more recent than the Last Updated Date.
Things to Consider

- Esri’s Locate Features Along Route will select the closest route to the feature which may not be the correct route.

- Consider a sign at an intersection
  - The sign may be physically located closer to the intersecting route than to the route the sign is on.
  - Accuracy would be improved if the Route ID were collected with the sign attribute data.
  - The Route ID could then be used to filter the network and ensure the feature was associated with the correct route.
Things to Consider

- It’s possible to have a one-to-many relationship from an asset to Route IDs.
- Consider a guardrail that follows along an interstate route (one Route ID) and then proceeds along an exit ramp (another Route ID)
- Or a culvert that passes under both primary and non-primary sections of a divided highway
- In these cases, business rules need to be established to handle these relationships.
Locate Features (Revisited)

- Locate Features supports three different Update Methods for determining the Route ID and Measure(s) for each feature.

  - Method #1: Re-Capture Route IDs and Measures
    - Updates Route ID and measure values based on the nearest route
    - For linear assets, this could potentially mean begin and end points are located to different routes

  - Method #2: Locate features to single Route ID
    - Executes the same Re-Capture Route IDs logic
    - The tool then attempts to locate the asset’s begin and end points to the same route

  - Method #3: Honor Existing Route IDs
    - Keep the Existing Route ID and populate/update the measure value
    - Relevant when Route IDs have been assigned based on visual inspection
MDOT Case Study - Goals Achieved

- The actual location of the asset is available for map display and asset management.

- The LRS representation was available as well for analysis, Straight Line Diagramming, and use in Esri’s Roadway Reporter.

- MDOT was able to maintain the data in a single location – the asset Feature Class as they had been doing.
MDOT’s Roads and Highways Implementation: A Journey

Fri, Apr 26, 8:30 AM – 9:00 AM
Congressional A & B

Speakers

- Kevin McKnight – Supervisions, GIS Unit, MDOT
- Michael Reynolds – Transportation Planner, MDOT
- Patrick Allen – Transportation Engineer, MDOT
Questions & Answers
Thank You!

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