ADOT’s Roadway Characteristics Full Extent Project

GIS-T March 22nd, 2018

Patrick Whiteford, GISP
Overview

- Background
- Project Goals
- Extraction Methodology
- Data Integrity and Validation
- Sustainability
- Lessons Learned
- Future Steps
Background

- Need for Off-State Federal Aid System data
- Support MIRE, HPMS reassessment, and Safety Analyst
- Visualization

<table>
<thead>
<tr>
<th>Functional Classification</th>
<th>Mileage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Principal Arterial - Other</td>
<td>13.23</td>
</tr>
<tr>
<td>Rural Minor Arterial</td>
<td>142.5</td>
</tr>
<tr>
<td>Rural Major Collector</td>
<td>2,402.44</td>
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<tr>
<td>Rural Minor Collector</td>
<td>1,686.69</td>
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<tr>
<td>Urban Principal Arterial - Other Fwys &amp; Expwys</td>
<td>9.57</td>
</tr>
<tr>
<td>Urban Principal Arterial - Other</td>
<td>497.89</td>
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<td>Urban Minor Arterial</td>
<td>2,477.65</td>
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<td>Urban Major Collector</td>
<td>1,888.71</td>
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<tr>
<td>Urban Minor Collector</td>
<td>225.96</td>
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<td></td>
<td>9,344.64</td>
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</tbody>
</table>
Model Inventory of Roadway Elements (MIRE)

- Listing of roadway inventory and traffic elements critical to safety management
  - 202 total elements
  - 37 fundamental data elements
  - Data required for on and off the State Highway System

- Guideline to help improve roadway/traffic data
  - Data for On/Off the State System

- Highway Performance Monitoring System (HPMS)
Model Inventory of Roadway Elements (MIRE)

37 Fundamental Data Elements (FDE)

- Type of Governmental Ownership
- Route Number
- Route/Street Name
- Begin Point Segment Descriptor
- End Point Segment Descriptor
- Segment Identifier
- Segment Length
- Direction of Inventory
- Functional Classification
- Rural/Urban Designation
- Federal Aid/Route Type
- Access Control
- Surface Type
- Number of Through Lanes
- Median Type
- Annual Average Daily Traffic (AADT)
- AADT Year
- One/Two-Way Operations
- Unique Junction Identifier
- Location Identifier for Road 1 Crossing Point
- Location Identifier for Road 2 Crossing Point
- Intersection/Junction Geometry
- Intersection/Junction Traffic Control
- Annual Average Daily Traffic (AADT)
- AADT Year
- Unique Approach Identifier
- Unique Interchange Identifier
- Functional Classification
- Type of Governmental Ownership
- Interchange Type
- Ramp Length
- Ramp AADT
- Year of Ramp AADT
- Roadway Type at Beginning Ramp Terminal
- Location Identifier for Roadway at Beginning Ramp Terminal
- Roadway Type at Ending Ramp Terminal
- Location Identifier for Roadway at Ending Ramp Terminal
Project Goals

- Extract RCI data on all non-state Federal Aid routes
- Create data integrity/validation rules
- Implement route dominance
- Create methods for sustainability
- Document workflows
## Extraction Methodology

- Identified the data items to be extracted

### Data Items

<table>
<thead>
<tr>
<th>Data Item Type</th>
<th>HPMS Data Item</th>
<th>Event Name</th>
<th>Event Fields to Edit</th>
<th>Recommended Method of Extraction</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Facility Face</td>
<td>Facility Face event</td>
<td>Facility Type, Location</td>
<td>Structure: Location, Structure Number</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<tr>
<td>Structure</td>
<td>Structure event</td>
<td>Structure Location, Structure Number</td>
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<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td></td>
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<tr>
<td>Access Control</td>
<td>Access Control event</td>
<td>Access Control Location</td>
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<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<td>PIO Lanes</td>
<td>PIO Lanes event</td>
<td>PIO Lane Location, PIO Description</td>
<td>Number of Lanes, PIOLocation</td>
<td>Vertical extent</td>
<td>Verify with topology</td>
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<tr>
<td>Inventory Items</td>
<td>Peal Lanes event</td>
<td>Number of Lanes, Inventory Date</td>
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<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<tr>
<td>Counter Peak Lanes</td>
<td>Counter Peak Lane event</td>
<td>Counter Peak Lane Location, Counter Peak Lane Number</td>
<td>Number of Lanes, Inventory Date</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<td>Right Turn Lanes</td>
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<td>Right Turn Lane Location, Right Turn Lane Number</td>
<td>Number of Lanes, Right Turn Lane Description</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Include lane names</td>
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<td>Left Turn Lanes</td>
<td>Left Turn Lane event</td>
<td>Left Turn Lane Location, Left Turn Lane Number</td>
<td>Number of Lanes, Left Turn Lane Description</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Include lane names</td>
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<td>Turn Lane Peak-Protected</td>
<td>Turn Lane Peak-Protected event</td>
<td>Turn Lane Peak-Protected Location, Turn Lane Peak-Protected Number</td>
<td>Number of Lanes, Left Turn Lane Location</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<td>Speed Limit</td>
<td>Speed Limit event</td>
<td>Speed Limit Location, Speed Limit Direction</td>
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<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Collect both directions on undivided roadways, with overlapping speed limits</td>
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<td>Geometric Items</td>
<td>Through Lanes event</td>
<td>Through Lanes Location, Avg Lane Width, Inventory Date</td>
<td>Number of Lanes, Avg Lane Width</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Additive of lanes on undivided roadways, include lane types</td>
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<td>Median</td>
<td>Median event</td>
<td>Median Location, Median Type</td>
<td>Median Width, Median Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<tr>
<td>Shoulder Surf Type/Left</td>
<td>Shoulder Surf Type/Left event</td>
<td>Shoulder Surf Type/Left Location, Shoulder Surf Type/Left Number</td>
<td>Shoulder Type, Shoulder Type/Left</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<td>Shoulder Surf Type/Right</td>
<td>Shoulder Surf Type/Right event</td>
<td>Shoulder Surf Type/Right Location, Shoulder Surf Type/Right Number</td>
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<td>Shoulder Width</td>
<td>Shoulder Width event</td>
<td>Shoulder Width Location, Shoulder Width Type</td>
<td>Shoulder Width, Shoulder Width Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<td>Peak Parking</td>
<td>Peak Parking event</td>
<td>Peak Parking Location, Peak Parking Type</td>
<td>Peak Parking, Peak Parking Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Collect both directions on undivided roadways, with overlapping speed limits</td>
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<tr>
<td>Parking Zones</td>
<td>Parking Zones event</td>
<td>Parking Zones Location, Parking Zones Type</td>
<td>Parking Zones, Parking Zones Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<td>Pavement Items</td>
<td>Travel Surface Type</td>
<td>Travel Surface Type Location, Travel Surface Type Number</td>
<td>Travel Surface Type, Travel Surface Type Number</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<tr>
<td>Surface Items</td>
<td>Junctions</td>
<td>Junctions Location, Junctions Type</td>
<td>Junction Sym, Traffic Count</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Collect 2 points per intersection, the main and secondary route</td>
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<td>Bicycle Lanes</td>
<td>Bicycle Lanes event</td>
<td>Bicycle Lanes Location, Bicycle Lanes Type</td>
<td>Bicycle Lanes, Bicycle Lanes Type</td>
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<td>Include images</td>
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<td>Paving Lane</td>
<td>Paving Lane event</td>
<td>Paving Lane Location, Paving Lane Type</td>
<td>Paving Lane, Paving Lane Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
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<tr>
<td>Non-Highways Items</td>
<td>Cub &amp; Gutters event</td>
<td>Cub &amp; Gutters Location, Cub &amp; Gutters Type</td>
<td>Cub Type, Cub &amp; Gutters Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Addition of pedestrian facilities (bridges)</td>
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<td>Sign Vehicle Pullout</td>
<td>Sign Vehicle Pullout event</td>
<td>Sign Vehicle Pullout Location, Sign Vehicle Pullout Type</td>
<td>Sign Type, Sign Vehicle Pullout Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Bus pullout, work with MADT/FWM to pullout stop locations</td>
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<td>Variable Message Signs</td>
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<td>Channels Items</td>
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<td>Review Only Items</td>
<td>Functional Classification</td>
<td>Functional Classification event</td>
<td>Functional Classification, Functional Classification Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Verify with topology</td>
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<td>Count Code</td>
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<td>Count Code Location, Count Code Type</td>
<td>Count Code, Count Code Type</td>
<td>Engineering Plan Sheets, Aerial Images, Photo Log, Google Maps</td>
<td>Verify with topology and use the CRM project form WorkBench</td>
</tr>
</tbody>
</table>
Extraction Methodology

- Identified the data items to be extracted
- Roadway Characteristics Editor (RCE)
Extraction Methodology

- Identified the data items to be extracted
- Roadway Characteristics Editor (RCE)
- CADD data? Photo log, Aerial Imagery and Google Street View
Extraction Methodology

- Identified the data items to be extracted
- Roadway Characteristics Editor (RCE)
- CADD data? Photo log, Aerial Imagery and Google Street View

- Extraction Training and Data Nuances
Data Integrity and Validation

- Topology Checks
- Implement Route Dominance
- Event and Cross Event Validation Rules
  1. Can't have a functional classification of interstate and have an unpaved surface type
  2. Can't have speed limit attribute without a "0" or "5" in the last digit
Sustainability

- Methods to keep data updated (automation)
- Automation and Workflow Updates
- Data Supply Chain
- Local Involvement
Lessons Learned

- Timeline Change
  - Support HPMS
- Documentation
- Need for QC early on
- Staffing...or lack there of
- Concurrent Projects
  - Centerline Unification (ARNOLD)
  - Functional Classification Rebalancing
  - Mobile Data Collection
- Technology
Future Steps

- Maintenance of roadway characteristics
- Creation of a statewide traffic monitoring plan
- Data Governance Plan
- Agency Wide Data Maturity
Questions?

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Multimodal Planning Division
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