Visualization of Traffic Data

WVDOH, Planning Divisions
Statewide Planning Section, Traffic Modeling and Analysis Unit
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Agenda

- Introduction - WV DOT Traffic Monitoring Program
- Visualize Traffic Data 1 – Data Preparation
- Visualize Traffic Data 2 – GIS Validation Check
- Visualize Traffic Data 3 – Statewide AADT Map
- Conclusion
Introduction

WV DOT Traffic Monitoring Program

- Traffic Modeling and Analysis Unit
- Traffic Modeling Guide (TMG) by FHWA
  - Continuous Data Program (74) - Volume count derived from permanently installed counters for a period of 24 hours each day over 365 days
  - Short Duration Data Program (over 3500) - Counters may be permanently installed or moved to accommodate count locations to monitoring for a specified period
- Interstate mainlines and ramps are collected every year
- Other volume and classification data are collected on 3 year cycle by District counts
- Special counts –upon request
Visualize Traffic Data

1. Data Preparation and Cleanup

- Historical data (x-y coordinate from sites, 11 digit LRS ID)
- Maintained within Traffic Server by Transmetric
  - Stations (point feature class/shape file)
  - Segments (linear referenced feature class along with WVDOT LRS network, beginning MP, and ending MP)

- On-going Data Cleanup
  - Status Change
  - 13 digit LRS ID Assignment
    - LRS Network Change
    - Two way roads (Direction Code, Dominant Route ID)
    - Any location errors
Steps

1. Spatially define new segment’s LRS ID
   - Tool: Locate Features Along Routes
   - LRS Network: Same network as HPMS team use
   - Concurrency: Dominant Route Layer
2. Compare to original LRS ID
3. Validate data
   - Direction code?
   - Rule exception on concurrency?
   - LRS ID change? AADT Values? etc
4. Update Traffic Server information

If they do not match 😨...
2. GIS Validation Checks

- Traffic Data is a part of HPMS Datasets (Vehicle Summaries)
- Validation checks
  - Annual Average Daily Traffic (AADT)
  - Ramp AADT
  - Future AADT
  - AADT Single Unit
  - AADT Combination
  - K and Dir factors
AADT (full extent)
General review for connectivity (State/County boundaries, cities), any large change
Cont. AADT
Missing AADT? (anywhere Functional Classification exist, but no AADT)
Ramp AADT
Connectivity, any large change,
### Visualize Traffic Data
#### Cont.  2. GIS Validation

- **Future AADT**
  - Future traffic flows
  - Ratio to AADT
  - Missing values?

- **AADT Single Unit (SU)**
- **AADT Combination (CU)**

<table>
<thead>
<tr>
<th>Class 1</th>
<th>Class 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorcycles</td>
<td>Four or more axle, single unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class 2</th>
<th>Class 8</th>
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</thead>
<tbody>
<tr>
<td>Passenger cars</td>
<td>Four or less axle, single trailer</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Class 3</th>
<th>Class 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four tire, single unit</td>
<td>5-Axle tractor semitrailer</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Class 4</th>
<th>Class 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buses</td>
<td>Six or more axle, single trailer</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class 5</th>
<th>Class 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two axle, six tire, single unit</td>
<td>Five or less axle, multi-trailer</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Class 6</th>
<th>Class 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three axle, single unit</td>
<td>Six axle, multi-trailer</td>
</tr>
</tbody>
</table>

| Class 13 | |
|---------| |
| | Seven or more axle, multi-trailer |
AADT Single Unit (sample section, NHS routes)
AADT for single-unit truck and buses

Class 4-7
AADT Combination (sample section + NHS routes)

AADT for combination truck

Class 8 - 13

Class 8
Four or less axle, single trailer

Class 9
5-Axle tractor semitrailer

Class 10
Six or more axle, single trailer

Class 11
Five or less axle, multi trailer

Class 12
Six axle, multi-trailer

Class 13
Seven or more axle, multi trailer

Traffic Flow
- 50,000 and Over
- 5,000 - 49,999
- 1,000 - 4,999
- 500 - 999
- 100 - 499
- 99 and Under
Cont.

GIS Validation Check on AADT SU & AADT CU

- Beside traffic flow check...
  
  IF
  
  o AADT Single Unit ≥ 50% of AADT
  o AADT Combination ≥ 50% of AADT
  o AADT Single Unit + AADT Combination ≥ AADT
  o AADT Single Unit = AADT Combination
Dir factor - 100% for one way roads only (sample sections, area by area) missing? any strange flow (Green – near 50% vs Red – near 65%)
Visualize Traffic Data
Cont.  2. GIS Validation Checks

- Map can tell a story...
  - Traffic flow and ramp flow
  - Connectivity between cities
  - Heavy traffic area
  - Change from year to year
  - What to expect in future
  - Urban and rural travel patterns
  - Local trend
Visualize Traffic Data

3. AADT Web Maps

- Used to be...
  - Station AADT in County maps (pdf)
  - Segment AADT in one statewide map (pdf)

- Paper (pdf) to Web Map
- Test Version for internal use
- Version 1 for public (Under development)
Visualize Traffic Data

cont. 3. AADT Web Maps

TEST VERSION

Purpose
- Internal Use
- Review Traffic Flow
- Check any correlation between Station AADT and Segment AADT

Development
- HTML
- CCS, ArcGIS API Java Script

ArcGIS JS 3.18
- Basemap toggle
- Feature layer
- Popups.PopupTemplate
- Measurement
- Inset map
- Legend
- Search bar
Visualize Traffic Data
cont.  3. AADT Web Maps

Problems

- Styling, map layout
- Legend size does not reflect the screen size

Solution

- “Calcite Map” new framework by Esri
Visualize Traffic Data

3. AADT Web Maps

Calcite Map

- Design framework for web map prepared by Esri
- Style is ready
  - Layout, dropdown, panels, themes, colors, widget themes...
- RESPONSIVE !!

- New Map Purpose
  - Public Use
  - Provide AADT in simple and easy user interface
  - Display difference between volume counter and class counter
  - Use latest available data after clean up (report year 2016) CSS, AGIS Java Script
Version 1.0 with Calcite Map framework

Go to demo
New Challenge

- Different code/support depends on tool
  - Calcite Map 2D Map (Map view) vs 3D Map (Scene View)
  - ArcGIS JavaScript API 3.x vs 4.x
  - Labeling, measurement, highlight
Conclusion

- Keep data clean-up
- Prioritize the GIS validation checks for annual reporting
- Find new coding solution to satisfy the needs for AADT webmap using Calcite Map
Questions ?
Special Thanks 😊

Perry Keller, Gehan Elsayed, Karen Skeen, Leland Johnson

Everyone in GTI Section

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