Work Zone Traffic Analysis in Oregon

Taking the next step
Outline

- Why do we do it?
- What do we do?
- How do we do it?
Why do we do it?


Kansas DOT & University of Kansas Center for Research

68% of crashes were multi-vehicle crashes including head-on, sideswipe, and rear-end.

40% caused by heavy trucks.
Why do we do it?

- Determine safe times for lane closures
- Times when volumes are low enough that travel speeds are not significantly decreased
Why do we do it?

Truck driver charged in fatal crash

Carroll Edward Jett, 60, of Sherman, W.Va., turned himself into authorities Thursday. The July 1 crash on Interstate 40 east of Asheville killed 15-month-old Haiden Bailey and sent 11 people to the hospital.

A tractor-trailer driven by Jett plowed into six vehicles from behind, causing the pileup, according to the Highway Patrol said. Traffic had stopped after being narrowed to one lane while work crews trimmed trees.
Why do we do it?

Backups see fatal crash at Newark Toll Plaza of I-95 Delaware Turnpike

Police said that at 21:32 Thursday night a northbound Ford Econoline van ran into the back of an Accura that formed the end of one of five queues of vehicles 400m (a quarter mile) long from the toll plaza.
What do we do?

- Estimate traffic volumes
- Select a free flow threshold
- Compare
What’s a Free Flow Threshold

- The maximum sustainable volume that yields average travel speeds at or near free flow conditions
- FFT depends on a number of factors
Free flow thresholds

Thresholds differ depending on the work...
Free flow thresholds

Not recognizing that may have unwanted results...
What traffic numbers are needed?

- Design Hour Volume?
- Peak vs. off-peak?
- 24/7

- Does not account for month-to-month variations.
- Peak and off-peak hours start and end at different times in different places.
How do we do it?

- WZTA Tool
- Timeline
  - May 2004 – Oregon Bridge Delivery Program Starts
  - Summer 2005 – WZTA is created in spreadsheet form
  - Summer 2006 – WZTA is expanded for statewide use
  - Fall 2006 – ODOT WZTA Manual is revised
  - October 2008 – WZTA online tool goes live
WZTA Background

- OTIA III Bridge Locations
Mobility Corridors

- Statewide Mobility Corridors Defined
Mobility Management and Delay Thresholds

- I-5 South Corridor (Eugene to CA State Line)
Mobility Management and Delay Thresholds

- Segment 4-C (US 199 to CA State Line)
Mobility Management and Delay Thresholds

- Length: 55 miles
- Delay Threshold: 7 minutes
Mobility Management and Delay Thresholds

- Length: 55 miles
- Delay Threshold: 7 minutes
Mobility Management and Delay Thresholds

- Corridors broken into segments
- Delay thresholds assigned to segments
- Delay thresholds to be enforced 24/7/365
- Detailed delay estimates are needed to help manage mobility
- Individual delays must be aggregated
Analysis Needs

- Delay estimates required for all projects
- Estimated delays on each segment must be compared to thresholds
WZTA Tool

- Requires only an internet connection and browser
- Up-to-date data
- Analysis results stored on server
- 5-15 minutes per analysis

Output
- Lane closure charts
- Delay estimates
- Other…
How Does It Work?

- Gather data
- Adjust data
  - Heavy vehicles
  - Seasonal variations
  - Weekday/weekend
  - Growth rates
- Identify free flow threshold
- Compare

**Free Flow Threshold** –
The maximum sustainable volume that yields average travel speeds at or near free flow conditions.
Where Does the Data Come From?

- ODOT Manual Count Database
- ITIS
  - ODOT Highway Inventory
  - Average Daily Traffic
  - Growth rates
  - Truck percentages
- ODOT Traffic Database
  - Daily Trends/ATR Data
- GIS
  - UGB/MPO
  - Region Boundaries
Choose Your Location

Method 1

- Select Highway # and MP
Choose Your Location

- Select highway via drop down
Choose Your Location – Method 1

Manual entry of milepost

[Map of Oregon with mileposts and highway numbers]
Choose Your Location – Method 2

Use map to select location
Choose Your Location

Location data should now be displayed
Year of Analysis

- Inputting the year of analysis yields projected traffic data
Manual count data
Viewing manual count data
Example closure charts

### Eastbound

<table>
<thead>
<tr>
<th>Data</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
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### Westbound

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</table>
### Lane Closure Chart

#### I-5 Fairgrounds Interchange - Roseburg

**Southbound - Weekday**

<table>
<thead>
<tr>
<th>Year of Analysis</th>
<th>Lane</th>
<th>Lane</th>
<th>Average PCIe for Monday</th>
<th>Average PCIe for Tuesday</th>
<th>Average PCIe for Wednesday</th>
<th>Average PCIe for Thursday</th>
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<tbody>
<tr>
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<td>-</td>
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<td>-</td>
</tr>
</tbody>
</table>

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**Analysis Prepared By: Jeremy Jackson**

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**Legend**

- **Not Available:** Data not available.
- **Periods above PCIe Limit:** Periods above PCIe limit.
Closure Chart Uses

- Used primarily in the planning and design phases
- Planning: May influence final design
- Design: Project specifications
- Construction: Short notice issues
Output – Graphical Delay

Example graphical output
Output – Graphical Delay

Example graphical output

Visual Delay: Highway 1 - Milepost 220

Highway 1 - Milepost 220

Highway 1 - Milepost 220

Highway 1 - Milepost 220

Highway 1 - Milepost 220
Output - Aggregate Delay

Aggregate delay over user-defined segments

![Visual Delay - Segment 2-F: OR 58 - Oakridge to US 97](image)
An example of context...

<table>
<thead>
<tr>
<th>Location</th>
<th></th>
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<tbody>
<tr>
<td>ODOT Hwy #</td>
<td>001</td>
</tr>
<tr>
<td>Milepoint</td>
<td>91.85</td>
</tr>
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<td>ODOT Region</td>
<td>3</td>
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<tr>
<td>Area Type</td>
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<tr>
<td>Area(shoulder)</td>
<td>Freeway</td>
</tr>
<tr>
<td>Roadway Type</td>
<td>Freeway</td>
</tr>
<tr>
<td>Terrain Type</td>
<td>Level</td>
</tr>
<tr>
<td>Existing Posted Speed Limit (mph)</td>
<td>65</td>
</tr>
<tr>
<td># of Existing Lanes: (per direction)</td>
<td>2</td>
</tr>
<tr>
<td>Total Paved Surface Width (feet)</td>
<td>40</td>
</tr>
<tr>
<td>NHS Route</td>
<td>Yes</td>
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<tr>
<td>OHP Freight Route</td>
<td>Yes</td>
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<tr>
<td>National Network (Freight)</td>
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<table>
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<th>Traffic Data</th>
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<tr>
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</table>
Check Horizontal Geometry

- Work zone is on a 4.0 degree curve
Check Vertical Geometry

Work zone is on a 4-6% grade
Roadway Geometry Example

- Horizontal geometry = 4 degree curve
- Vertical geometry = 4-6% grade
- What does this do to the free flow threshold?
Traffic Planning Sheet (TPS)

- Can be accessed without login
- Input ODOT Hwy# and MP
Traffic Planning Sheet (TPS)

Outputs include:
- Roadway profile
- Straightline diagrams
- Horizontal curve table
- Vertical grade table
- Vertical type table
Traffic Planning Sheet (TPS)

Roadway Profile

[Image of a road profile graph showing elevation changes along different milepoints]
Traffic Planning Sheet (TPS)

Straightline Diagram
## Horizontal Curve Table

<table>
<thead>
<tr>
<th>LRS</th>
<th>BEGIN_MP</th>
<th>ENDING_MP</th>
<th>Degree Curve Angle</th>
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<td>90.53</td>
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<tr>
<td>000100100S00</td>
<td>90.77</td>
<td>90.84</td>
<td>2.00</td>
</tr>
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## Traffic Planning Sheet (TPS)

### Vertical Grade Table

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### Traffic Planning Sheet (TPS)

- **Vertical Type Table**

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<td>94.65</td>
<td>94.67</td>
<td>S</td>
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</tbody>
</table>
The map legend can be activated to turn on and off data layers including the following:

- ADT
- Truck percentage
- Horizontal Curve data (degree of curvature)
- Vertical grade
- ATR locations
- Manual Count locations
The map legend can be activated to turn on and off data layers including the following:

- Traffic and Count Locations
- ATRs
- Signals
- MCTD Maps
- Boundaries
- Geometry
Other Important Information

ODOT Motor Carrier Transportation Division Route Maps

- Group Map 1
- Route Map 2
- Route Map 5
- Route Map 6
- Route Map 9
This map shows routes allowing loads up to 12’ wide on Continuous Trip Permits (CTP)
This map shows routes allowing overwidth loads to travel at night (12’ on freeways, 10’ on others)
MCTD Route Map 5

This map shows routes approved for triple tractor trailers.
This map shows routes that allow loads up to 14’ wide on CTPs.
This map shows routes that allow loads up to 14’ wide on CTPs.
ATR graphing tool

- Allows for the graphing of actual volumes over a user-defined period
ATR graphing tool

- 3 week graph covering Thanksgiving
ATR Graphing Tool

- Sunday after Thanksgiving – Baker Valley
ATR Graphing Tool

- The same day at Yoncalla

![Graph showing volume (vph) with peak on 11/27/05 12:00 AM]
ATR Graphing Tool

- Memorial Day weekend at Oakridge ATR
ATR Graphing Tool

- Albany ATR
- October 6, 2007 to October 9, 2007
Delay estimates and work windows can be generated quickly

Ability to predict delays/travel times for work zones, segments, and corridors

During planning: Closure chart and delay estimates influence staging strategies

During design: Closure information used in project specifications
Summary

- Scheduling and staging for major construction projects
Contact Information

Smith Siromaskul, P.E.
HDR
Professional Associate
Traffic Engineer
smith.siromaskul@hdrinc.com
660 Hawthorne Ave SE, Suite 220
Salem, OR 97301
(224) 766-0526

Jeremy Jackson, E.I.
HDR
Traffic Engineering Intern
jeremy.jackson@hdrinc.com
660 Hawthorne Ave SE, Suite 220
Salem, OR 97301
(503) 510-3098