Training Material for the ODOT Safety Investigations Manual

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Agenda

• 8:30 Welcome and Introductions
• 8:45 SIM Part # 1
• 10:00 Break
• 10:15 SIM Part # 2
• 11:45 Lunch
• 1:00 Case Study # 1
• 2:00 Case Study # 2
• 3:00 Wrap Up
• 3:15 Adjourn
Icebreaker
Outline of the Manual

1. Manual Overview
2. Safety Investigation Basics
3. Overview of Data Sources
4. Diagnosing Crash Patterns
5. Site Investigations
6. Countermeasure Selection and Recommend Improvement Analysis
7. Document Implementation

• Appendix
  – Worksheets, Instructions, Example Problems, Case Studies
Purpose

- Resource for traffic investigators
  - Both experienced & new
- Training material
- Standardized approach
- Documentation
- Useable by local agencies
What This Manual Does Not Do

• Tell you how to do your job
• Cover all circumstances or crash patterns likely to be observed
Limitations

• Access to local crash data is still a challenge but will be improving.
  – Online access to Excel crash reports (not just summary) for non-state highways
  – Automated collision diagramming
  – GIS SPIS
Principles of Investigation

• The doctor is in!

• Crashes are rare events

• Most users prefer to avoid a crash

• Trying to detect a pattern of crashes that are “out of the ordinary”
Basic Concepts

• Factors that “cause” crashes

• Rates

• Duration

• Severity
Sample: OR99E & Checkerboard Road

Karen K. Dixon
Associate Professor
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## In Office Data

<table>
<thead>
<tr>
<th>Crash</th>
<th>Geometry</th>
<th>Exposure</th>
<th>Other</th>
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<tbody>
<tr>
<td>Crash Data</td>
<td>Highway Inventory</td>
<td>Functional Class</td>
<td>Web TransGIS</td>
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<td>SPIS</td>
<td>Digital Video Log</td>
<td>Traffic Volumes</td>
<td>Traffic Signal Timing</td>
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<td>Google Maps</td>
<td>As Built Plans</td>
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**Data Collection**
- Crash Data Analysis
- Site Investigation
- Identify Candidate Countermeasures
- Recommend Improvements
- Document and Implement Improvements
Data Collection

• Need:
  – Crash data
  – Photos or DVL
  – Site maps
  – Functional class
  – Traffic volumes
Location
Hwy 081 MP 37.055
Browse the DVL (Digital Video Log)

- The ODOTDVL can be accessed internally at  [http://rssa.odot.state.or.us/cf/dvl/](http://rssa.odot.state.or.us/cf/dvl/)
- The external link to the ODOT DVL is included at:  [http://www.oregon.gov/ODOT/TD/TDATA/rics/PublicRoadsInventory.shtml](http://www.oregon.gov/ODOT/TD/TDATA/rics/PublicRoadsInventory.shtml)

Make some notes about what you see
Use Google Maps Streetview


• Type OR 99E and Checkerboard Road in the search dialog window
Get the Functional Class


RURAL
• Rural interstate
• Rural other principal arterial
• Rural minor arterial
• Rural major collector
• Rural minor collector
• Rural local

URBAN
• Urban interstate
• Urban other freeways and expressway
• Urban other principal arterial
• Urban minor arterial
• Urban collector
• Urban local
# Functional Class

## Functional Classification and National Highway System Status on Oregon State Highways

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Get Traffic Volumes

• See ODOT traffic volume tables
  
  • http://www.oregon.gov/ODOT/TD/TDATA/tvm/tvt.shtml

  • Minor street volume may require some digging.
Crash Data

- Relational database
  - Crash
    - 1 record
  - Vehicle
    - 1 record for every vehicle
  - Participant
    - 1 record for every person
Let’s browse the code manual
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In class exercise

Using the PRC report, add the following to the diagram below for crash serial # 00964. Be sure to place in the appropriate box:

1) The milepost of the crash
2) Day of the week of crash
3) Severity of crash
4) Weather and lighting of the crash
5) Type and direction of travel for each vehicle
6) Type, age, sex, injury severity and license status of each participant
7) Label the vehicles to the left (with number)
Download Crash Data

• Download
  – PRC Report in Excel Format
  – Must use Internet Explorer
  – Link

PRC: Program Research Corporation
SIM Worksheets

• Download the worksheet
• Notice tabs:
  – Cover sheet
  – Data entry
  – PRC Rawdata
  – ...

Cover Sheet

• Fill in all yellow highlighted cells
• This information will appear on most other forms
• Be sure to select whether it is a
  – SEGMENT
  – INTERSECTION
  – then the appropriate class or type
Data Entry

• Select all rows/columns in the PRC report you downloaded.
• Copy and paste into SIM worksheet, PRC_RAWDATA tab in cell A1
• Go to DATAENTRY tab
• Fill in
Crash Patterns Worksheet

- Collision type (all)
- Collision type (fatal & severe injury)
- Number of vehicle
- Residence of driver
- Sex of driver
- Time of day
- Light condition
- Weather

- Surface
- Day of the week
- Driver age
- Location
  - On roadway
  - Off roadway
- Cause codes

Red variables require use of PRC report
### Decoding the Patterns

**Severity**

<table>
<thead>
<tr>
<th></th>
<th>Crash</th>
<th>Obs %</th>
<th>Ex %</th>
<th>P(Norm)</th>
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<tbody>
<tr>
<td>Fatal+ Inj A</td>
<td>2</td>
<td>11.8%</td>
<td>3.9%</td>
<td>14.1%</td>
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<tr>
<td>Injury B+C</td>
<td>11</td>
<td>64.7%</td>
<td>39.1%</td>
<td>2.9%</td>
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<tr>
<td>PDO</td>
<td>4</td>
<td>23.5%</td>
<td>57.0%</td>
<td>99.9%</td>
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</table>

**Crashes at study site**

\[
\frac{2}{17} = 11.8\%
\]

“Expected” % (Its looked based on facility type)

|                |       | 17     | 100.0%| 100.0% |

P(Norm) - How likely is the proportion (2/17) observed by chance? Values less than 5% flagged but you can look at value as another clue.
Decoding the Patterns Worksheets

![Bar chart showing observed vs. expected percent of total crashes for different categories: Fatal+ Inj A, Injury B+C, PDO.](chart.png)
Patterns

• Look at case study sheet
• Highlight or note “flagged patterns”
Crash Rates

• What is the calculated rate?
• What is the critical rate?
• Is this intersection “flagged” as above average?
Collision Diagram

• The investigators other best friend!

• (New automated statewide tool available soon)
Site Investigations

• Based on the patterns:
  – What crash patterns should they look for?
  – What time should investigator go to the site?
  – What items should they try to document?
    • Table 1, pg 44
  – What types of field studies might be considered?
    • Table 2, pg 48
  – Are there any crash pattern specific elements to collect?
    • Table 3 and 4, pg 51
Countermeasure Selection

- Select the “cure” for the crash
- Good countermeasure should reduce either the frequency or severity of dominant crashes types.
- Tradeoffs between safety and other competing decision elements should be expected
Countermeasures

• Based on field data and collision data
  – What are some possible countermeasures?
  – Use Table 3, 4 to brainstorm
Apply access management to limit open access

Realign Checkerboard to remove skew

Add left-turn lane refuge (both directions)
Getting a CMF or CRF

http://www.cmfclearinghouse.org/
B/C Form

• Calculate the B/C
• Note: new ODOT forms to replace form shown.
HSIR

• “Highway Safety Investigations Report” - HSIR
• Document the final results.
Documentation

• Preparing consistent documentation is a key ingredient in safety improvement process.

• Narrative description of problem
  – Try writing a statement that summarizes the investigation (be prepared to share)

• Recommendation
  – Try writing a statement (be prepared to share)