Getting to Zero Deaths on Ohio’s Low-Volume Roads

Ohio Transportation Engineering Conference
October 3, 2018
The purpose of this presentation is to review crash data trends and statistics for the pilot projects of Ohio’s Township Sign Grant Program and will expand on the analysis completed for a TRB paper on the township sign program.
Getting to Zero Deaths on Ohio’s Low-Volume Roads

Presentation Agenda

Brief Program Background

Crash Data Analysis

Trend Analysis

Benefit/Cost Analysis

Real World Applications

Moving Forward
Program Background

Ohio’s Township Sign Grant Program
The township system is the largest segment of Ohio’s roadway network and accounts for 34% of Ohio’s center lane mileage.

The goals of the township sign program are to:

• Reduce crashes
• Eliminate fatalities and serious injuries
• Improve overall roadway safety on the township system
Program Background

Why Signs?

Roadway signage is a major component of roadway safety.

- Good signage clearly identifies roadway hazards, curvature, and intersections.
- Poor, non-reflective, or damaged signage can contribute to increased crash frequencies.
Program Background

Why Signs?

Improved and retroreflective signage is an ideal choice to improve safety on the local level.

• Low cost improvement
• Ease of implementation (vs. other strategies)
• Systemic approach
Program Background

Implementation

Ohio’s Township Sign Grant Program identifies high crash townships and invites them to apply for up to $50,000 in signage.

ODOT Responsibilities:

• Identify candidate townships
• Award grants
• Right of Way, Environmental, Federal Authorization
• Order signs

Township Responsibilities:

• Determine specific signage needs
• Receive and install signage
Crash Data Analysis

Before and After Implementation
Crash Data Analysis

Identifying Candidate Townships

ODOT used statewide crash data to identify townships with high numbers of crashes and fatalities/serious injuries on township system roads.
<table>
<thead>
<tr>
<th>Township</th>
<th>County</th>
<th>District</th>
<th>Population</th>
<th>Mileage</th>
<th>Crashes</th>
<th>Fatalities</th>
<th>Incapacitating</th>
<th>Non-Incapacitating</th>
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</table>

Getting to Zero Deaths on Ohio's Low-Volume Roads

October 3, 2018
Crash Data Analysis

Data Collection

24 Townships covering 19 Counties were evaluated to determine the initial effectiveness of the Township Sign Grant Program.

For these townships:

- 2012-2014 Data was used as pre-implementation (before)
- Signage was installed during the year 2015
- All had at least one year since implementation (after)
Crash Data Analysis

Data Collection

Data was collected using ODOT’s GIS Crash Analysis Tool (GCAT) which is a web-based GIS platform incorporated into ODOT’s Transportation Information Mapping System (TIMS).

- GCAT incorporates data directly from OH-1 crash reports
- Data is presented graphically, and can be downloaded for processing
October 3, 2018

Getting to Zero Deaths on Ohio's Low-Volume Roads
Crash Data Analysis

Data Processing

Data from GCAT was processed using ODOT’s Crash Analysis Module Tool (CAMTool), an Excel based spreadsheet that directly uses GCAT data.

- Data processing included removing all non-township system crashes.
### Crash Analysis Module - CAM Tool

#### GCAT / GQIL

Click to Open Analysis Toolbox or Type "Ctrl + t"

Macros Must Be Enabled to Run the CAM Tool

Click to go to help on enabling Macros on Excel 2007

The Tool Will Not Run Properly.

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</table>

### GCAT Resources

### View Crash Reports

### TIMS-GCAT 'How to' Recording

### ODOT Program Management

### Launch TIMS-GCAT

### ODOT Destripe

### ADT Volumes
Crash Data Analysis

Pre-Implementation Data

Pre-Implementation (2012-2014)

Over the 24 study townships:

- 1434 crashes/year (avg.)
- 14 total fatalities
- Key trends:
  - Fixed Object
  - Run off road
  - Intersection Related

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<th>2012-2014 Average</th>
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<td>O</td>
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Crash Data Analysis

Post-Implementation

2016 was the first full year of data available after installation of the new signage in the 24 study townships.

Post-Implementation Data (2016)

- 1294 Crashes (10% Reduction)
- 0 fatalities (100% reduction)
- 25 serious injuries (35% reduction)

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<td>1123.33</td>
<td>1003</td>
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</table>
Crash Data Analysis

Post-Implementation

2017 data is now available for the study townships.

Post-Implementation Data (2016-2017)

- 1217 crashes/year (15% reduction vs. 2012-2014 average)
- 3 fatalities (67% reduction vs. 2012-2014 average)
- 26 serious injuries/year (33% reduction vs. 2012-2014 average)
Crash Data Analysis

Post-Implementation

Statewide Trends* (2012-2014 average vs 2016)

- Crashes: Increased 10%
- Fatalities: Increased 9%
- Injuries (all inclusive): Increased 11%

*http://www.dot.state.oh.us/Divisions/Planning/ProgramManagement/HighwaySafety/HSIP/Crash_Rate_Information/Historical%20Crash%20Rates.pdf
Crash Data Analysis

Key Takeaways

- Overall crash reductions of 10-15%
- Significant reductions in fatal crashes
- >30% reduction in serious injuries

Crashes, fatalities, and injuries decreased within the study townships during a period of increased crashes, fatalities, and injuries statewide.
Trend Analysis

Measures of Effectiveness
Trend Analysis

Contributing Factors

Improved signage can be useful in low-visibility situations such as poor roadway conditions, along dark roadways, and in poor weather seasons such as winter.

• Across the 24 study townships, “after” data indicated reductions in non-dry pavement, overnight, and winter crashes.
Trend Analysis

Key Contributing Factors

-27%
Non-Dry Pavement
(Wet, Snow, Ice)

-6%
Winter Crashes
(Nov-Mar)

2016-2017 averages compared to 2012-2014 averages, study townships
Trend Analysis

Key Contributing Factors

-5%

Overnight Crashes
(7pm-6am)

2016-2017 averages compared to 2012-2014 averages, study townships
Trend Analysis

Key Takeaways

Clear, visible signage can impact driver behavior and improve safety.

- Drivers who are aware of upcoming hazards, curvature, and intersections are in a better position to prevent or avoid an incident.
- In accidents that do occur, slower speeds improve safety outcomes.
Benefit/Cost Analysis

Return on Investment
Benefit/Cost Analysis

Definitions

Comprehensive Societal Cost

The cost of each crash by either crash type or severity that includes the human capital costs in addition to non-monetary costs related to the reduction in the quality of life in order to capture a more accurate level of the burden of injury.
Benefit/Cost Analysis

Definitions

**Human Capital Cost**

The cost of each crash by either crash type or severity that includes monetary losses associated with medical care, emergency services, property damage, and lost productivity.
## Benefit/Cost Analysis

### Development of the B/C Ratio

<table>
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<th>Crash Severity</th>
<th>Comprehensive Societal Cost</th>
<th>Human Capital Cost</th>
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Benefit/Cost Analysis

Key Information

Total Spent: $522,924.29

2012-2014
Before Data (avg.)

2016*
After Data

Total Spent: $522,924.29

min: $733.86 average: $21,788.51 max: $51,096.29
## Benefit/Cost Analysis

### BCA Results

<table>
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<th>Comprehensive Societal Benefit</th>
<th>Human Capital Benefit</th>
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<td>$32,727,526.67</td>
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</table>

**Benefit/Cost Ratio:**

- **Comprehensive Societal Benefit:** 62.6:1
- **Human Capital Benefit:** 21.4:1
Benefit/Cost Analysis

Key Takeaway

Upgraded signage is a low cost countermeasure with significant potential benefit that outweigh its implementation costs.
Real World Applications

Licking County, Ohio
Real World Applications

Jones Road, Licking County Ohio

• Vertical curves
• Hidden horizontal curves
• High density of fixed objects (large trees)
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October 3, 2018

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Getting to Zero Deaths on Ohio's Low-Volume Roads
Moving Forward

Conclusions and Future Applications
Moving Forward

Evaluation

The goals of the township sign program were to:

• Reduce crashes
• Eliminate fatalities and serious injuries
• Improve overall roadway safety on the township system

Initial evaluation indicates that the program has:

• Reduced crashes
• Reduced fatalities and serious injuries
• Improved safety
• Generated positive return on investment
Moving Forward

Awareness and Future Applications

The Township Sign Grant Program was recently presented at the 2018 TRB Annual Meeting, and was published into the Transportation Research Record in July.
Moving Forward

Awareness and Future Applications

Improved signage has applications beyond the Township system, and the high potential benefit should justify to all roadway owners the value of such improvements.

- Complex geometry
- Hidden/obstructed hazards
- Older/younger drivers
- Urban/rural
- Systemic approaches
Questions relating to the facilitation of the Township Sign Grant Program:

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Questions
Thank you

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T 216.535.3650