Optimum Urban Clear-Zone Distance

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Why the Urban Clear-Zone Distance is Important

- Limited Right-of-Way Available
- Cost of Right-of-Way vs. Risk of Crashes
Presentation Outline

- Introduction
- Problem Statement
- Project Goals
- Research Plan
- Literature Review
- State Synthesis
- Data Collection
- Analysis
- Conclusions and Recommendations

Introduction

- Definition – Clear-Zone
  - The unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles (AASHTO, Green Book)

- Omissions
  - Does not provide a specific clear zone width
  - Only provides guidance on an absolute recommended minimum clear zones dimensions
Problem Statement

Tendency for fixed object crashes to be more severe than other urban crash types

| Iowa Crashes, Average Annual Crashes from 2004 to 2006 |
|---------------------------------|---------|---------|---------|---------|-------|
| Total Crashes                  | Fatal   | Major Injury | Minor Injury | Possible | Property Damage | Total |
| 380                            | 1,643   | 5,488    | 10,263  | 39,756  | 57,540 |
| Urban Crashes*                 | 66      | 584      | 2,649   | 6,429   | 22,797 | 32,525 |
| Urban Fixed Object Crashes     | 10      | 51       | 186     | 357     | 1,240  | 1,844  |
| % of all Crashes               | 3%      | 3%       | 3%      | 3%      | 3%    | 3%    |
| % of all Urban Crashes         | 15%     | 9%       | 7%      | 6%      | 5%    | 6%    |

*Urban crashes are those crashes that take place on curbed roads.

Project Goals

- The project was conducted in 2 Phases:
  1. Synthesis of practice
  2. Investigate the benefits of a 10 foot clear-zone

- Research Outcomes:
  - Provide guidance for when it is practical and cost effective to provide clear-zone less than 10 feet.
  - Help to clarify jurisdictions’ policies of clear-zone width.
Research Plan

- Literature Review
- Conduct a Synthesis of Practice
- Develop a Statistical Design
- Collect Data Elements and Generate a Project Database
- Conduct Analysis
- Final Report

State Synthesis

States Surveyed
- California
- Colorado
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Michigan
- Minnesota
- Missouri
- Nebraska
- Nevada
- North Carolina
- North Dakota
- Ohio
- Oregon
- South Dakota
- Texas
- Washington
- Wisconsin
Data Collection

- **Data Base**
  - 11 Corridors in Des Moines
  - 2 Corridors in Waterloo

- **Physical characteristics collected**
  - Longitude
  - Latitude
  - Fixed object type
  - Setback distance from curb
  - Roadway name
  - Speed limit
Data Collection

Segment
Block
15 Meter

Analysis

- Predictors
  - Minimum Setback
  - Average Setback
  - 15th Percentile Setback
  - Effect of Intersections
  - Violation of the Area-of-Influence
  - Speed Limit
  - Fixed Object Density
  - Cumulative Percent Crashes
  - Cumulative Percent Cost
  - Economic Evaluation
Analysis
Minimum and Average and 15th Percentile Setback Significance

Analysis
Intersection Significance

0 = 45 meter segment is within 45 meters of intersection
1 = 45 meter segment is not within 45 meters of intersection
Analysis

Violation of Area of Influence

A consistent clear zone distance decreases fixed object crashes

![Graph showing the relationship between average fixed object crashes per year and violation of area of influence.]

Analysis

Fixed Object Density

The fixed object density did not have an impact on the number of crashes

![Graphs showing the relationship between average fixed object crashes per year and density of fixed objects per mile for different density ranges.]
**Analysis**

**Economic Evaluation**

<table>
<thead>
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<th>Setback</th>
<th>Average Incremental Benefit from next lowest setback</th>
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<tr>
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**Analysis**

**Cumulative Percent Crashes**

5 foot clear-zone is most effective
Conclusions and Recommendations

Summary of Findings

- Synthesis of practice
- Investigation of clear zone
  - Intersection is significant
  - Consistent clear-zone is important
  - Minimize number fixed object crashes = 5 ft clear zone
  - Minimize cost of fixed object crashes = 4 ft clear zone
  - Greatest incremental benefits at 2 and 5 ft

Conclusions and Recommendations

Policy Implications

- What is the optimal fixed object setback on urban curbed roads?
  - Natural break in crash frequency at 5 ft
Conclusions and Recommendations
Limitations and Future Research

- Data collection
  - Limited sample size
- Other Characteristics
  - Turning percentages
  - Access point density
  - Pedestrians

Questions?

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