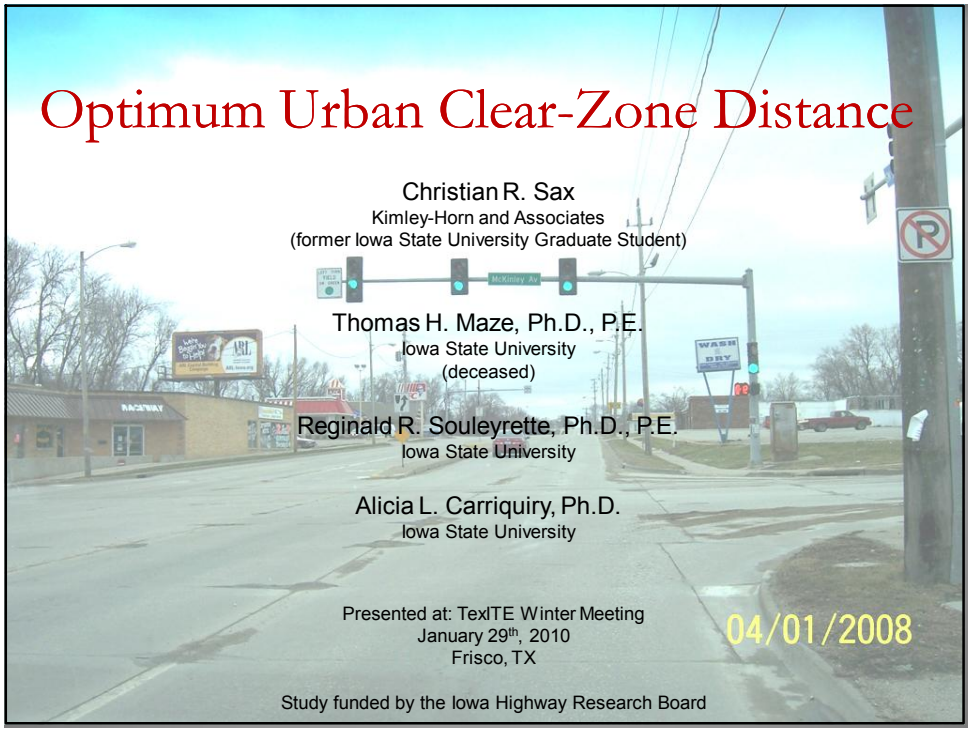


Why the Urban Clear-Zone Distance is Important

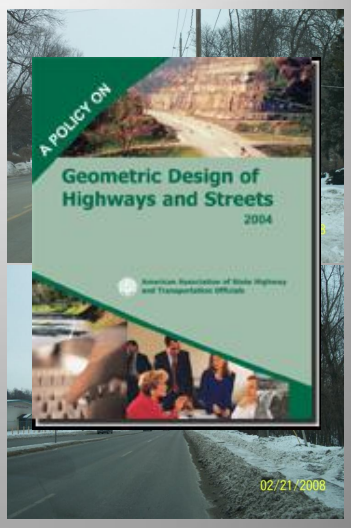
- Limited Right-of-Way Available
- Cost of Right-of-Way vs. Risk of Crashes

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

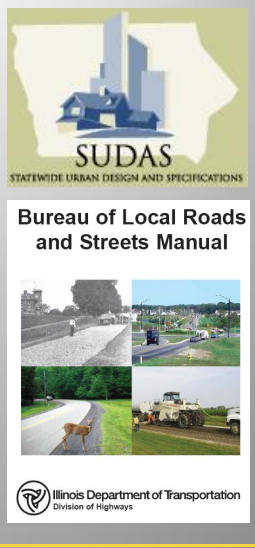
Iowa Crashes, Average Annual Crashes from 2004 to 2006						
	Fatal	Major Injury	Minor Injury	Possible	Property Damage	Total
Total Crashes	380	1,643	5,498	10,263	39,756	57,540
Urban Crashes*	66	584	2,649	6,429	22,797	32,525
Urban Fixed Object Crashes	10	51	186	357	1,240	1,844
% of all Crashes	3%	3%	3%	3%	3%	3%
% of all Urban Crashes	15%	9%	7%	6%	5%	6%

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

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

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.



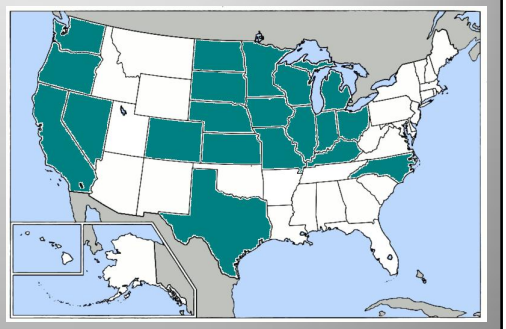
Research Plan

- 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

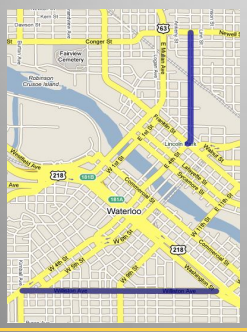
States Surveyed

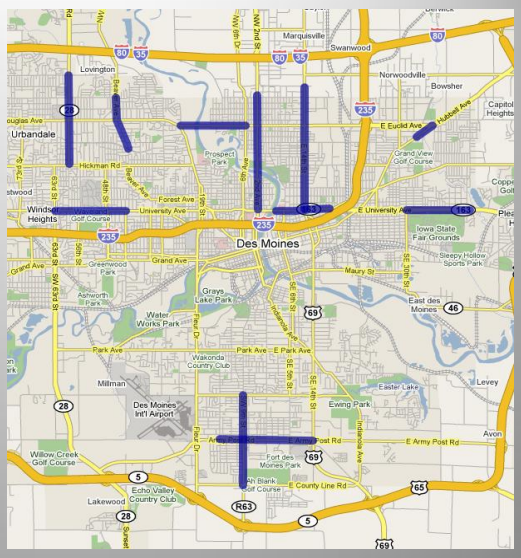
- California
- Colorado
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Michigan
- Minnesota
- Missouri
- Nebraska
- Nevada
- North Carolina
- North Dakota
- Ohio
- Oregon
- South Dakota
- Texas
- Washington
- Wisconsin



Data Collection

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



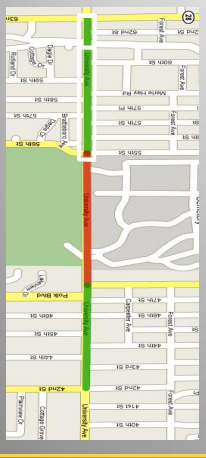


Data Collection

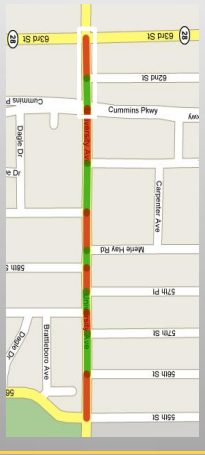
- Physical characteristics collected
  - Longitude
  - Latitude
  - Fixed object type
  - Setback distance from curb
  - Roadway name
  - Speed limit

Data Collection

Segment



Block



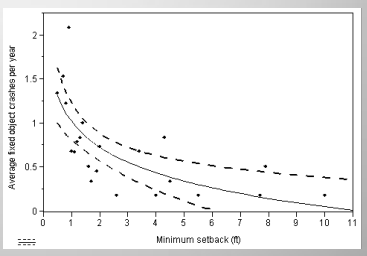
15 Meter

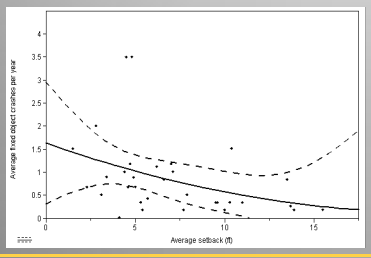
Analysis

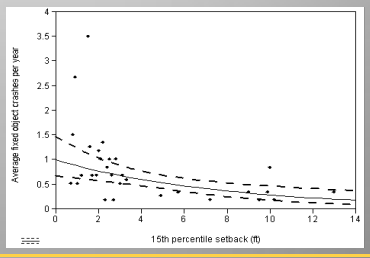
- Predictors
  - Minimum Setback
  - Average Setback
  - 15th Percentile Setback
  - Effect of Intersections
  - Violation of the Area-of-Influence
  - Speed Limit
  - Fixed Object Density
  - Cumulative Percent Crashes
  - Cumulative Percent Cost
  - Economic Evaluation

Analysis

Minimum and Average and 15th Percentile Setback Significance

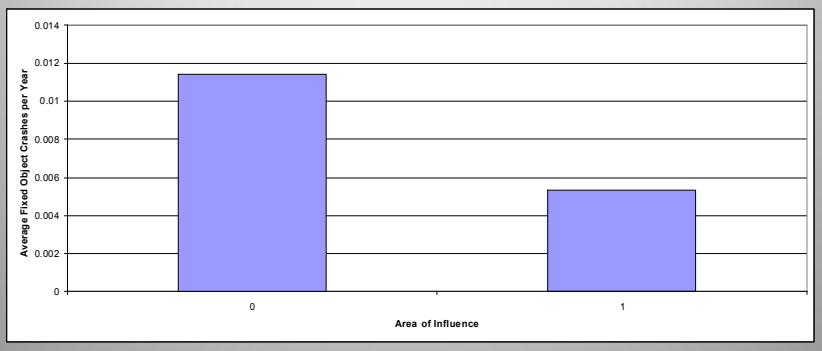






Analysis

Intersection Significance



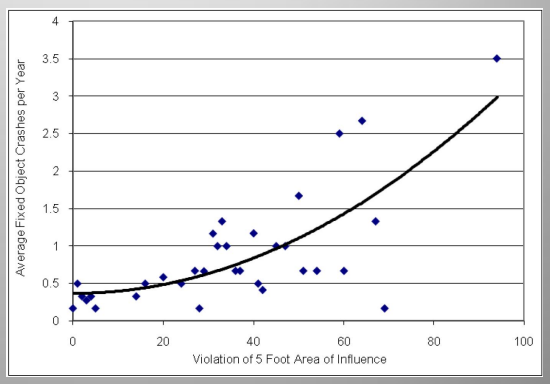
0 = 45 meter segment is within 45 meters of intersection

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

Analysis

Violation of Area of Influence

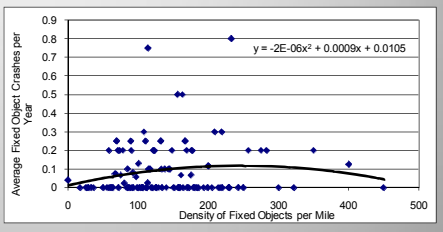
A consistent clear zone distance decreases fixed object crashes

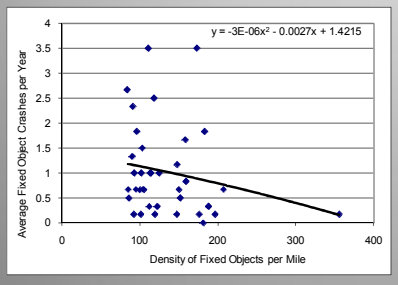


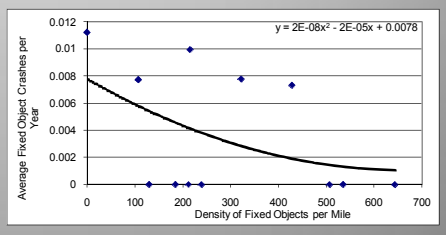
Analysis

Fixed Object Density

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







Analysis

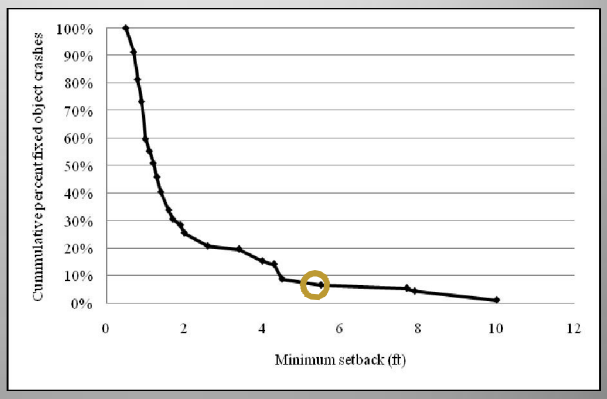
Economic Evaluation

Setback	Average Incremental Benefit from next lowest setback
2	$40,123
3	$10,134
4	$3,772
5	$35,339
6	$8,350
7	
8	$4,129
9	
10	
11	$1,250

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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