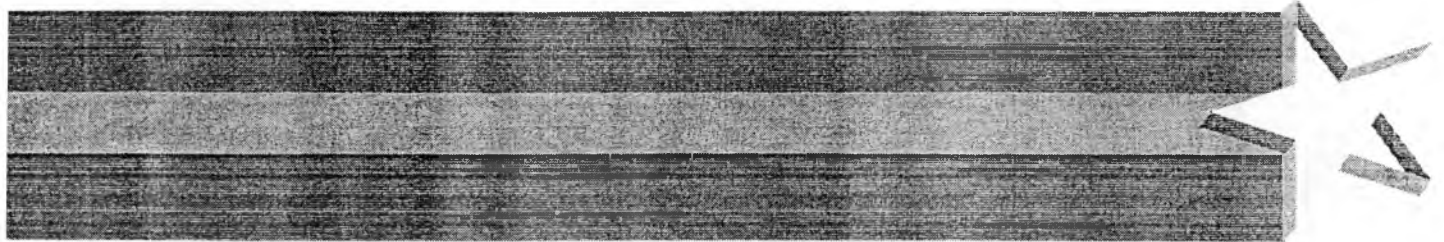


Cost Effective Roadside Environment

Indiana Division

Federal Highway Administration



FHWA's Vision

★ “Create the best transportation system in the world for the American people through proactive leadership, innovation and excellence in service.”

FHWA's Goals

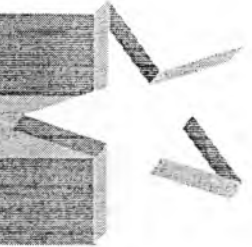
★ **Mobility**

★ **Productivity**

★ **Human and Natural Environment**

★ **National Security**

★ **Safety**

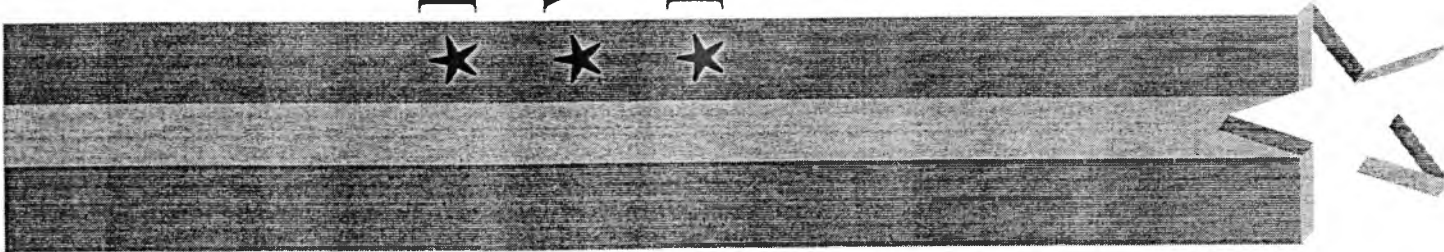


Highway Safety Elements

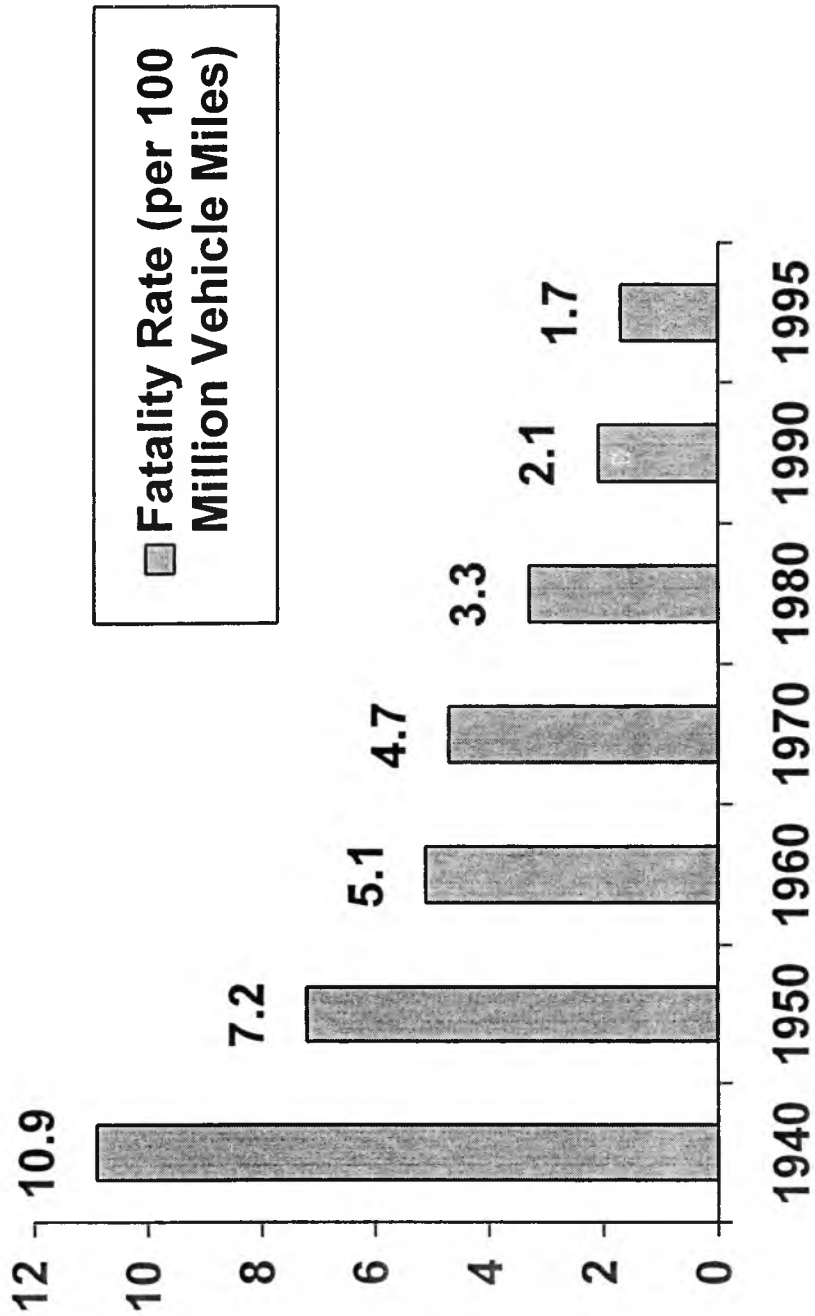
★ Driver

★ Vehicle

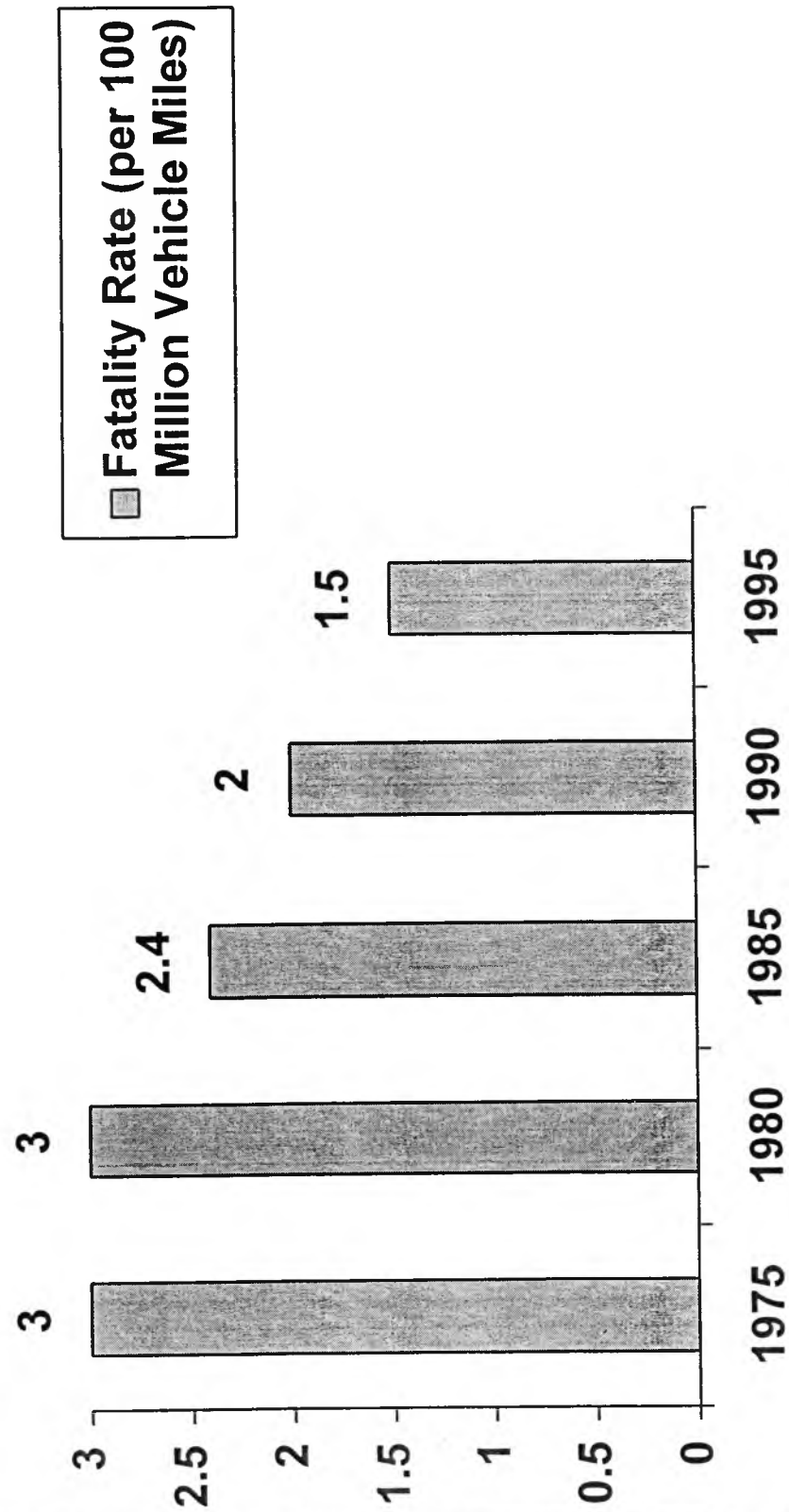
★ Roadway



National Crash Trends



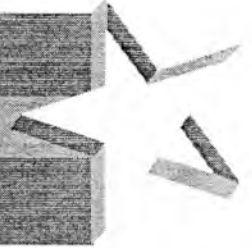
Indiana Crash Trends



Safety Opportunities

- ★ Educate
- ★ Promote Safety Belt and Air Bag Use
- ★ Reduce Impaired Driving
- ★ Manage Speed
- ★ Develop Safer Vehicles

★ Design Safer Roadway Environments



Roadside Obstacles

★ Nearly 30% of all traffic fatalities are caused by collisions with fixed objects.

★ Trees/Shrubs

★ Guardrail

★ Embankments

★ Utility Poles

Why Drivers Leave the Roadway

- ★ Forced Off By Other Drivers
- ★ Inattention
- ★ Excessive Speed
- ★ Fatigue
- ★ To Avoid An Obstacle
- ★ Driving Impaired
- ★ Vehicle Failure
- ★ Weather Conditions

“Forgiving Roadside” Concept

- ★ Recognizes that good drivers can make mistakes and stray from the roadway.
- ★ Provides a recovery opportunity for drivers.

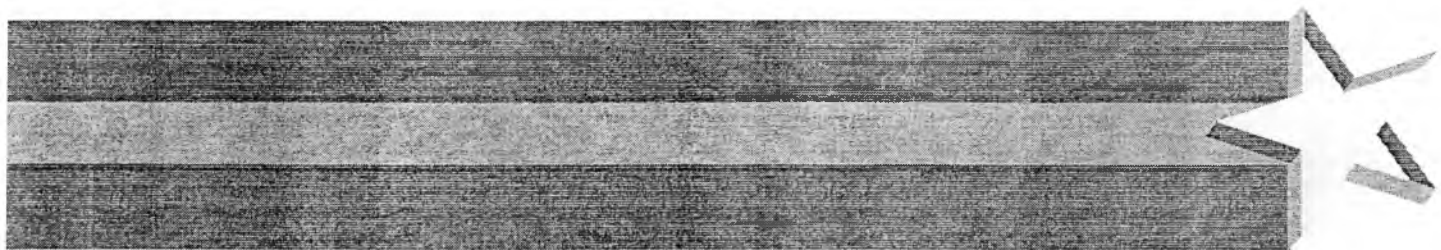
Clear Zone

★ The total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles.

Design Options

- ★ Remove Obstacles
- ★ Relocate Obstacles
- ★ Redesign Obstacles (Breakaway Devices)
- ★ Shield Obstacles

Cost Effective Analysis



Cost Effective Analysis Uses

- ★ Evaluate Need For Barriers
- ★ Evaluate Best Treatment
- ★ Prioritize
- ★ Establish Policy

Agency Cost

★ Installation

★ Accident Repair

★ Routine Maintenance

★ Salvage



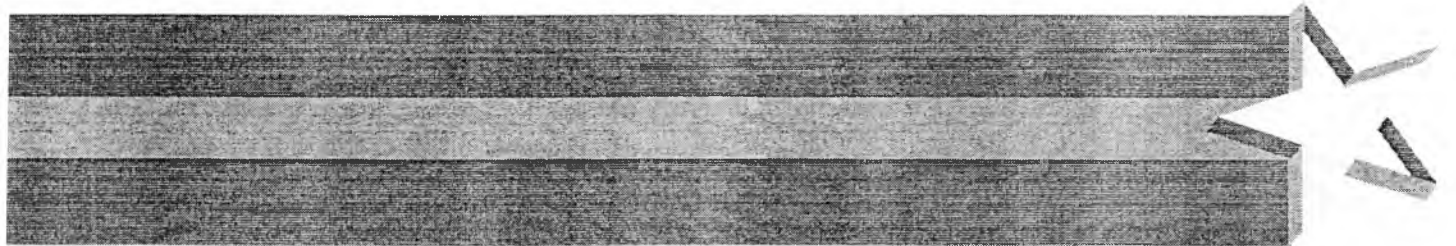
User Costs (Annual Accident Cost)

★ Collision

★ Severity

★ Accident Type Costs

*Need a Common Comparison
for Different Investments over
Time*



Discounting

★ Time Value of Money

★ Low - Current Investments

★ High - Future Investments

Accident Costs

- ★ Property Damage Only Accident Level 1 = \$625
- ★ Property Damage Only Accident Level 2 = \$3,125
- ★ Slight Injury Accident = \$3,750
- ★ Moderate Injury Accident = \$12,500
- ★ Severe Injury Accident = \$200,000
- ★ Fatal Accident = \$1,000,000

Fatal Accidents

- ★ FHWA - \$1,500,000
- ★ ROADSIDE - \$1,000,000
- ★ Agency Policy - ?

Severity Index

★ 0-10 Scale

★ Proportion of Accident Types

*Total Accident Cost = (Cost of
Severity Index)(Probability of
Severity Index)*

Suggested Severity Indexes

	60 Km/h	80 Km/h	100 Km/h
Tree (150 mm)	2.6	2.7	3.0
1:2 Foreslope (2 meter height)	3.2	3.8	4.3
Longitudinal Barrier	2.0	2.3	2.7
CAT	2.2	2.6	3.2

Collision Frequency

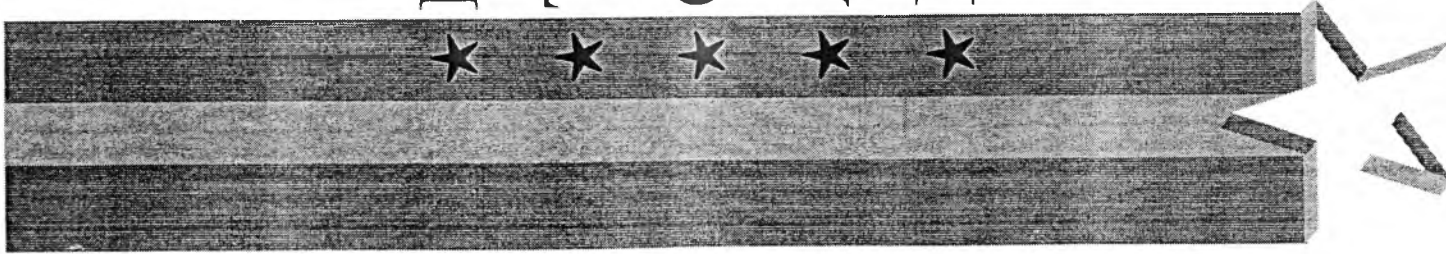
★ Encroachments

★ Traffic Volume

★ Geometrics

★ Angle

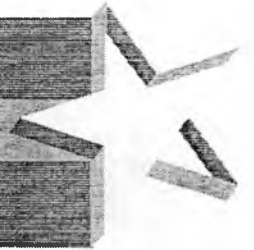
★ Hazard



Cost Effective Analysis System

Results with ROADSIDE

★ Present Worth and Annual Cost for both
Total and Agency Costs



Cost Effective Analysis Example

★ Highway

- Two-way, Two-lane Undivided
- Lane Width = 3.3 meters
- No Shoulder

★ Traffic

- Design Year (20 years) Traffic = 1,806 VPD
- Traffic Growth = 3.0%
- Design Speed = 100 km/h

Cost Effective Analysis Example

Continued

★ Feature

- 3.0 meter x 3.0 meter Concrete Box Culvert
- 0.3 meter Protruding Headwall
- 1:2 Taper Wingwalls

Cost Effective Analysis Example

Continued - Design Options

- ★ Do Nothing
- ★ Extend Concrete Box Culvert to Clear Zone (9 meters)
- ★ Extend Concrete Box Culvert; Lane Width and Shoulder (3.6 meter and 1.2 meter respectively)
- ★ Eliminate Headwall, Rebuild Wingwalls (1:4), and Install Pipe Grates

Cost Effective Analysis Comparisons

	Annual Accident Cost	Annual Highway Cost
Option 1 (Do Nothing)	\$980	\$0
Option 2 (Extend to Clear Zone)	\$184	\$736
Option 3 (3.6 m lane and 1.2 m shoulder)	\$765	\$589
Option 4 (1:4 Foreslope)	\$89	\$441

Benefit/Cost Analysis Comparisons

	Benefit/Cost Ratio
Option 2 (Extend to Clear Zone)	1.1
Option 3 (3.6 meter lane and 1.2 meter shoulder)	0.4
Option 4 (1:4 Foreslope)	2.0



Cost Effective Analysis

★ Tool

★ NOT THE ANSWER

Cost Effective Analysis Benefits

- ★ Compare Alternatives
- ★ Prioritize for “Best Treatment”
- ★ Establish Policy
- ★ AND...

IT CAN \$AVE YOU MONEY

