Integration of Safety into the Design Process

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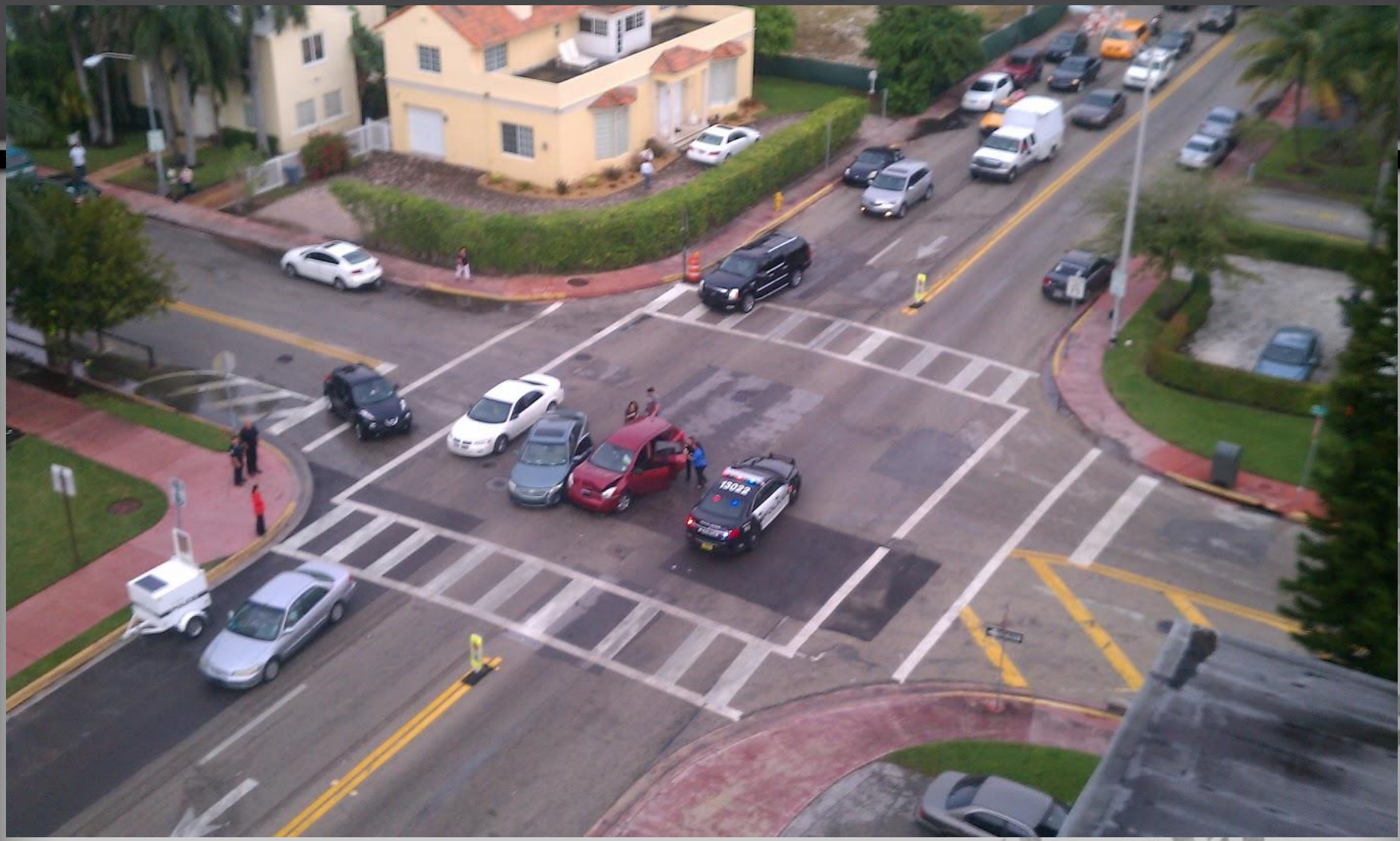
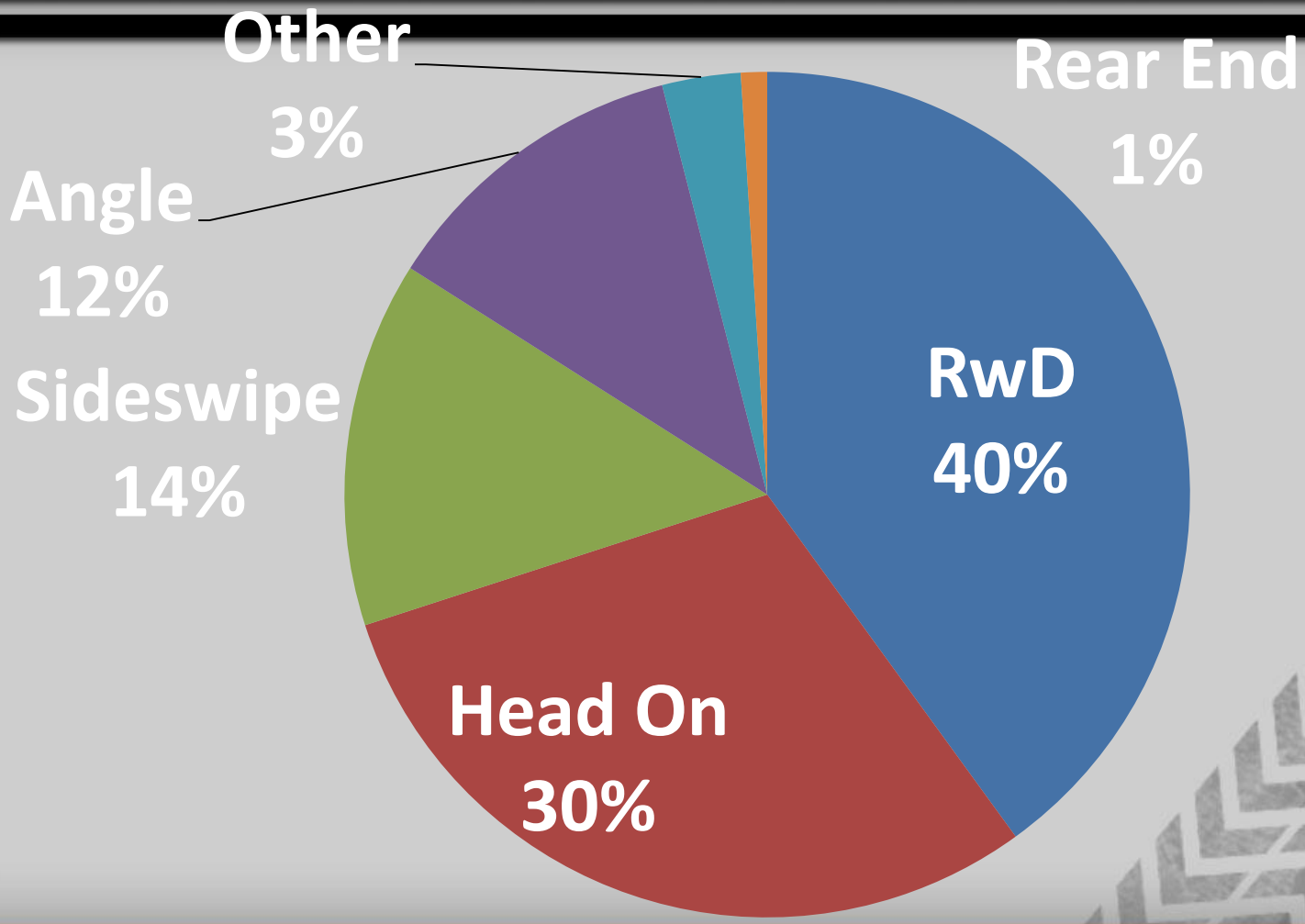
“IF YOU THINK GOOD DESIGN IS EXPENSIVE, YOU SHOULD LOOK AT THE COST OF BAD DESIGN”

DR. RALF SPETH, CEO JAGUAR

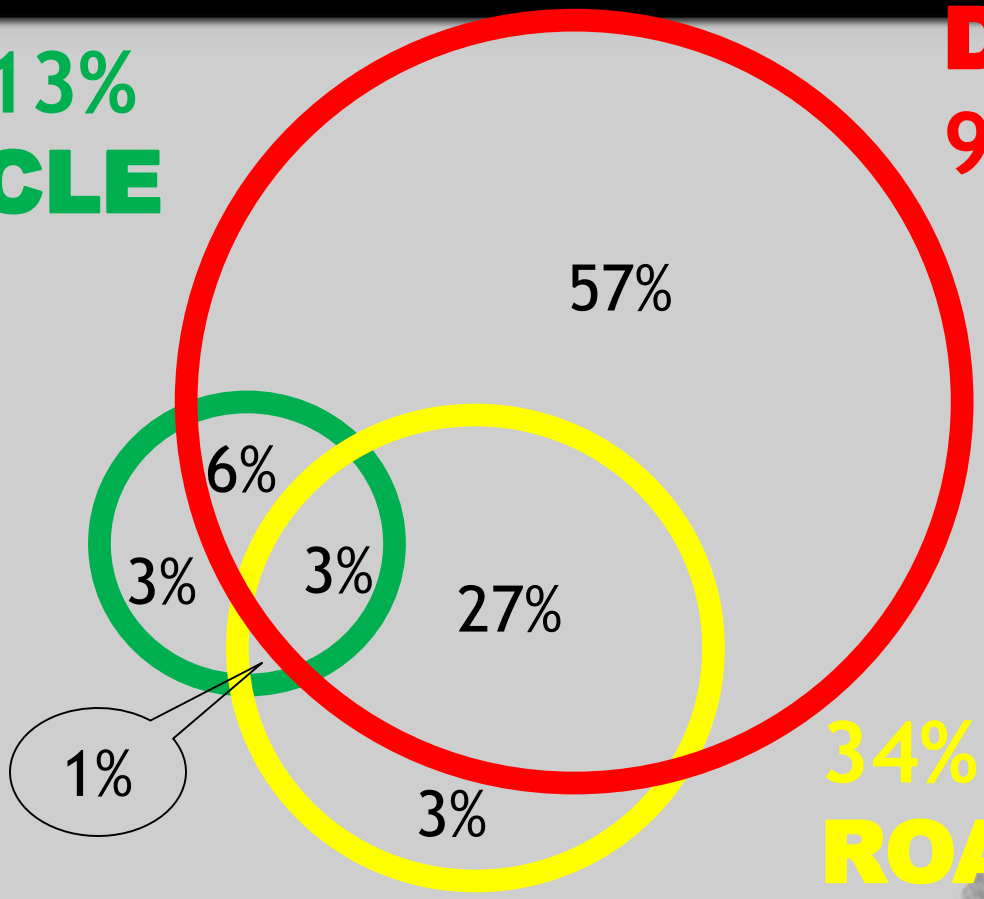


Fatal Collisions in Alabama

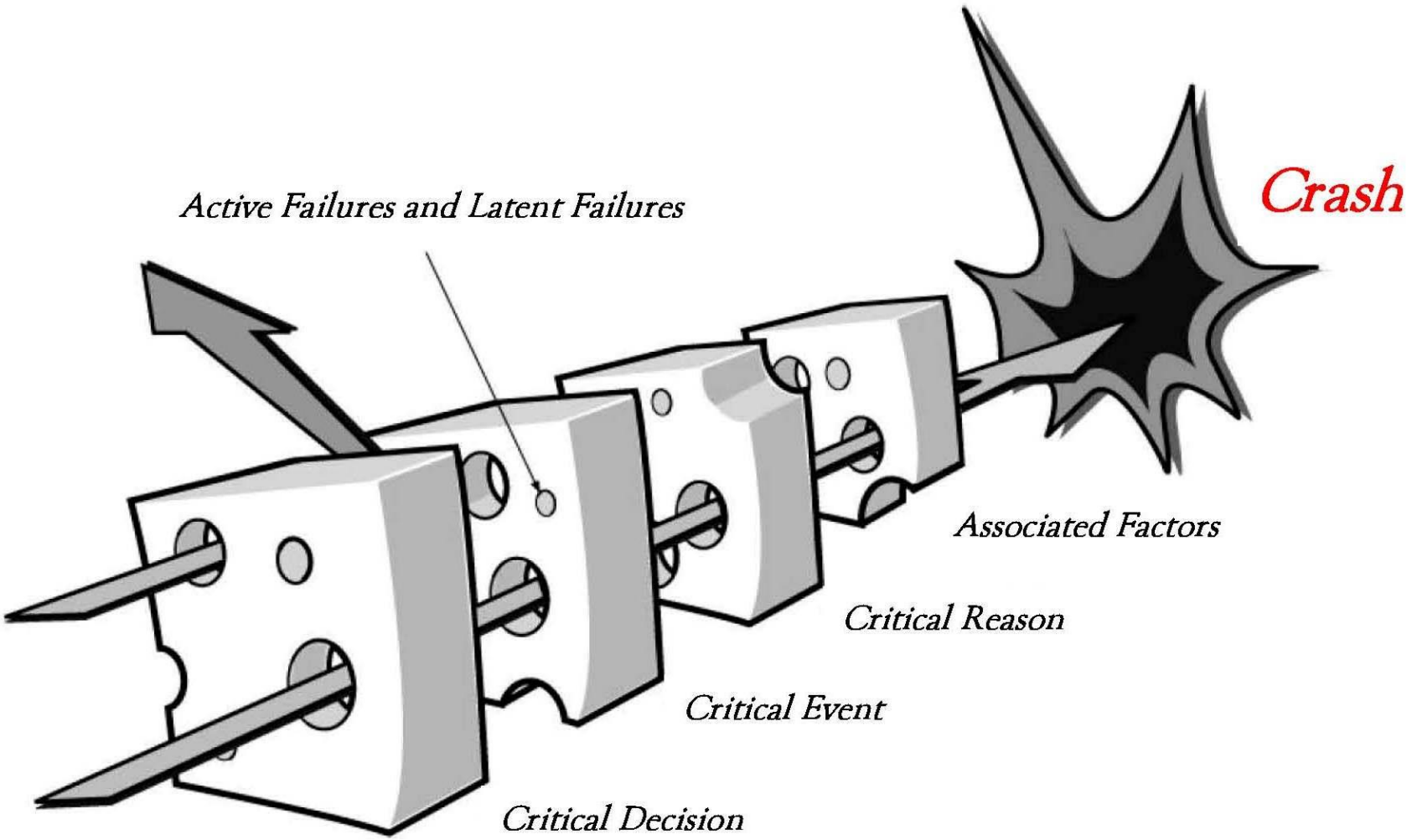



YOU'RE
IN A BOX ON
WHEELS HURTLING
ALONG SEVERAL TIMES
FASTER THAN EVOLUTION COULD
POSSIBLY HAVE PREPARED
YOU TO GO
NEXT 5 MILES

Crash Contributing Factors



Treat, 1979;
Graphic Credit: Thomas Neuman


Active Failures and Latent Failures
Crash
Associated Factors
Critical Reason
Critical Event
Critical Decision

Commonly Held View

Most design engineers believe a design value published in a manual is there primarily for safety reasons, and that any deviation from that value will result in significant degradation in safety.

In Fact

Rigid design standards in many cases have evolved to serve three purposes:

- Efficiency in design,
- As a quality control measure,
- Efficiency in construction.

Philosophical Considerations in Highway Design

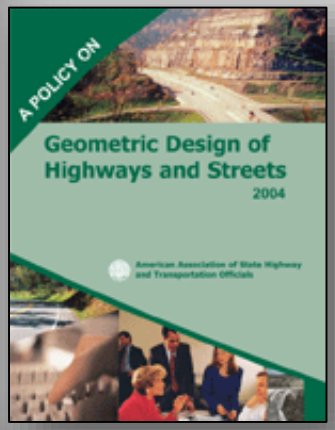
"The direct application of established design criteria or standards (i.e., nominal safety) is no assurance that a certain quality of design (i.e., substantive safety) will be achieved—indicating that such criteria are not sufficient in themselves."

Jack E. Leisch
"Dynamic Design for Safety"
ITE 1972

Nominal versus Substantive Safety

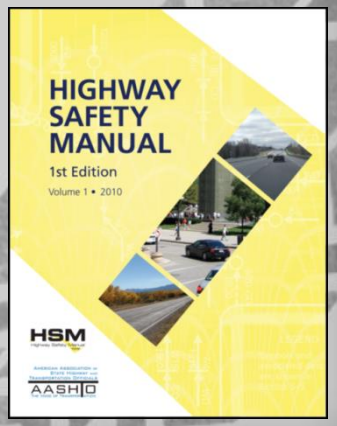
Nominal Safety

Substantive Safety

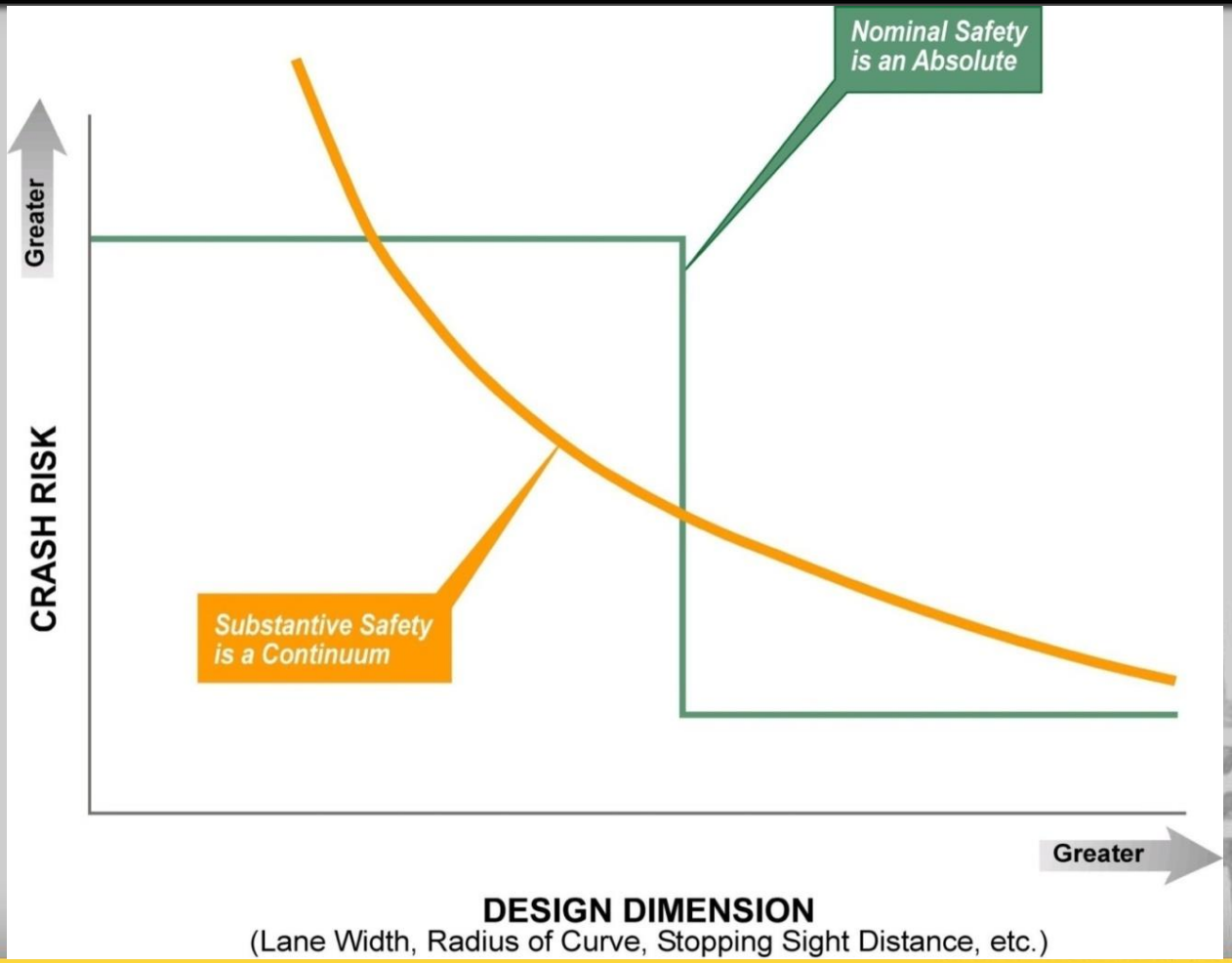


Examined in reference to compliance with standards, warrants, guidelines and sanctioned design procedures

The expected or actual crash frequency and severity for a highway or roadway



Nominal Safety is Absolute
Substantive Safety is a Continuum



AASHTO Policy

AASHTO has emphasized that the *Policy on Geometric Design is a flexible document*.

Indeed, a close reading of it reveals that there is significant flexibility in both technical content and recommended usage.

Focus on Standards

The focus on rigid standards has been translated in the minds of designers to a belief that standards equals safety, and that no compromises can be accepted.

This view holds even with design values that clearly are not related to substantive safety.

Training

- For the most part, we have focused on the importance of nominal safety, and
- Many designers have been taught that adherence to nominal safety directly translates into substantive safety performance.

Preliminary and Final Engineering

Traffic volume is the chief determinant of relative risk.

The length of highway over which the exception occurs strongly influences relative risk.

The design element or feature in question (lane width, shoulder width, superelevation, curvature, grade) will have differing expected sensitivities based on the type of facility.

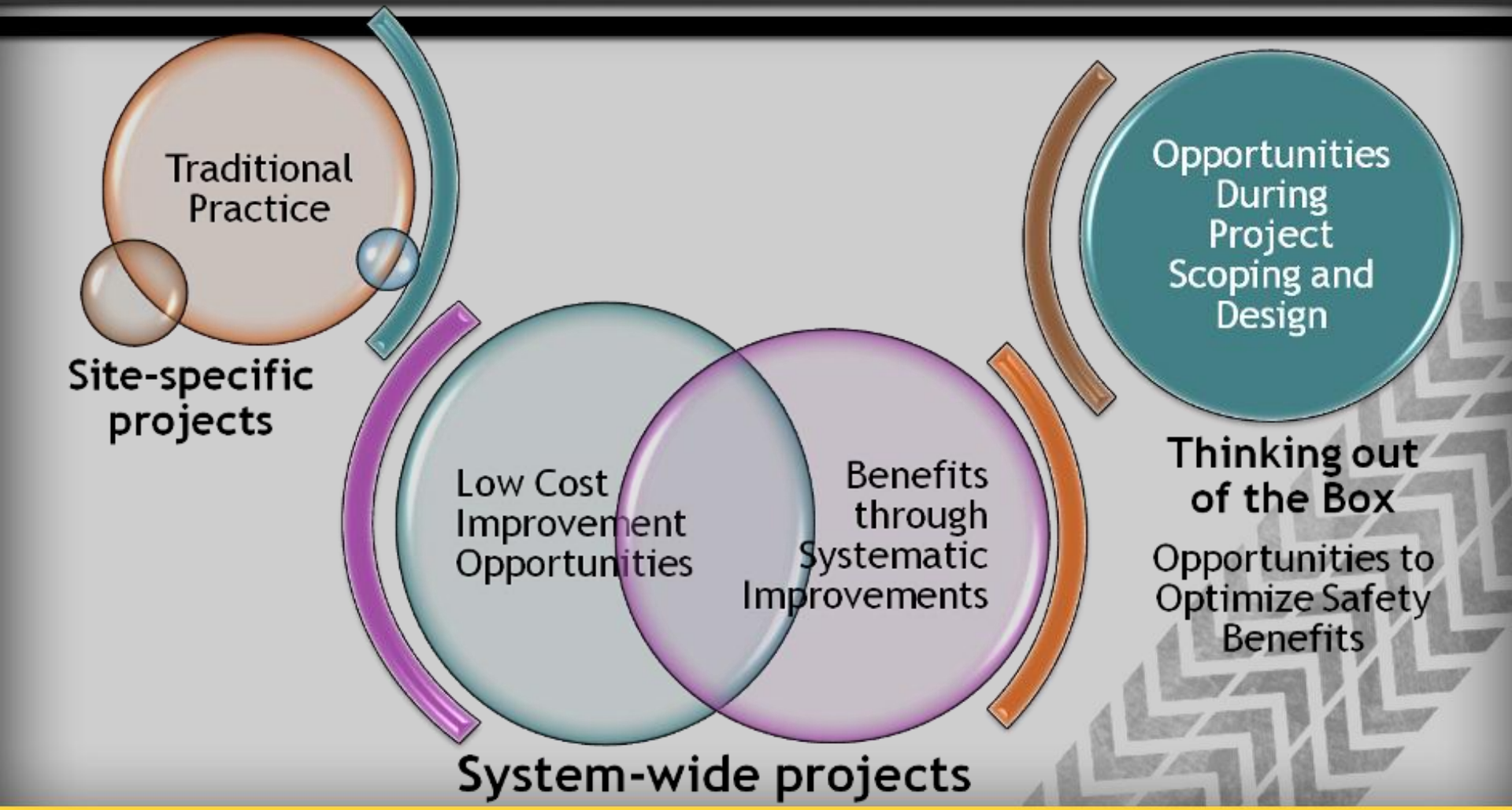
Planning Level Tools

- Statewide Strategic Highway Safety Plan
- ALSAFE

Project Level Tools

- Roadway Improvement Safety Evaluation (RISE)
- Vision Zero Suite
- Interactive Highway Safety Design Methodology (IHSDM)

Different Approach



Design

Existing Conditions

Alternative 1

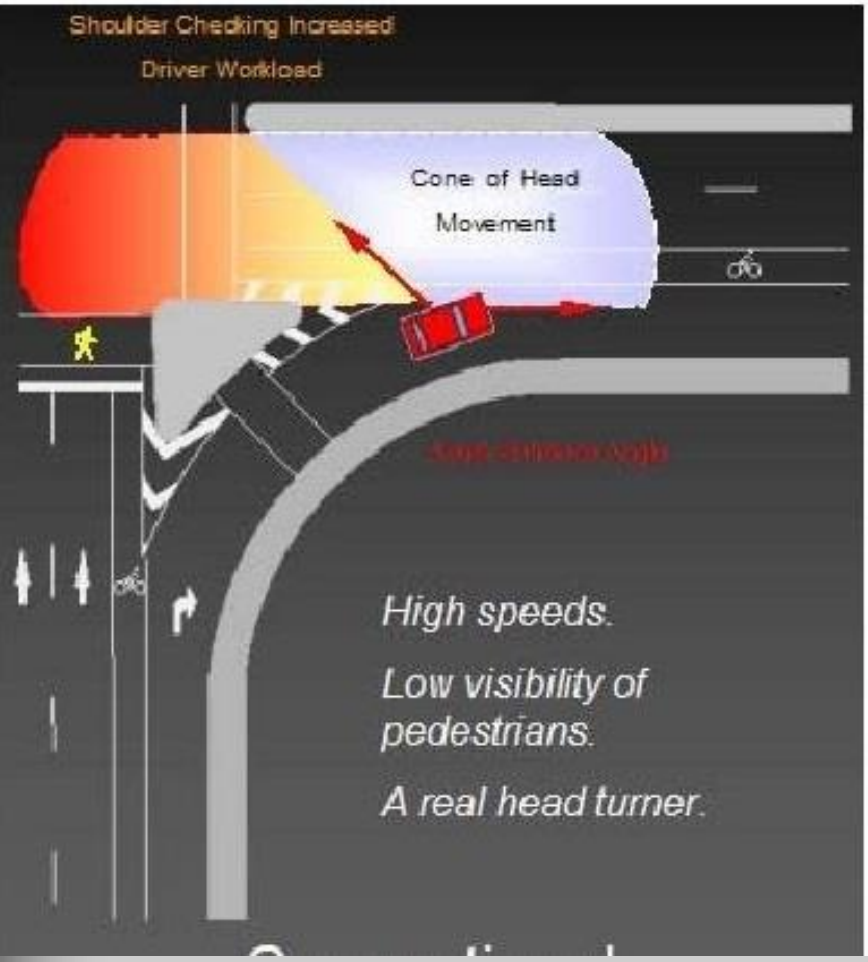
Alternative 2

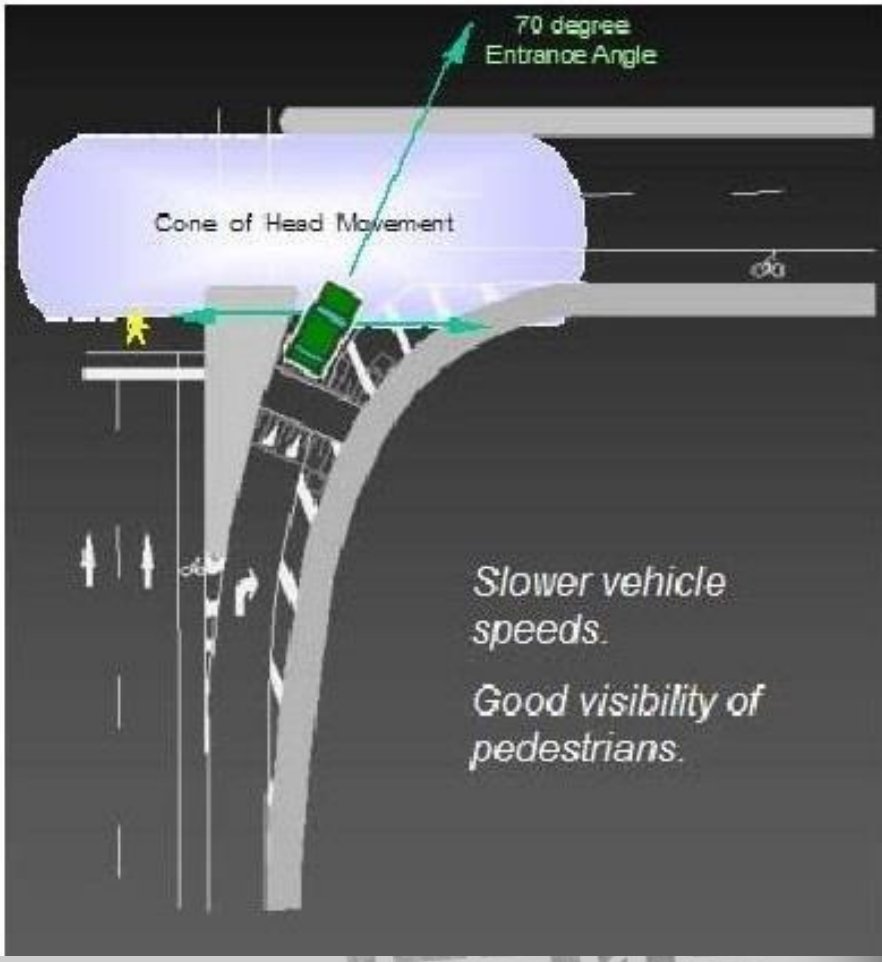
Alternative 3

Design Countermeasures to Address Safety

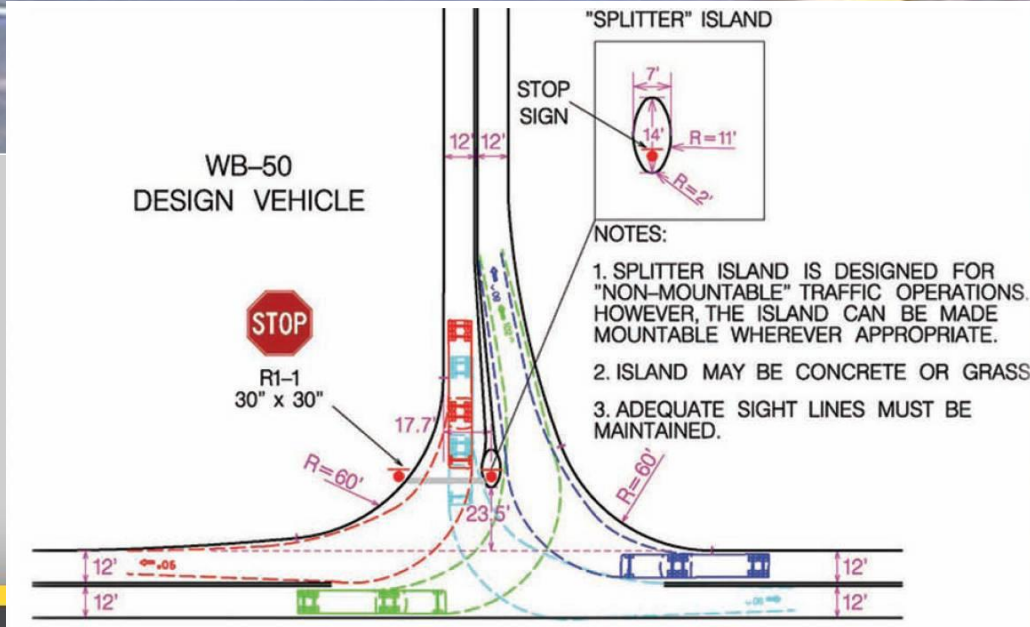
- Intersection Design
- Roadway Departures

Older Driver and Pedestrian Safety Issue



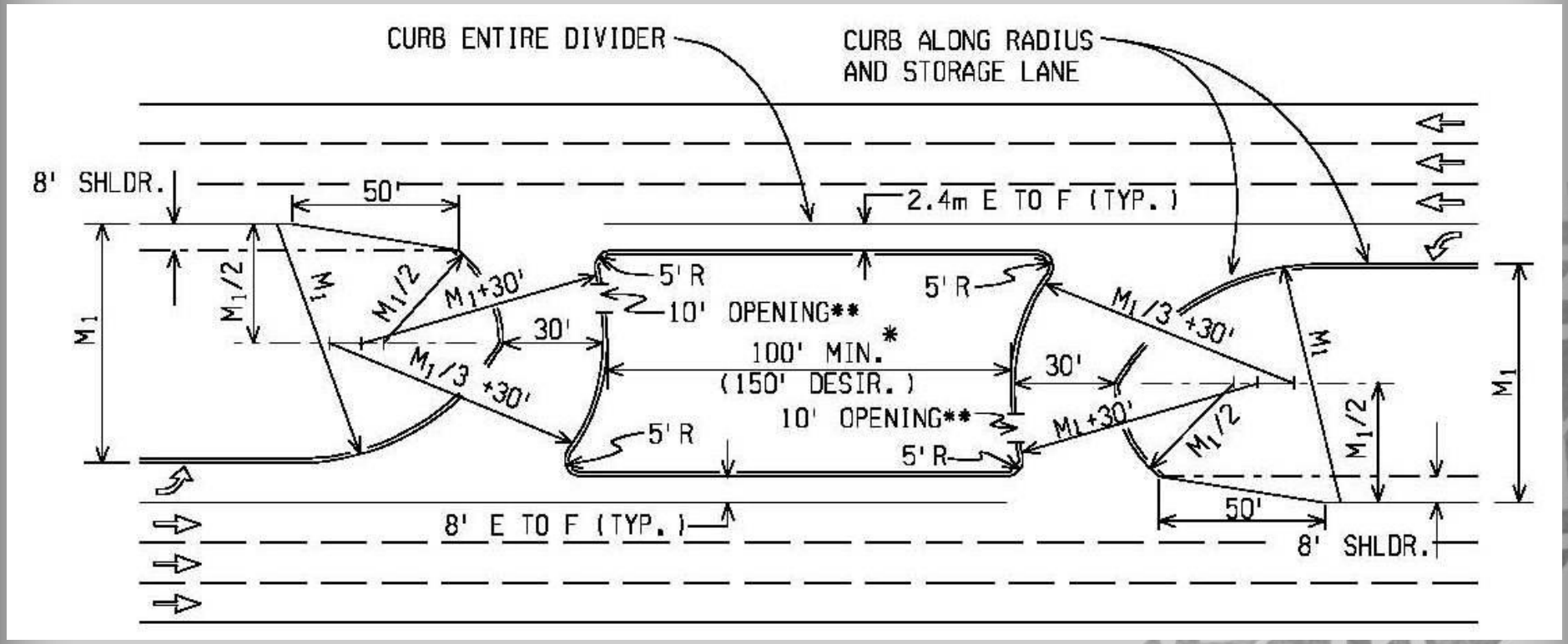


Rural Intersections



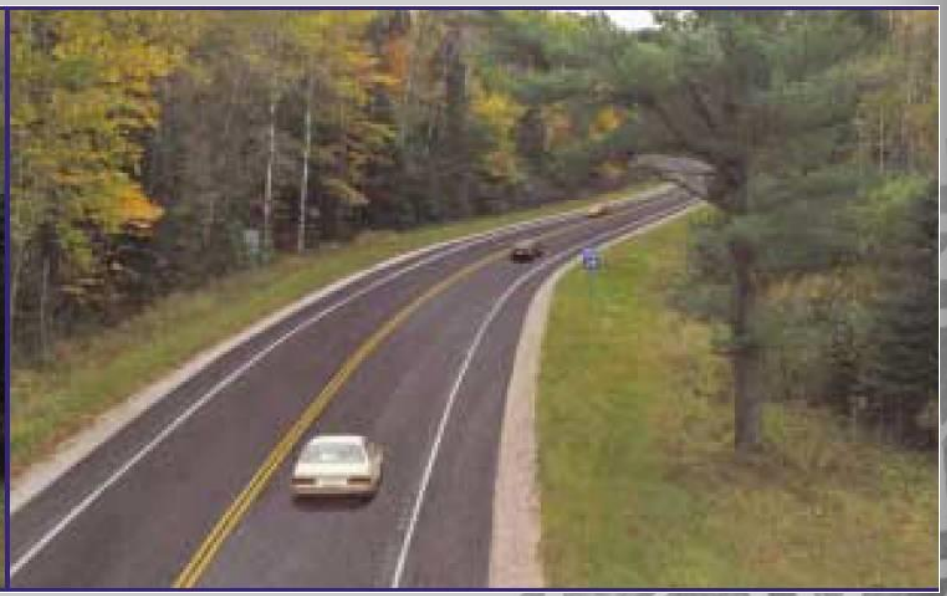
1 ft = 0.305 m

Directional Crossovers



Alternative Intersection/Interchange Design

Shoulders



Median Barriers

Roadside Barriers

Centerline Rumble Stripes

Cross Centerline Crash

Edge Lines

THANK YOU

For your contribution to saving lives