



Road Safety Audits



ROAD SAFETY AUDITS:

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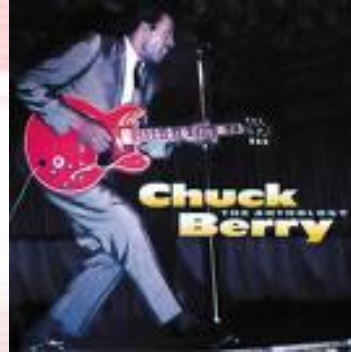




Making Your Roads Safer

Ground Rules

- **Cells, Blackberry, Boysenberry, Strawberries,**



- **Stay on time:**
 - **Breaks**
 - **Start time**
 - **Exercise**
- **Large Group Help Us with Comments**

Introductions

- **Name**
- **Present Position**
- **Past Experience**
- **Years Experience**
- **Expectations**

The background of the slide is a blurred American flag, showing the stars and stripes in a soft, out-of-focus manner. The colors are muted, with the red appearing as a light pinkish-red and the blue as a pale blue. The stars are white and scattered across the field.

Outline of Briefing

- 1. Why RSAs?**
- 2. Basic Concepts**
- 3. RSA Procedures**
- 4. Common Issues and Challenges**
- 5. Examples**

Goals and Objectives

- **introduce road safety audits as a useful tool to reduce traffic injuries and fatalities**



What are the benefits of RSAs?

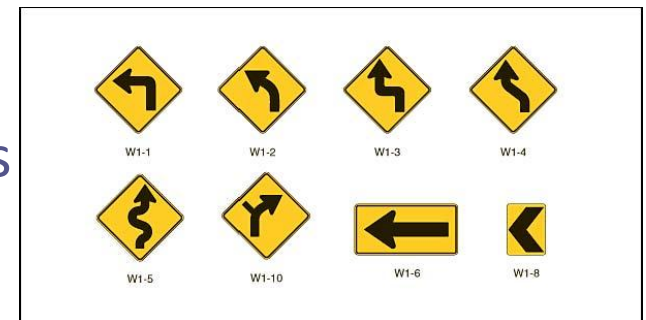
Tennessee: 3.84-mile section of State Route 101 in Cumberland County

- Issues

1. Severe curve
2. Limited sight distance

- Suggested Improvements

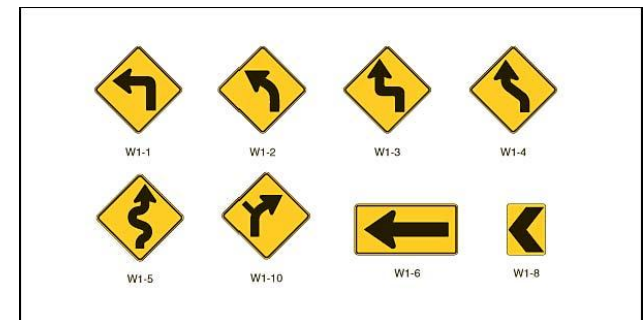
1. Add chevron signs, advance curve warning signs, 8" edgelines
2. Move stop bar, remove trees, relocate sign



What are the benefits of RSAs?

Tennessee (continued)

- Cost to conduct RSA (using in-house staff): ~\$10,000
- Cost to implement suggested improvements: ~\$23,000
 - Funded by High Risk Rural Roads (HRRR) program
- 27% reduction in injury crashes
- B/C ratio approximately 3: 1



Mitigate Safety Concerns: Short and Long Term Solutions

Short Term Solutions

- Low-Cost Maintenance Improvements
- Trimming Vegetation
- Signing & Pavement Markings

Long Term Solutions

- Curve Flattening
- Modify Vertical Alignment
- Access Management

Results from RSAs can be incorporated into planning documents.

- Long Range Transportation Plans
- Environment Impact Statements (EIS)

Mitigate Safety Concerns: Short and Long Term Solutions

Short Term Solutions

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- Long Range Transportation Plans
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10/12/2003

The background of the slide is a blurred, close-up view of the United States flag, showing the red and white stripes and the blue field with white stars. The text is centered within a black rectangular border.

BASIC CONCEPTS

Dead Rat Theory



The background of the entire image is a blurred American flag, showing the stars and stripes in a soft, out-of-focus manner.

S W I M

**Say What It
Means**

The background of the entire image is a stylized, slightly blurred American flag with its characteristic stars and stripes.

ADT

An Alarm Company

**Average Daily Travel
Traffic**

Atomic Demolition Tech

Warrant

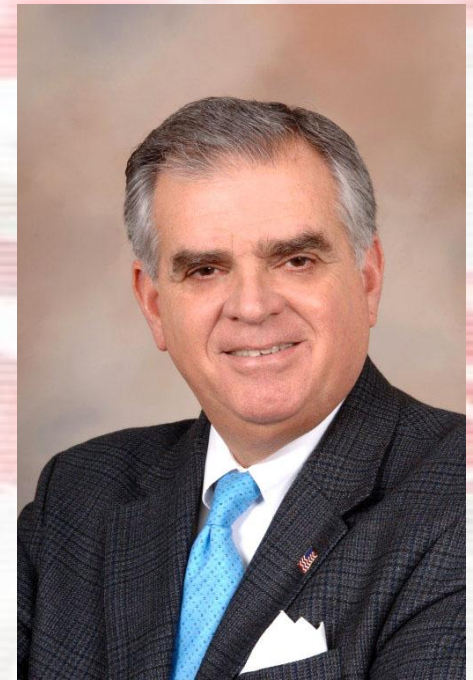
- **Going to see the Judge/Jail**
- **Meeting the Criteria**

The background of the slide is a blurred American flag, showing the stars and stripes in a soft, out-of-focus manner.

Super-Elevation

Bank or Slope





Secretary Ray LaHood

Responsible for maintaining a safe, reliable and efficient transportation system

“Highway Safety is a Top Priority”

The Problem

- **Increase in:**
 - **Drivers**
 - **Vehicles**
 - **Miles < > ?**
 - **Congestion**
 - **Crashes**
- **Competition for resources**
 - **Budget**
 - **Staffing**

The Real Problem

My Granddaughter along with 99 other children born this year...

**One will die violently
in a highway crash
during his/her lifetime.**



**70 will be injured in a crash
during their lifetimes...**

We must reduce deaths and injuries.

Federal Highway Administration (FHWA)

- **The Vital Few**
 - **Safety**
 - **Mobility**
 - **Environment**



Safety





856 111

R.S. DIESEL SPECIALISTS

GOLD CROSS

Mobility



Blast closes canyon

Truck tips over, explodes; at least 10 people hurt

By Sara Israelsen, Tad Walch and Laura Hancock

Deseret Morning News

SPANISH FORK CANYON — Metal shards, frayed pieces of tire and an engine block were all that was left of a truck carrying 38,000 pounds of explosives after the cargo detonated Wednesday afternoon on U.S. 6 in Spanish Fork Canyon.

The truck's driver was going too fast, officials said



The explosion left a crater 30 feet deep and caused hillside fires.





2-lane highway destroyed

70'x80' crater left by explosion
35,000 pounds of explosives

Other damage includes broken utility corridors



Double railroad tracks damaged



Crater 20'-30' deep

Hillside set ablaze

Spanish Fork River







ville 3/4
ngton 4 1/4
9 5 1/2

Environment



Why RSAs?

- **Consistent & Comprehensive Approach to Design Process**
- **Stewardship**
- **Cost Effective**
- **Vital Few**



California Strategic Highway Safety Plan *Version 2*



- California's SHSP approved on September 26, 2006
- 80 Agencies & Over 300 Stakeholders
- Data Analysis
- Strategy Development
- Stakeholder Meetings
- Safety Summits

http://www.dot.ca.gov/SHSP/

Office of Strategic Highway Safety Program - Windows Internet Explorer

http://www.dot.ca.gov/SHSP/

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STRATEGIC HIGHWAY SAFETY PLAN
SHSP
OUR PLAN FOR A SAFER CALIFORNIA

→ [Implementation of the SHSP \(152 Actions\)](#)

→ [Download California SHSP v2.pdf](#)

→ [SHSP Safety Stakeholder Team](#)

→ [SHSP Fact Sheet](#)

→ [SHSP Status Report](#)

RELATED LINKS

→ [FHWA Legislation & Regulations](#)

Trusted sites 100%

Start Office of Strat... 11:37 AM



Road Safety Audits (RSAs)

- **Formal safety performance examination**
- **Existing or Future Road Segment or Intersection**
- **Independent, multidisciplinary team**





Road Safety Audits (RSAs)

- Formal safety performance examination
- Existing or Future Road Segment or Intersection
- Independent, multidisciplinary team





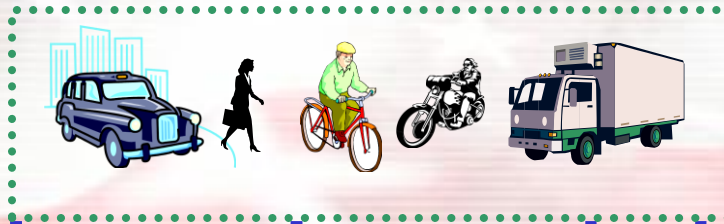
Road Safety Audits (RSAs)

- Formal safety performance examination
- Existing or Future Road Segment or Intersection
- Independent, multidisciplinary team



A road safety audit also...

- considers the safety of all road users



- considers interactions at the borders or limits of the project
- examines the interaction of project elements
- may proactively consider mitigation measures

The background of the slide is a blurred, wavy American flag with red and white stripes and white stars on a blue field.

A road safety audit is NOT....

... a simple standards check for adherence to design guidelines.

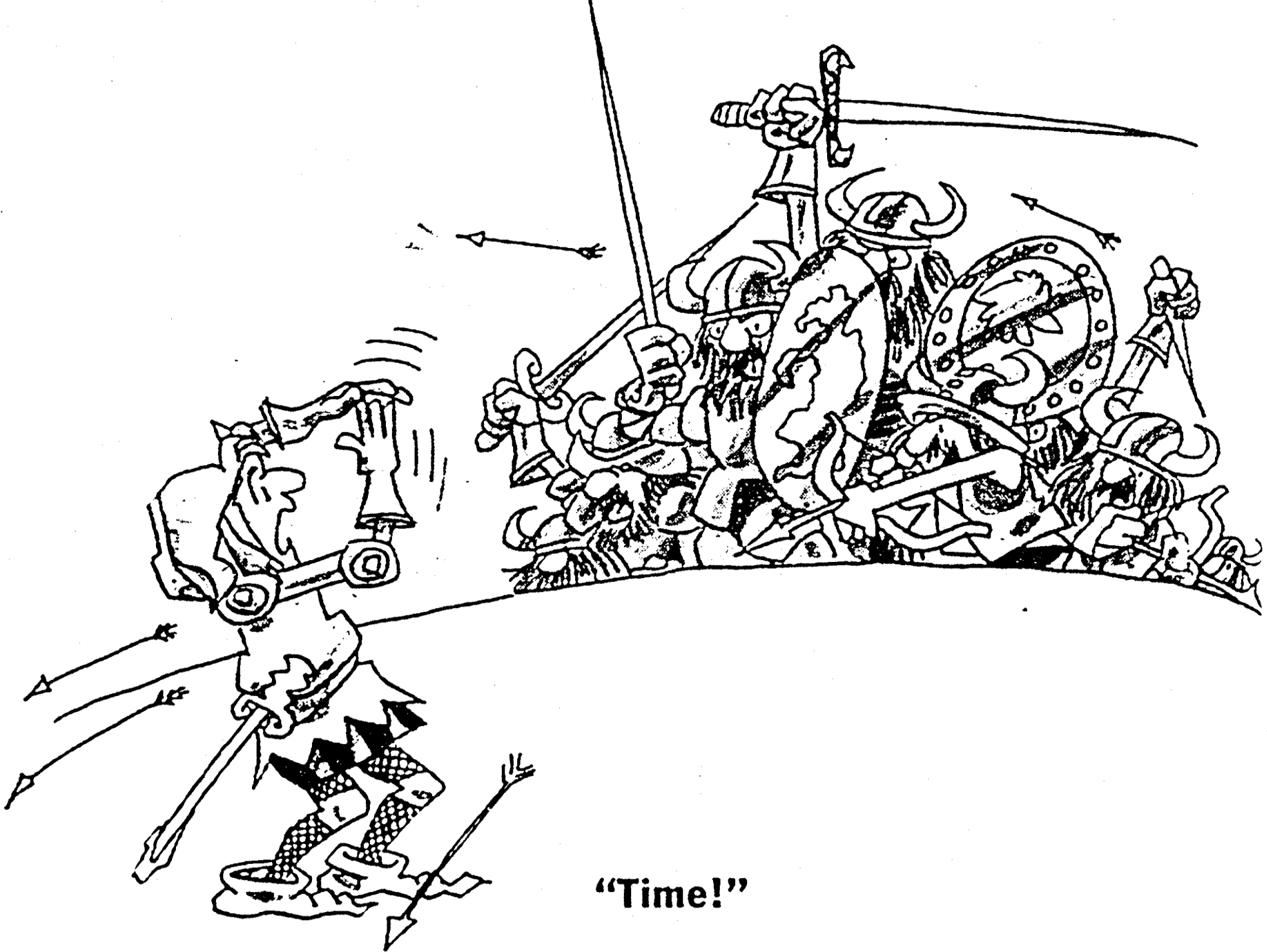
... an opportunity to redesign the project.

Barriers to RSA's

- **Cost**

- **Time**

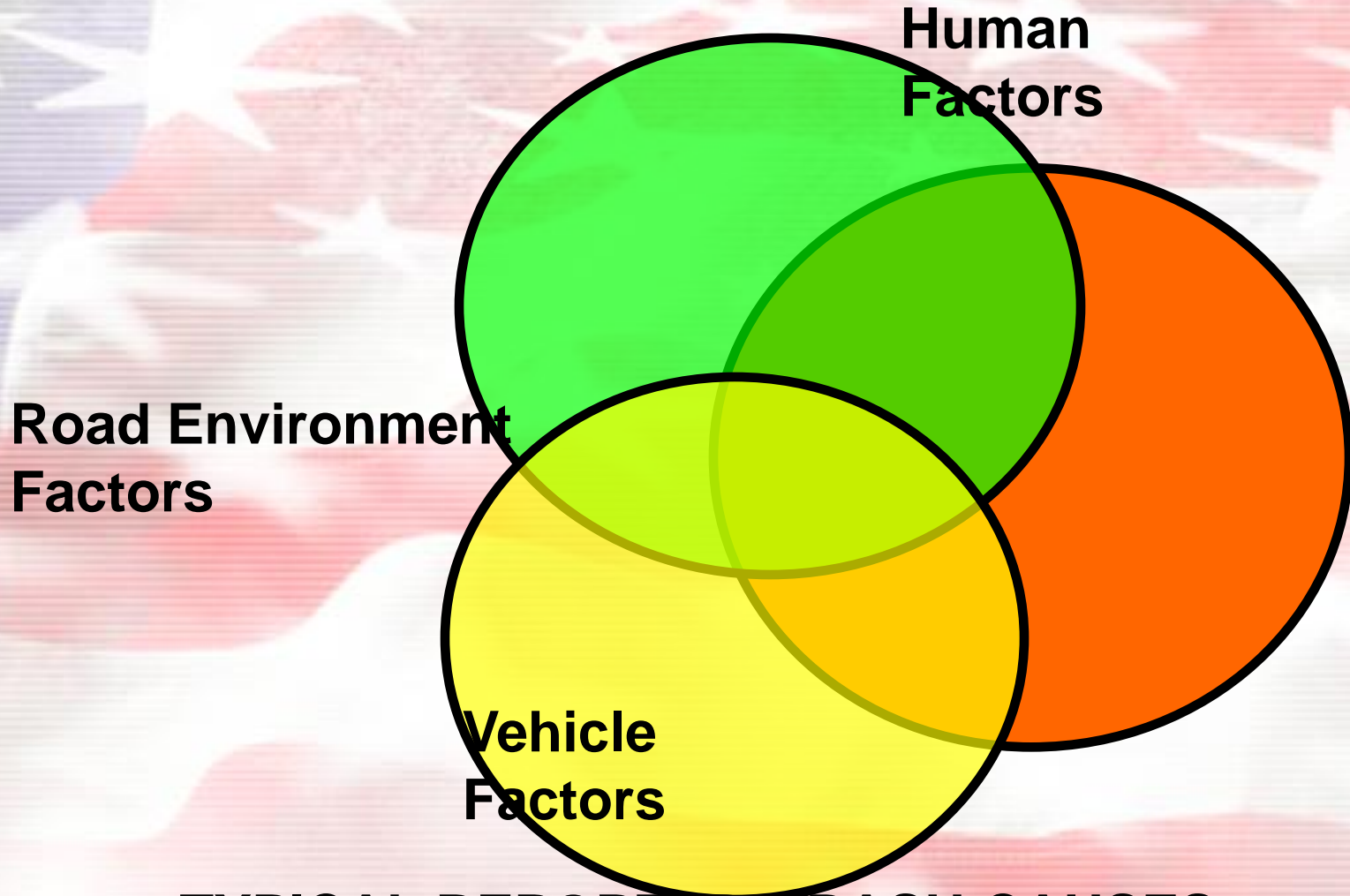
- **Risk**



"Time!"

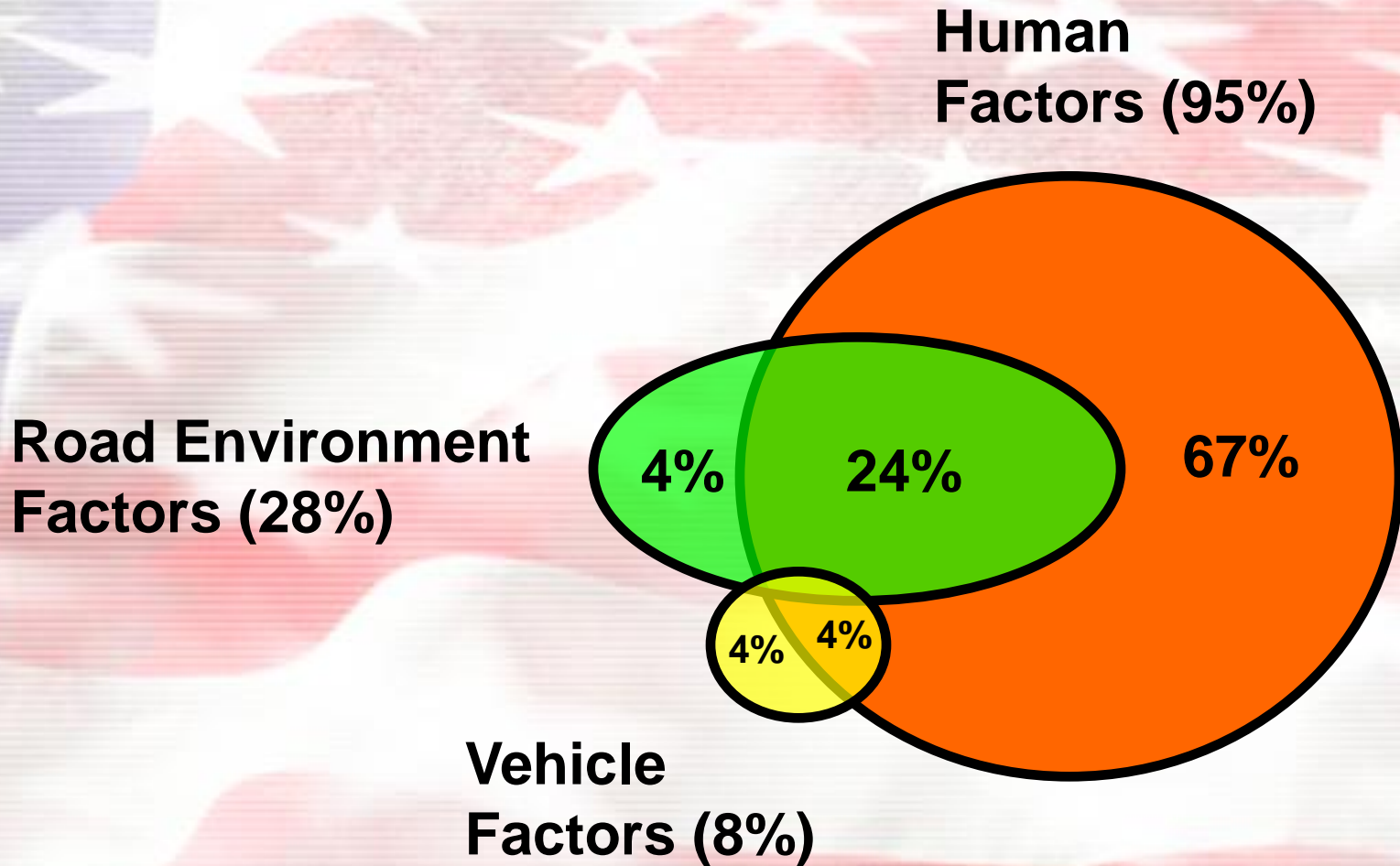
Лефортово-
тоннель
смерти

Why do we need RSAs?



TYPICAL REPORTED CRASH CAUSES

Why do we need RSAs?



TYPICAL REPORTED CRASH CAUSES

Why do we need RSAs?

- Relatively few road-related safety issues are identified in collision reports.
- Road designs need to anticipate and accommodate common driver errors.
- Easier to design and build safer roads than to modify some entrenched driver behaviors.

The background of the slide is a blurred American flag, showing the stars and stripes in a soft, out-of-focus manner. The text is centered over this background.

Proactive
vs
Reactive



Benefits

“Road Safety Audits are a proven way to review just how safe our local roads are and can be a valuable tool for local government road professionals in making their roads safer.”



**Tony Giancola
Executive Director
NACE**



Benefits

“We have implemented RSAs on proposed resurfacing projects. We now see our staff consistently looking for and implementing numerous low cost safety improvements on Iowa’s roads.”



**Thomas Welch, P.E.
State Safety Engineer
Iowa DOT**







TWO WELLS

Native Americans
Kerry Edwards



STOP



HISTORIC
LIBERTY

TRAIL

COLONIAL
MIDWAY
MUSEUM

FORT
STEWART
MUSEUM

CAY CREEK
WET LANDS
INTERPRETATIVE
CENTER

DORCHESTER
ACADEMY

LECONTE
WOODMANSTON

REVOLUTIONARY
FORT
MORRIS

SEABROOK
VILLAGE

SUNBURY
CEMETERY

MELON BLUFF
NATURE
CENTER





SPEED
LIMIT

A rectangular speed limit sign with a white background and a black border. The sign is mounted on a black pole. The text "SPEED" and "LIMIT" is printed in bold, black, sans-serif capital letters. Below the text is a large, empty rectangular space, indicating that the specific speed limit value has been removed or is missing. The sign shows signs of wear, including some dark smudges and a small hole near the bottom center. The background consists of a grey sky and a brick wall with a concrete pillar.

EXIT

M.P.H.



**ROCKY POINT
BAPTIST CHURCH**
SUN SCHOOL 9:45 A.M. WORSHIP
SUN EVENING 6:45 P.M. WED. 11:00 A.M.
PRAY FOR OUR
AND OUR
MAY

35

SPEED
LIMIT
155












A paved road curves through a natural area. On the grassy shoulder to the right of the road, several alligators are resting. A wooden sign on two posts stands on the grass. The sign has a dark brown background with white text. In the background, there is a dense line of green trees and bushes. A body of water with lily pads is visible to the right of the sign.

HIKERS and BIKERS
Move to the side of
the road when a
vehicle approaches

TO CROSS
ERIE BLVD
PUSH BUTTON
WAIT FOR
WALK SIGNAL





TO CROSS
ERIE BLVD
PUSH BUTTON
WAIT FOR
WALK SIGNAL









S 4th



SPEED
LIMIT
35



4
2
1





SPEED
LIMIT
80

SPEED LIMIT
TEST SECTION
NEXT 17 MILES

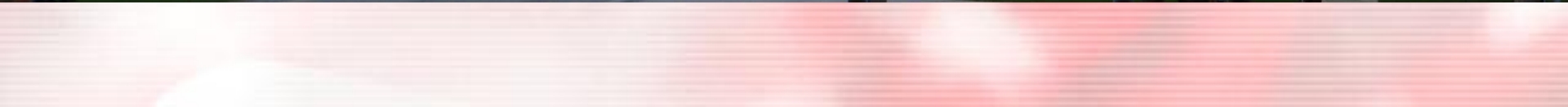




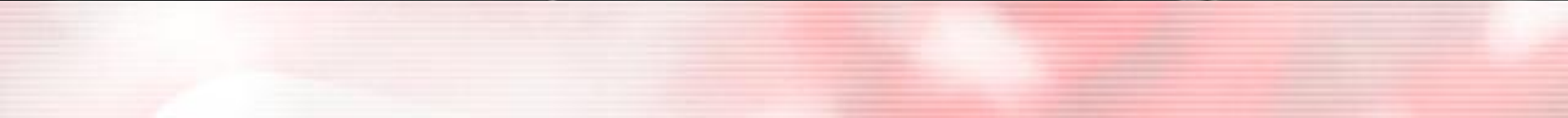




SIGNAL SIGNAL









AUTO SERVICE EXPERTS

MILK



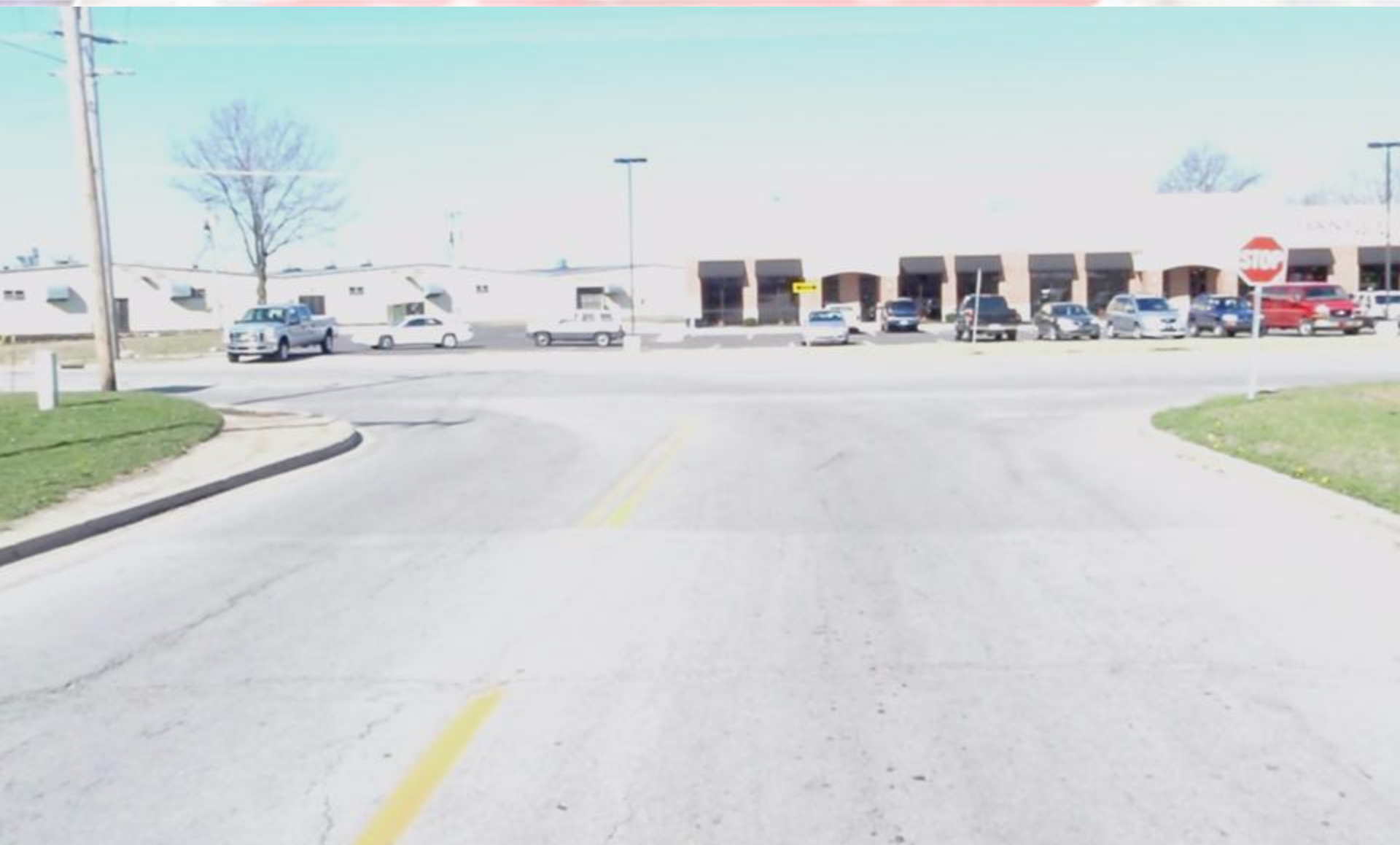
Signage in the foreground, possibly a real estate sign.



IMMANUEL
BAPTIST













RED
LIGHT
PHOTO
FORCE

PackBackers
TRUSTED BOOKSTORE

A **GO-USED** Bookstore

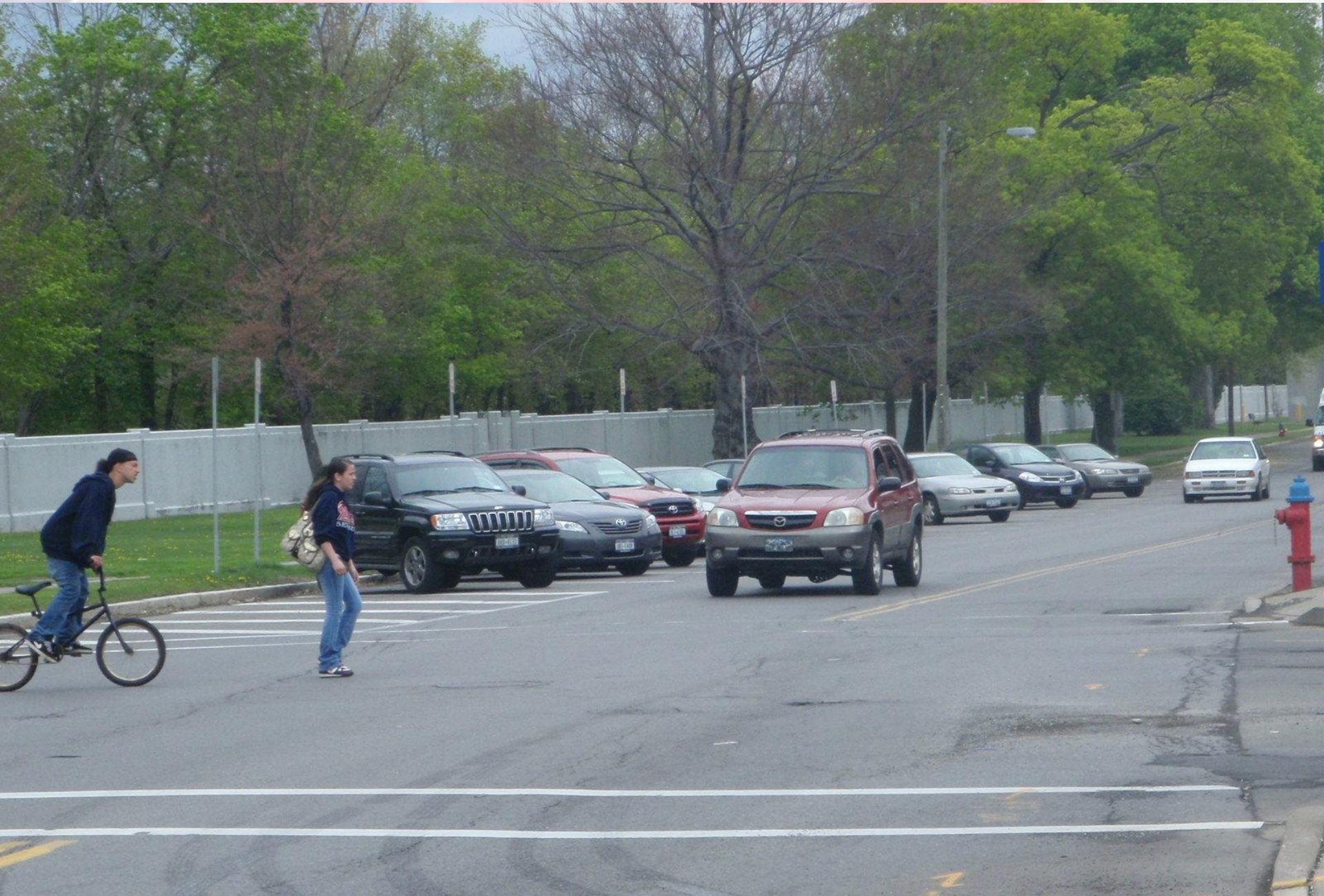
ECO-FRIENDLY PARKING IN REAR





















8
29
83
DUSTY CAIN
7
26
00

11
30
83
ISSAC COVEY
7
26
00

9
19
84
BOBBY TIDWELL
7
26
00

1
25
59
PRISCILLA HINAHON
7
26
00







FREEWAY
ENTRANCE

5 NORTH

NORTH

INTERSTATE
515

93

95

↑

29

NORTH

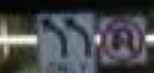
INTERSTATE
515

93

95



Construction worker in a yellow safety vest and blue jeans, wearing a white face mask, holding a clipboard and looking at it.





West
10 TO 10
Baton Rouge
New Orleans

↑ Baton Rouge
New Orleans ↗

WEST
10

EAST
10

ECONOMICAL
COMMERCIAL & HOME SERVICES
504-464-7166
1-800-730-6745

PSN 810

WEST
10 TO 12
Baton Rouge
Hammond
←

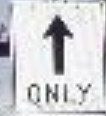
SPEED
LIMIT
4.5

...
BLOCK
INTERSECT



PHOTO
ENFORCED





CAUTION
SNOWPLOW
ROUTE

SCHOOL
BUS TURN
AROUND

















WEST
354
←

EAST
354
→

STOP

WINDY

2
↓

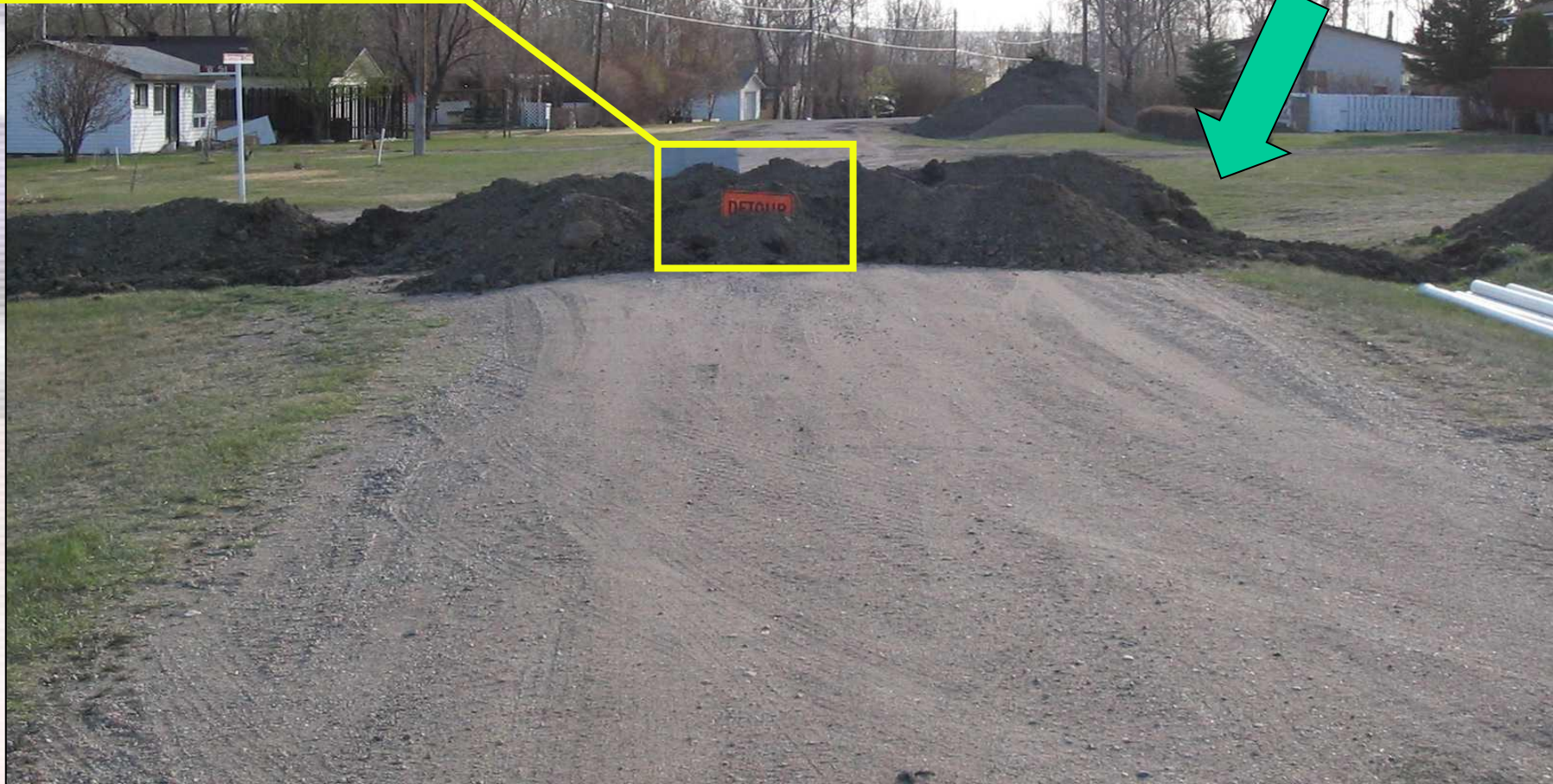
↓











THE DEADLY EQUATION:



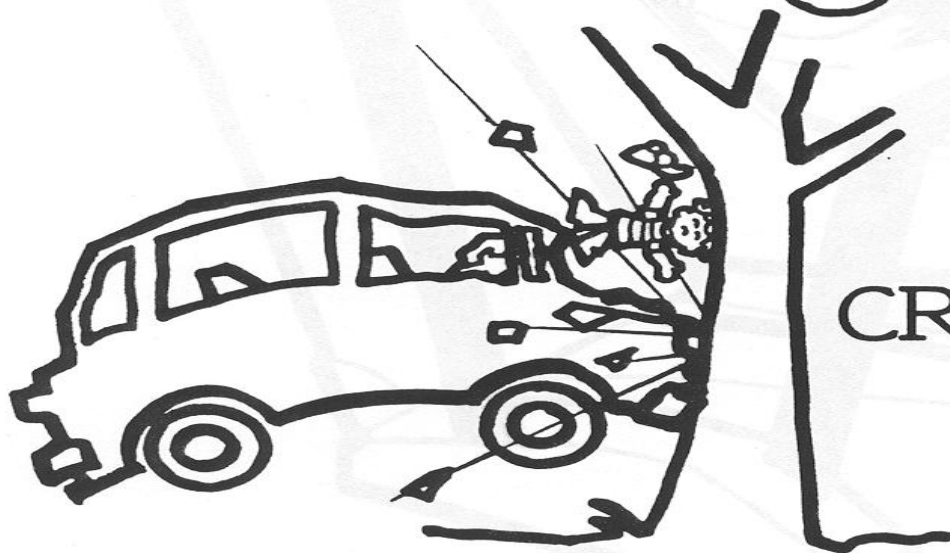
30 LBS.

X

40 M.P.H.



=



1200 LBS.
CRASH WEIGHT

DID YOU KNOW THAT IN A CRASH OR SUDDEN STOP, YOUR BODY WEIGHT IS MULTIPLIED BY THE SPEEDS OF THE CAR?





Reserve Now

On Line

CRUISEAMERICA.com

**1-800
RV 4
RENT**

X45ENBI

253318



















**ROUGH
BREAK
AHEAD**

BALD EAGLE
MGMT. AREA
NO STOPPING
STANDING
OR WALKING
NEXT $\frac{1}{4}$ MILE
PURSUANT TO 36 C F R 1.5 A1





GREEN GROVE

PHONE SYSTEMS

DATA

11/11

11/11



GREEN GROVE

PAD LOCATIONS AVAILABLE

CATERING SERVICE

RENTAL SERVICE

RENTAL SERVICE

RENTAL SERVICE

RENTAL SERVICE

RENTAL SERVICE

RENTAL SERVICE

RENTAL SERVICE

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STOP

STOP



GROVE





NOW
Leasing
Apartment
Search

Select



maceys
FOOD & DRUG
OPEN 24 HOURS
CLOSED SUNDAYS
DOLLAR CHEST
GREAT CLIPS
MAUITAN
EXCEPTIONAL COPY CLEANERS
The UPS Store
TAPES & LABELS
BEAUTY SUPPLY









TRIMMINGS	Regular	3.938
FLYING J	Plus	4.034
	Premium	4.131
	Diesel	4.591



Canal Street & Bowery



The background of the slide is a blurred, low-resolution image of the United States flag, showing the stars and stripes in shades of red, white, and blue.

Teaching Pigs How to Jump

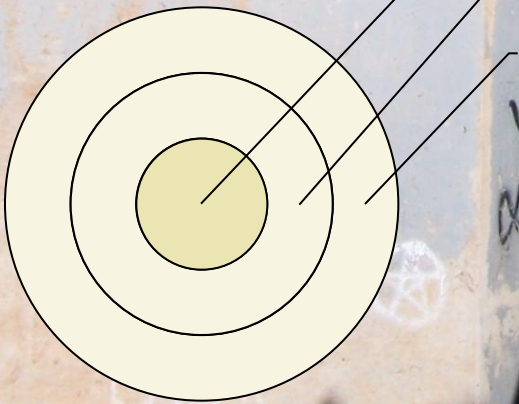


BINGO
SUNDAY
Oct. 22, 2006
SDRS CAFETERIA
12pm - 8pm
Sponsored by
FRANK ARMILLO + FAMILY











Gerardo Molina
Ave 8 Agosto 83
Fall 7 Octubre 05

Gabriel Molina
Ave 8 Agosto 8, 1983
Fall 9, 2005

06/09/2007



06/09/2007



06/09/2007



06/09/2007





06/09/2007



15 FT. 6 IN.

06/10/2007





06/10/2007







15
M.P.H.



SNOW RELEASED AS
NEXT 2 WEEKS
NO PARKING OR STANDING
NOVEMBER 1 TO MAY 1



STOP









Why do we need RSAs?

There are many competing interests at play in road projects:

- cost**
- right of way**
- environment**
- topographic and geotechnical conditions**
- socio-economic issues**
- capacity / efficiency**
- politics**
- safety**

Why do we need RSAs?

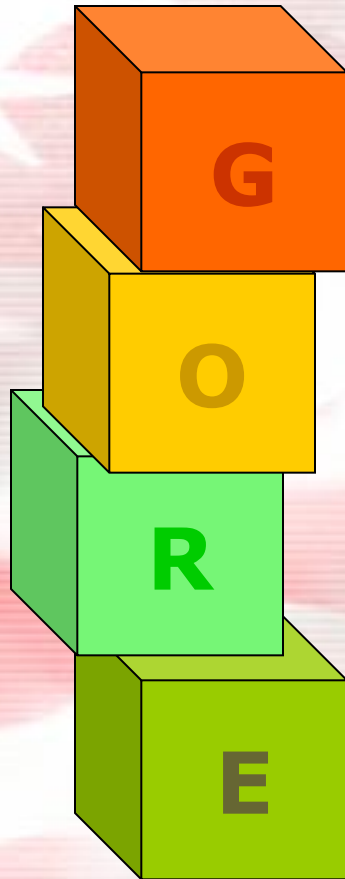
- **Compromises and constraints are a normal part of transportation budgeting.**
- **RSAs demonstrate the safety implications of roadway elements.**
- **RSAs ensure that safety is an explicit consideration, and that safety does not “fall through the cracks”.**

When do we conduct RSAs?

- **pre-construction:**
 - planning / feasibility
 - preliminary (draft) design
 - detailed design
- **construction:**
 - work zones
 - pre-opening
- **post-construction/operational:**
 - existing roads

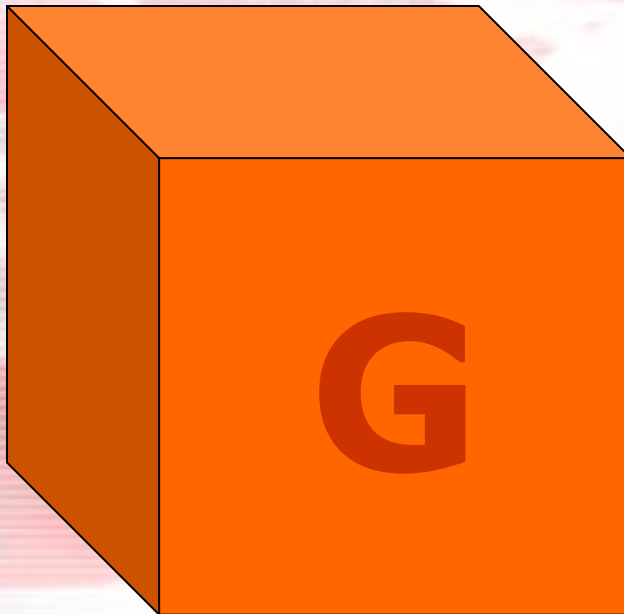


Road Safety: Gore



- **Geometry**
- **Operations**
- **Road Users**
- **Environment**

Road Safety: Geometry



- **Curve**
- **Gradient**
- **Cross Section**
- **Clearance**
- **Sight distance**
- **Clear zone**

Road Safety: Geometry Example 1



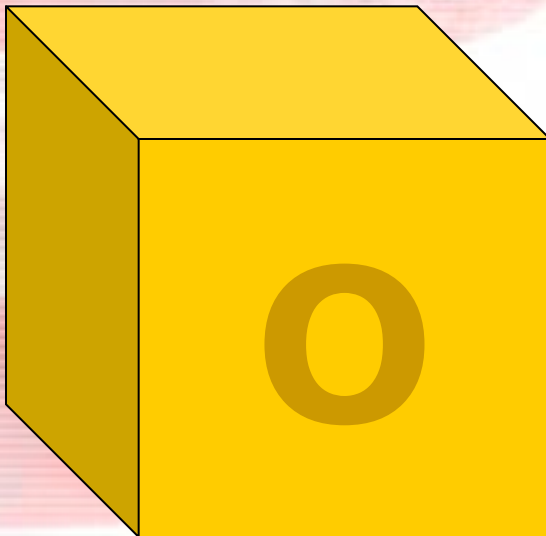
Road Safety: Geometry Example 2



Road Safety: Geometry Example 3



Road Safety: Operations

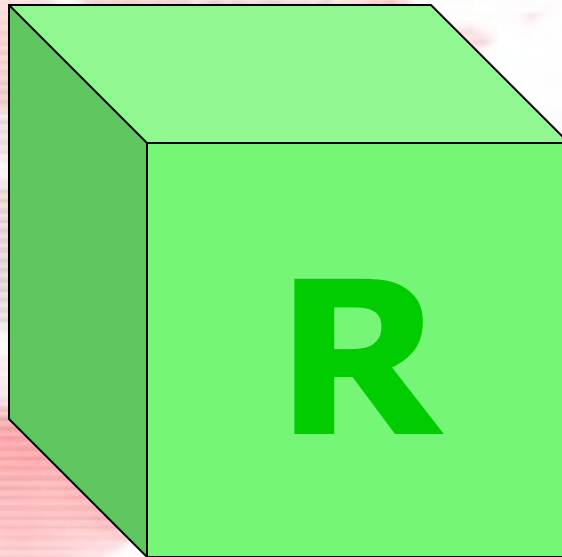


- **Congestion**
- **Signal operation**
- **Speeding**
- **Queuing**
- **Turning movements**

Road Safety: Operations Example 1

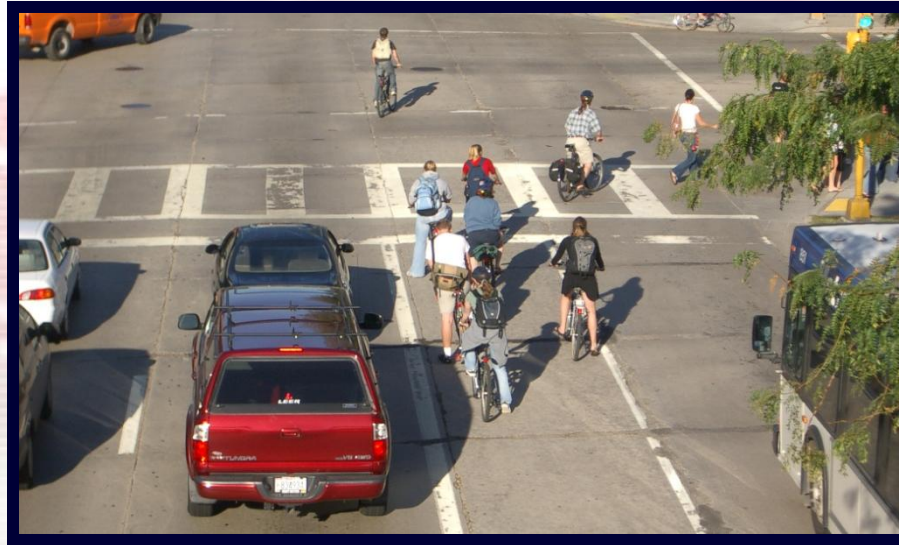


Road Safety: Road Users/Human Factor



- **Motorists**
- **Bicyclists**
- **Pedestrians**

Road Safety: Motorists



Road Safety: Bicyclists



Road Safety: Pedestrians

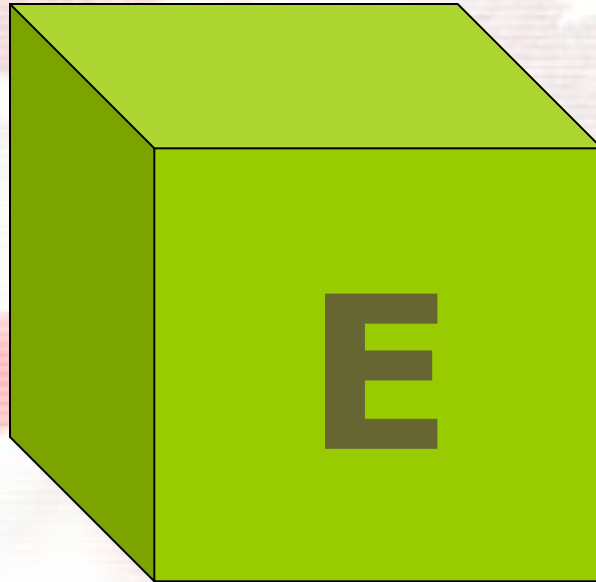


- Approximately 64,000 injured
- Approximately 5,000 killed each year

Road Safety: Road Users



Road Safety: Environment

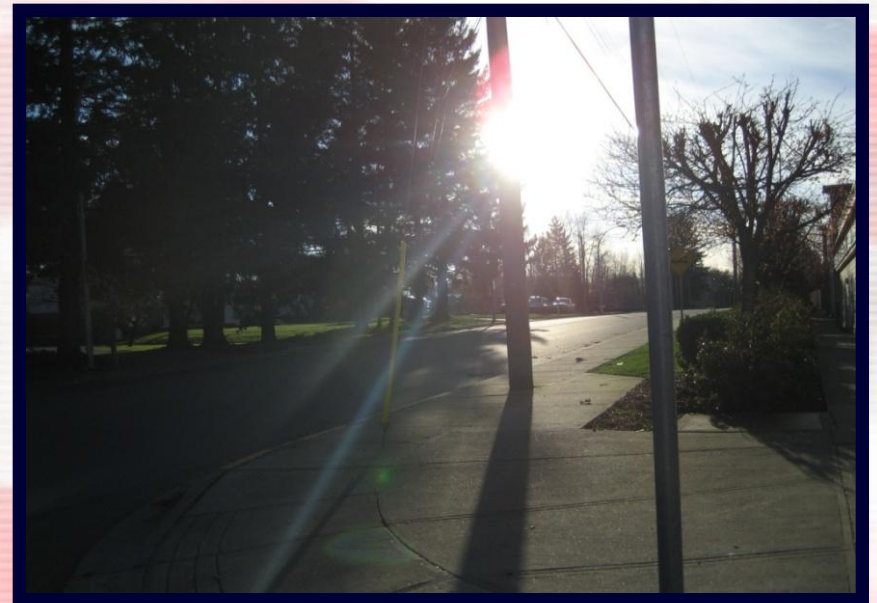


Road Safety: Environment



Weather

Lighting Conditions





WWTV
TRAVERSE CITY, MI



End of Part 1: Basic Concepts

