Road Safety Assessments

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Why Are We Here?
2005 US Traffic Fatalities = 43,443
2005 Illinois Crashes

PDO 80.6%
A Injury 3.3%
B Injury 8.7%
C Injury 7.1%
Fatal 0.3%
The Goal

Illinois Comprehensive Highway Safety Plan

Reduce the number of traffic-related deaths from 1,454 in 2003 to 1,000 or fewer by 2008, a rate of 1.0 fatality per 100 million vehicle miles traveled (VMT).
Previous Efforts

- Responses to a single incident.
- Engineering Projects without adequate crash data.
- Assuming what the problem is.
- Enforcement without goals.
## Enforcement Effectiveness

<table>
<thead>
<tr>
<th>Year</th>
<th>DUI Arrests</th>
<th>Fatalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>44</td>
<td>15</td>
</tr>
<tr>
<td>2003</td>
<td>68</td>
<td>15</td>
</tr>
<tr>
<td>2004</td>
<td>148</td>
<td>16</td>
</tr>
<tr>
<td>2005</td>
<td>258</td>
<td>18</td>
</tr>
<tr>
<td>2006</td>
<td>298</td>
<td>19</td>
</tr>
<tr>
<td>2007</td>
<td>(225) Projected</td>
<td>8 (To Date)</td>
</tr>
</tbody>
</table>
What is an RSA?

An RSA (Road Safety Assessment) is a formal examination of the safety performance of a roadway or a proposed project by an independent, multi-disciplinary team.
What is an RSA?

• Formal: Procedures & Documentation
• Safety Performance: Focus on Safety
• Independent: No previous experience with assessed road
• RSA Team: General experience and specialists
An RSA also….

- Considers the safety of all road users.
- May proactively consider mitigation measures.
- Considers interactions at the borders or limits of the project.
- Examines the interaction of project elements.
An RSA is **NOT**....

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

But...

An RSA is a process that looks beyond normal design guidelines to improve safety performance.
Who conducts an RSA

Composition and size

• 3-5 Team Members
• Staff from other agencies
• Consultants
• Academia
RSA Team

• Independent
• Experienced
• Interdisciplinary
RSA Team Skills

Core Skills Set
- Traffic operations
- Geometric design
- Road safety
- Enforcement
RSA Team Skills

Supplementary Skills

- Maintenance
- Positive guidance/human factors
- Specialist skills (bridges or signing)
How do we conduct an RSA?
RSA Process

Step 1: Start-up meeting & information exchange

Step 2: Problem identification

Step 3: Risk analysis & countermeasure identification

Step 4: Prepare RSA summary presentation

Step 5: RSA summary presentation

Step 6: Final report development

Step 7: Response letter

Responsibilities:
- RSA Team
- Design Team
- Project Owner

Site reviews
1) Start-up Meeting and Information Exchange

- Introductions
- RSA process overview
- Schedule
- Site information exchange
1) Start-up Meeting and Information Exchange

- Crash data
- Traffic volumes
- Aerial photographs
- Background reports
- Design drawings
- Design criteria
2) Problem Identification

- **Review of Site Information**
- **Site Visit(s)**
  - Physically view location
  - Gather photos
  - Make observations of safety issues
  - Take measurements
  - Reference site information
- **Comprehensive review of the interaction between the roadway and all users**
High Speed
Lane Width
Curves
Congestion
Unsignalized Intersections
Sight Distance and Sight Triangles
Identified Problems

- Access and Driveways
- Adequate signing
- Nighttime lighting
- Striping & marking
- Delineation
- Clear Zones
- Large Vehicles
- Drainage

- Fixed Objects
- Guardrails
- Slopes
- Signal visibility & timing
- Bridges
- Pavement
- Dropoffs
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Site reviews
Two Vital Steps in the RSA Process

Problem ID Analysis
Traffic Safety Basic Concepts

• “Risk” is the basis of understanding and describing traffic safety

• A specific road environment can be made less safe or more safe according to the “risk” that it presents to the road users

• The objective of RSAs is to reduce the risk of specific road elements

• Risk is influenced by three independent factors
Measuring Risk

- Crash Risk = f (E, P, C)
- E = Exposure
  - How many road users are exposed to the specific risk being assessed
- P = Probability
  - The likelihood of a crash occurring
- C = Consequence
  - The severity of a crash once it happens
Qualitative Estimate of Risk

Deficiencies = Risk

Risk is composed of two elements:

1. The **likelihood** that a collision occurs
2. The **severity** of the collision
# Risk Assessment Scale

<table>
<thead>
<tr>
<th>RISK CATEGORY</th>
<th>SEVERITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Frequent</td>
<td>C</td>
</tr>
<tr>
<td>Occasional</td>
<td>B</td>
</tr>
<tr>
<td>Infrequent</td>
<td>A</td>
</tr>
<tr>
<td>Rare</td>
<td>A</td>
</tr>
</tbody>
</table>
Risk Comparison

- Compare risk of existing situation to that of the proposed design situation
  - What existing risks are addressed by the proposed design?
  - What existing risks are not addressed by the proposed design?
  - What new risks are introduced by the proposed design?
Mitigate Safety Issues

For each safety issue, the RSA team may provide suggestions or possible solutions to reduce crash frequency and/or severity

• Suggestions should be:
  • Appropriate for stage of assessment
  • Appropriate for all road-users
Countermeasures

Roadway (Lane) Departure

Unsignalized Intersections

Signalized Intersections

Pedestrians
Hierarchy of Mitigating Roadway (Lane) Departure Crashes

1. Keep vehicle in lane
2. If vehicle departs lane, make recoverable
3. If vehicle does not recover and crash occurs, minimize severity
Reducing Edge Drop-Off Crashes

“Safety Edge”

NCHRP 500, Volume 6, Strategy 15.1 A8 – Apply Shoulder Treatment
The Safety Edge

- Helps errant vehicles to maintain stability, particularly on roadway re-entry
- Effective up to 5 inches of pavement depth
- Beneficial in reducing Tort Liability during construction and after project completion

NCHRP 500, Volume 6, Strategy 15.1 A8 – Apply Shoulder Treatment
Edge line Rumble Strips

Edgeline rumble strip on 2-lane rural highways

“Milled in”

“Rolled in”
Curves

ROADWAY DEPARTURE ON CURVES
Warning Signing for Curves

For “tight” turns - large single arrow at curve

Tried

CRF = 43% in fixed object crashes
Warning Signing for Curves

**Tried**

- CRF = 18%
- CRF = 22% with advisory speed

ROADWAY DEPARTURE ON CURVES
Flashers

LED yellow warning beacon (flasher)

Battery pack

CRF= 25% to 28%

Tried

ROADWAY DEPARTURE ON CURVES
Countermeasures for Trees

**Removal**

CRF = 66% fatalities

CRF = 20% non-fatal

**NCHRP 500, Volume 3, Strategy 16.1 B1 – Remove Trees in Hazardous Locations**
Countermeasures for Trees

Removal

CRF = 66% fatalities

CRF = 20% non-fatal

NCHRP 500, Volume 3, Strategy 16.1 B1 – Remove Trees in Hazardous Locations
Update/Replace Roadside Hardware

*NCHRP 500, Volume 6, Strategy 15.1 C1 – Improve Roadside Hardware
Unsignalized Intersections

- Visibility
- Geometrics
- Access management
- Horizontal/vertical approach alignments
- Signing/marking/channelization
Left Turn Lane
IL 104 and Triopia Intersection

Addition of Left turn lane

Proven

CRF = 44%
Right-of-Way Regulatory Signing
Change 2-way STOP to all-way STOP

CRF = 47% for all crashes
CRF = 72% for right angle crashes

*NCHRP 500, Objective 17.1 F2 – Provide All-Way Stop Control at Appropriate Intersections
Signalized Intersections

- Visibility
- Modernization/timing/phasing
- Geometrics/access management
- Signings/markings
Traffic Signals Countermeasures

1. Update yellow clearance timing
2. Add all-red clearance phase
3. Improve visibility
   • 12” sections, supplemental heads, etc.
4. Add back plates
5. Change permissive lefts to protected only
Traffic Signals Countermeasures

6. Add advance warning signs with active flashers
7. Add supplemental signal heads
8. Use overhead red “T” heads
9. Change late night yellow/red flash to full time signal
10. Coordination of signals
11. Controller/actuation upgrades
Pedestrians Facilities

• Facilities
  – Accommodations
  – Pedestrian signals
  – Refuge islands/raised medians
  – Separations

• Visibility
  – Crosswalk enhancements
  – Lighting/illumination
  – Eliminate screening

• Traffic calming
Comprehensive Highway Safety Plan for Local Agencies

- 4 E Approach to making local roads safer
  \- Engineering
  \- Education
  \- Enforcement
  \- Emergency Services
Engineering

- Improve quality of crash data
- Improve lines of communication between Law Enforcement and Engineering (County Engineer, IDOT)
- Local Personnel trained in Road Safety Assessments
- Identify locations for RSAs
A Memorial to Drinking & Driving
Williamson County Sheriff's Office

Children's $39.00 Everyday Price
MARION EYE CENTERS
Educational Efforts

- Billboards
- Public Service Announcements
- School Programs
- Utilize Earned Media Opportunities
- Child Safety Seat Events
Enforcement

- Roadside Safety Checks
- Saturation Patrols
- Speed Details
- Seatbelt Check Points
Road Side Safety Checks

- Utilized as a Enforcement and Education Tool
- Deterrence is the most promising tool for near-term success
- High Visibility
- Studies have shown a 10 to 20 percent reduction in DUI Crashes if conducted properly
Road Side Safety Checks

• A Saturation Patrol may make contact with 20 to 30 vehicles during 5 hour shift
• A Road Side Safety Check could come into contact with 500 vehicles during the same time period, and RAISE PUBLIC AWARENESS
Emergency Services

• Coordinate with EMS to ensure better response times and understanding of the situation
• Understand the needs and functions of the various branches of Emergency Services
Prepare RSA Summary Presentation

- **Objective**
  - Provide an overview of the RSA process performed
  - Provide descriptions and visual representations of preliminary results

- **Components**
  - Team members
  - Specific RSA objectives
  - RSA process overview
  - Terminology (risk, exposure, probability, consequence)
  - “Risk Assessment Scale”
  - Preliminary results*
  - Response letter instructions
Prepare RSA Summary Presentation

*Preliminary results

– Photograph (if available)
  • Add circles, arrows, signs, etc. as needed
– Identified issue
– Risk analysis
– Suggested countermeasures
• The horizontal and vertical alignment on South Market Road directly south of Cochran Road is an emphasis area of concern for horizontal and vertical alignment, considering the area’s crash history and night visibility.

<table>
<thead>
<tr>
<th>Expected Frequency</th>
<th>Occasional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Severity</td>
<td>High</td>
</tr>
<tr>
<td>Risk Rating</td>
<td>Significant</td>
</tr>
</tbody>
</table>

**Suggested Countermeasures**

• Advanced warning, pavement markings, grading, chevrons, object markers, fixed object removal. *LCSI*

• Extend or grate culvert and widen shoulders through curve

• Realign South Market from south of Cochran to Fox. This work should be the subject of a detailed engineering study to determine the various considerations and optimal treatment to improve safety.
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Responsibilities:
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Site reviews
RSA Summary Presentation

• RSA team, design team, project owners
• Platform to present and discuss preliminary results and possible solutions
Final Report Development

-- Documents the RSA results --

Introduction
- Definition
- Process description
- Condensed process outline

Results
- Photograph (if available)
- Identified issue
- Risk analysis
- Suggested countermeasures
Response Letter

- Prepared by owner and design team
- Brief letter or memo format
- Point-by-point response to each safety issue identified
  - Indicates action to be taken
  - If NO action is to be taken, indicate as such
- Includes brief explanation and/or justification for each response item
- Becomes part of the project record
- Completes the RSA process
Legal Liability

Do RSAs expose agencies to more legal liability?

- Agencies should seek legal advice
- Agencies can be taken to court with or without an RSA
- RSAs can be part of a safety management system
Legal Liability

- Documentation
  - Provides permanent record of the risk assessments and identified countermeasures
  - Validates why identified issues are or are not resolved
Legal Liability

Assessors must carefully complete the RSA to a reasonable standard of care and professionalism

- Identify RSA scope
- Identify RSA materials
- Identify limitations
- Consult during assessment
Legal Liability

“[RSAs] demonstrate a proactive approach to identifying and mitigating safety concerns.”

“Our attorneys say that once safety issues are identified, and if we have financial limitations on how much and how fast we can correct the issues, then the assessment will help us in defense of liability.”

NCHRP Synthesis 336: Road Safety Audits