Smart Investing: The Roadway Safety Portfolio

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## Most Common Elements in Fatalities

### Ada & Canyon Counties

<table>
<thead>
<tr>
<th>Year</th>
<th>Intersections</th>
<th>Aggressive</th>
<th>Impaired</th>
<th>Run Off Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Intersections</td>
<td>Aggressive</td>
<td>Impaired</td>
<td>Run Off Road</td>
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<tr>
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<tr>
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<td>Aggressive</td>
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<td>2012</td>
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</tr>
</tbody>
</table>

Note: Top 3 common elements each year. Not listed in 1-2-3 order.
fatal crash locations are random
fatal crash types are predictable
focus on the predictable
The Roadway Safety Portfolio

   • Run Off Road Crash Treatments
   • Intersection Treatments

2. Traffic Safety Culture
   • Within Transportation Agencies
   • Road User Behavior

3. Technological Advances
   • Connected Vehicles
   • Autonomous Vehicles
Run Off Road

Systemic Solutions
How to reduce run–off–road crashes

1. Keep Vehicle on Road
2. Safe Recovery
3. Reduce Severity
Curve sign and marking enhancements

- Oversized Warning Signs
- Fluorescent Yellow Sheeting
Basic Curve Warning Sign
Chevrons
Advanced Curve Pavement Marking
Advanced Signing with Beacons
Centerline Rumble Strips

1. Centerline rumble strips extend into the travel lane-most common

2. Centerline rumble strips within pavement markings

3. Centerline rumble strips beyond pavement markings
Shoulder Rumble Strips
Edge Line Rumble Stripes
Safety Edge™

Georgia DOT Safety Wedge Hardware.
Raised Pavement Markers
Guardrail Delineation
Barrier Delineation
High Friction Surface Treatment
Cable Median Barrier
Guardrail Crashes
Tree Removal
Utility Poles Relocated or Removed
Unsignalized Intersections

Systemic Solutions
How to get hurt at a stop-controlled intersections

1. Run a stop sign
2. Pull out in front of someone after stopping
3. Other driver does 1 or 2
Basic Sign and Marking Improvements

Suggested Mountable Curb
Raised Splitter Island on the Approach
Flashing Solar Powered LED Beacon
Flashing Overhead Intersection Beacon
Thru Approach Activated Warning System
Retroreflective Sign Posts
J-Turn Modifications on High-Speed Divided Arterials

24 Total J-Turn Conflict Points

- 12 @ Main Intersection
- 8 Weaving
- 4 @ U-Turns

- 4 Crossing
- ▲ 10 Merge
- □ 10 Diverge
Signalized Intersections

Systemic Solutions
How to get hurt at a traffic signal...

1. Run a red light
2. Make a left turn in front of oncoming traffic
3. Other driver does 1 or 2
Countermeasures for Systemic Deployment

1. Stop red light running
2. Stop left turn crashes
How to stop red light running

1. Conspicuity
2. Signal Timing
3. Enforcement
12-inch Heads, One Signal Head per Lane, and Back Plates
Retroreflective Back Plates (Daylight)
Retroreflective Back Plates (Night)
Advance “Signal Ahead” Warning Sign

Actuated versions – connected to signal timing
Advance Cross Street Name Signs
Supplemental Signal Face per Approach
Late Night Flash

- Eliminate late night flashing operations
  - Especially Red-on-mainline, Yellow-on-side-street
How to stop red light running

1. Conspicuity
2. Signal Timing
3. Enforcement
Clearance Interval Equations: NCHRP 731

\[ Y = t + \frac{1.47V}{2a + 64.4g} \]

\[ R = \frac{W + L}{1.47V} - 1 \]

Where:
- \( t \) = PRT (s),
- \( a \) = deceleration rate (ft/s²),
- \( V \) = 85th percentile approach speed (mph),
- \( g \) = approach grade (percent divided by 100, negative for downgrade),
- \( W \) = intersection width measured from the back edge of the approaching movement stop line to the far side of the intersection as defined by the extension of the curb line or outside edge of the farthest travel lane (ft), and
- \( L \) = length of vehicle (ft).
Signal Timing – Coordination

- Fewer stops = fewer opportunities to run red lights
How to stop red light running

1. Conspicuity
2. Signal Timing
3. Enforcement
Automated Red–Light Enforcement
Enforcement-Assisted Lights
Change of Permitted and Protected Left-Turn Phase to Protected-Only
A solid red light means STOP. Drivers turning left must stop and wait.

A solid yellow arrow warns drivers that the left-turn signal is about to go to red and they should prepare to stop, or prepare to complete their left turn if they are within the intersection.

A flashing yellow arrow means turns are permitted, but you must first yield to oncoming traffic and pedestrians and then proceed with caution. Oncoming traffic has a green light.

A solid green arrow means it is safe to turn left. Oncoming traffic must stop.
Traffic Safety Culture

Transportation Agencies & Road Users
Agency Safety Culture: Policies

- Outlasts individuals
- Project → Program → Policy
- Expand effective strategies to jurisdiction-wide policy and standard plans.

Example: Rumble Strips
- Project: Try it once on a section of roadway
- Program: Add to RwD Implementation Plan
- Policy: Rumble strips considered on every project (using regular funding)
I am the weakest link
  ◦ *Seriously. Me. Literally.*

Safety Belts

Impaired Driving

- Roadway Factors: 3
- Vehicle Factors: 3
- Driver Factors: 57

- 34% overlap
- 13% overlap
- 27 total
- 6 total
- 1 total

93% total factors
Safety Culture: Mode Split

- Ped–Ped Fatalities: zero
- Bike–Ped Fatalities: near-zero
- Bike–Bike Fatalities: near-zero
Eliminate the Weakest Link

- Connected Vehicles
- Autonomous Vehicles
Connected Vehicles

- Vehicle-to-Vehicle (V2V)
- Vehicle-to-Infrastructure (V2I)
- Vehicle-to-Pedestrian (V2P)
Autonomous Vehicles

1939

1958
Autonomous Vehicles

A laser sensor scans 360 degrees around the vehicle for objects.

A processor reads the data and regulates vehicle behavior.

Radar measures the speed of vehicles ahead.

An orientation sensor tracks the car’s motion and balance.

A wheel-hub sensor detects the number of rotations to help determine the car’s location.

Source: Google
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2. Traffic Safety Culture
3. Technological Advances

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