

Safety and Asset Management Case Study: Washington State

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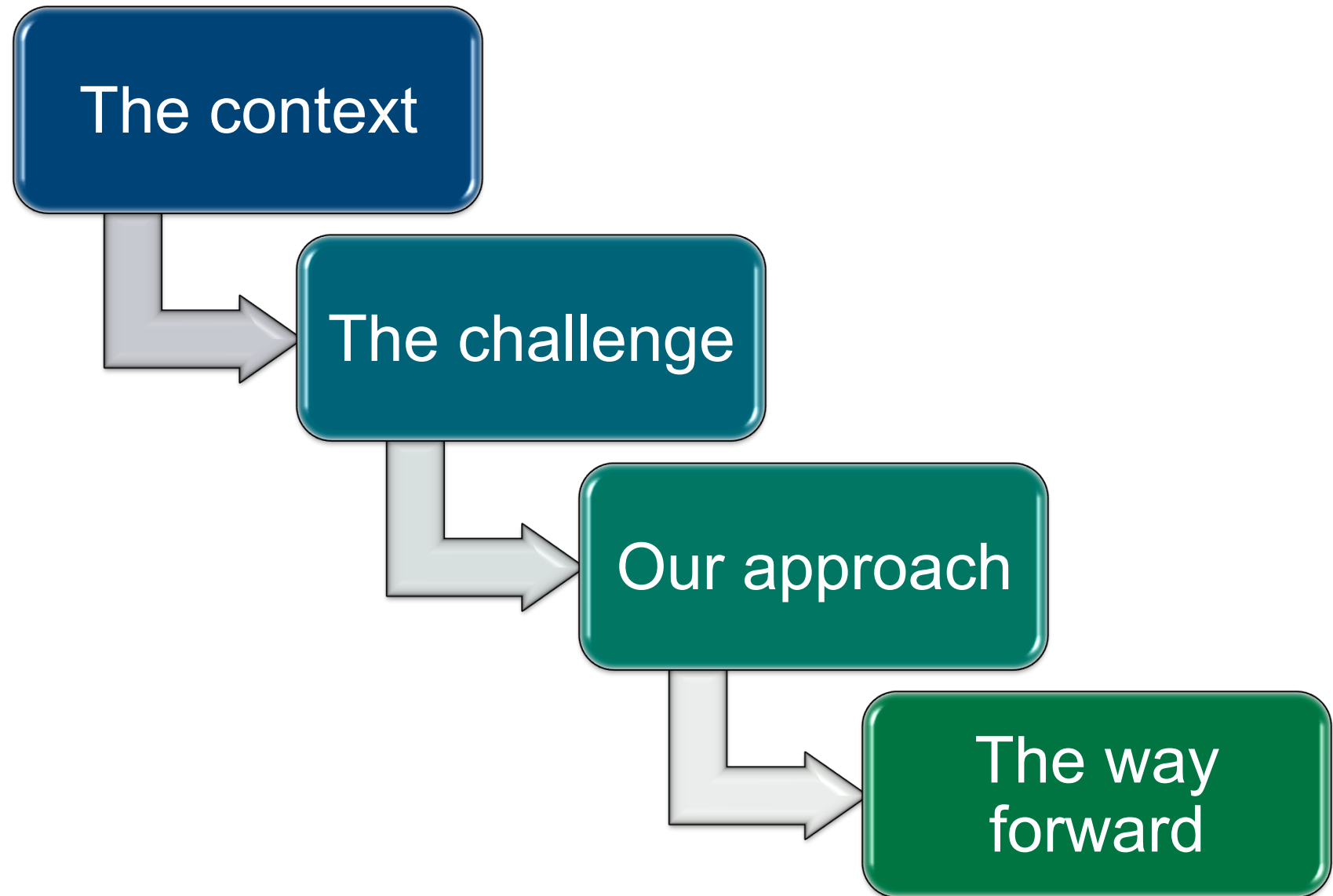
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Making Asset Management Work in Your Organization
San Diego, California
April 17, 2012

What is safety?



Who
defines
safety?





The context

Washington State's Strategic Highway Safety Plan 2010

Zero Deaths | Zero Serious Injuries | 2030



Target Zero

Achieve zero traffic deaths and zero serious injuries in Washington by the year 2030

www.targetzero.com



Washington State
Department of Transportation

Determining Target Zero priorities

1

Analyze the data

2

Target areas where investments will provide the greatest ~~safety~~ **crash reduction benefits**

3

Group priority areas into 4 levels, with priority 1 the most critical



2010 Priority Rankings

Priority 1

Priority 1 areas	% of total deaths ('06-'08)
Impaired Driving	47.7%
Speeding	40.2%
<i>Run off the Road Collisions*</i>	41.8%

*Moved up from Priority Level Two in last edition of Target Zero

2010 Priority Rankings

Priority 2

Priority 2 areas	% of total deaths ('06-'08)
<i>Young Drivers (ages 16-25)*</i>	18.4% (ages 16-20) 20.7% (ages 21-25) Total: 37.9%**
Unrestrained Occupants	29.0%
<i>Distracted Drivers*</i>	29.0%
Intersection Related	20.6%
Traffic Data Systems	n/a

*Moved up from Priority level 3 in last edition of Target Zero

** Percentages do not add up perfectly because some collisions involved drivers from both age groups.

Strategies Drive the Addition or Modification of Safety Assets?



Proven Strategies

1.2 Strategies to Reduce Run-Off-the-Road Crashes

1.2.A Reduce run-off-the-road collisions



1.2.A1 Establish or maintain programs to improve roadway maintenance to enhance highway safety. (P)

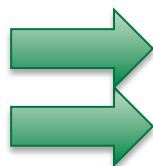
1.2.A2 Install rumble strips where appropriate. (P)

1.2.A3 Improve roadway geometrics. (P)

1.2.A4 Improve the pavement surface and/or establish better maintenance practices in regard to wet pavements and snow and ice control.

1.2.A5 Improve roadway signage and delineation. (P)

1.2.B Minimize the consequences of leaving the roadway



1.2.B1 Expand the use of, and maintain, existing best practices for the selection, installation, and maintenance of roadside safety hardware. (P)

1.2.B2 Develop and implement guidance to improve ditches and back slopes to minimize crash severity. (P)

1.2.B3 Develop and implement guidelines for safe urban streetscape design. (P)

1.2.B4 Install guardrail/barriers where necessary. (P)

1.2.B5 Remove or replace all non-standard guardrail. (P)

1.2.B6 Improve the clear zone. Enhance roadside safety by flattening slopes and removing hazardous objects. (P)

- Reduce the hazard from roadside utility poles by removing, redesigning, relocating, shielding, or delineating them. (P)
- Implement, in an environmentally acceptable manner, an effort to address hazardous trees. (P)
- Locate and inventory fixed objects inside the clear zone to support development of programs and projects to reduce the severity of run-off-the-road collisions.

1.2.B7 Install safety edge on all resurfacing projects on high speed facilities. (P)

1.2.C Reduce speed-related run-off-the-road collisions

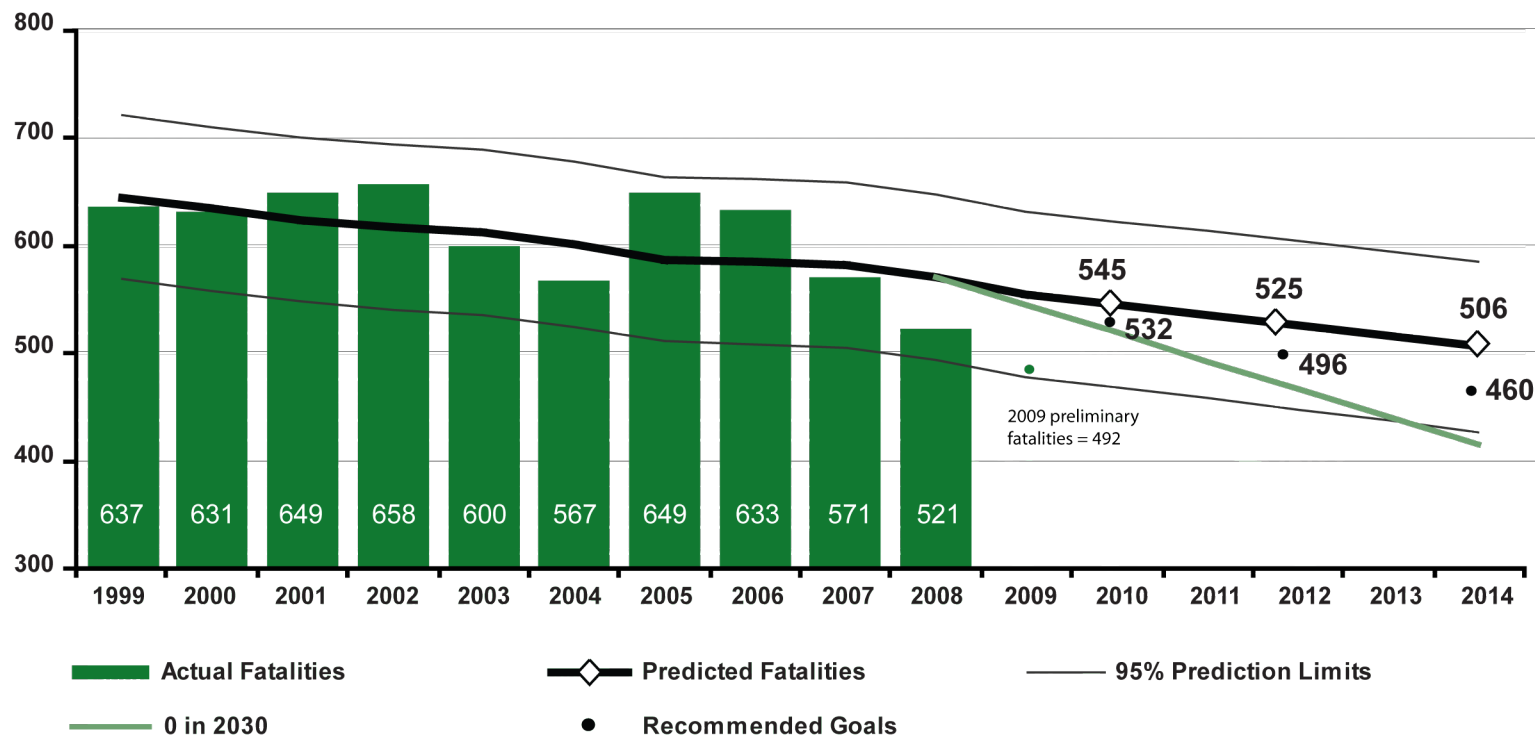
1.2.C1 Improve roadway geometrics. (P)

1.2.C2 Improve roadway signage and delineation. (P)



The challenge

All Washington Traffic Fatalities: Trends, Forecasts, and Goals

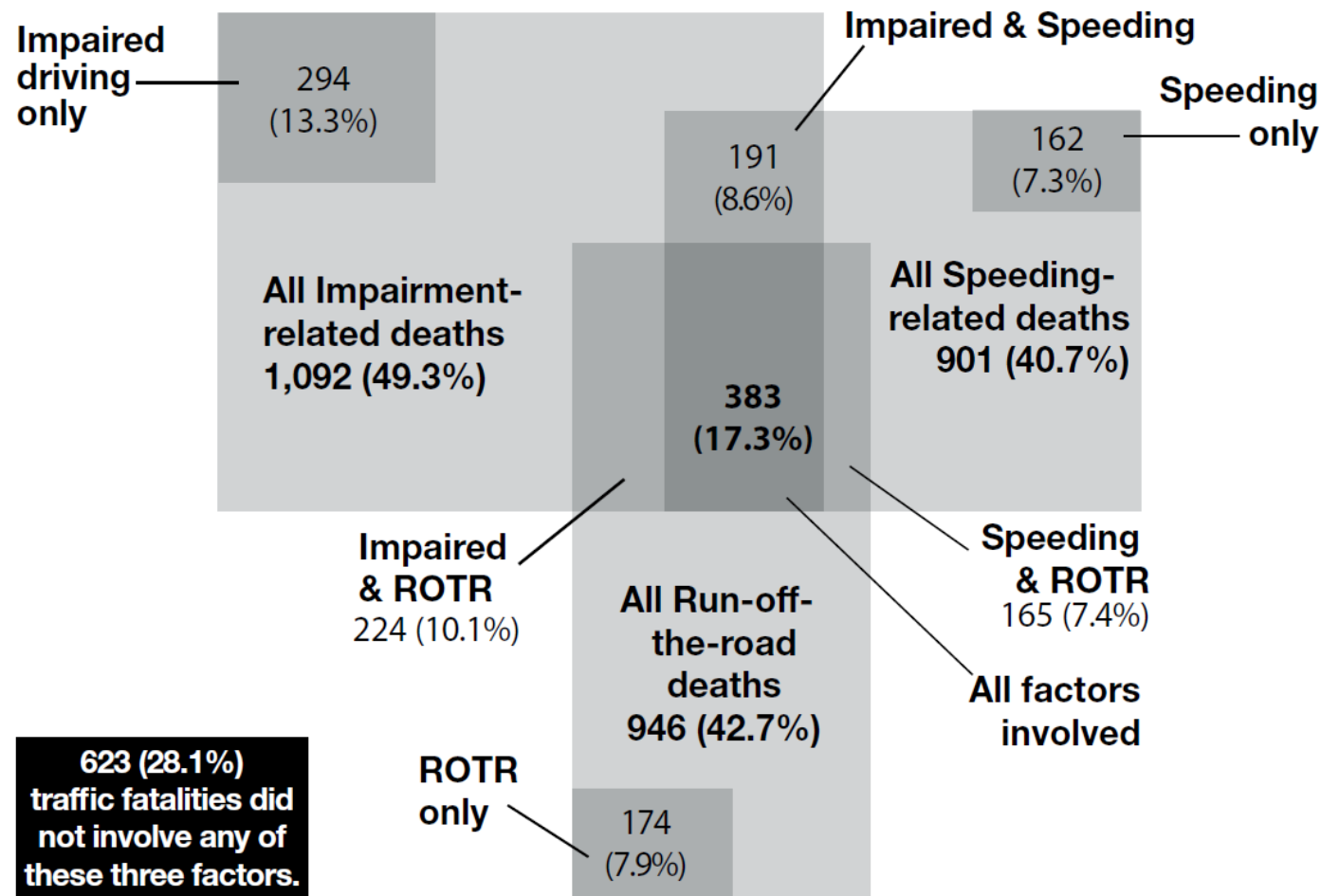


Source: Washington Traffic Safety Commission - Fatality Analysis Recording System (FARS)

...fatalities are declining, but not fast enough

The role of impairment, speed, or run-off-the-road in traffic fatalities, 2006-2009

Data derived from 2,216 total traffic fatalities; 71.9% or 1,593 deaths involved driver impairment, speeding, or run-off-the-road (ROTR), or a combination of these behaviors.



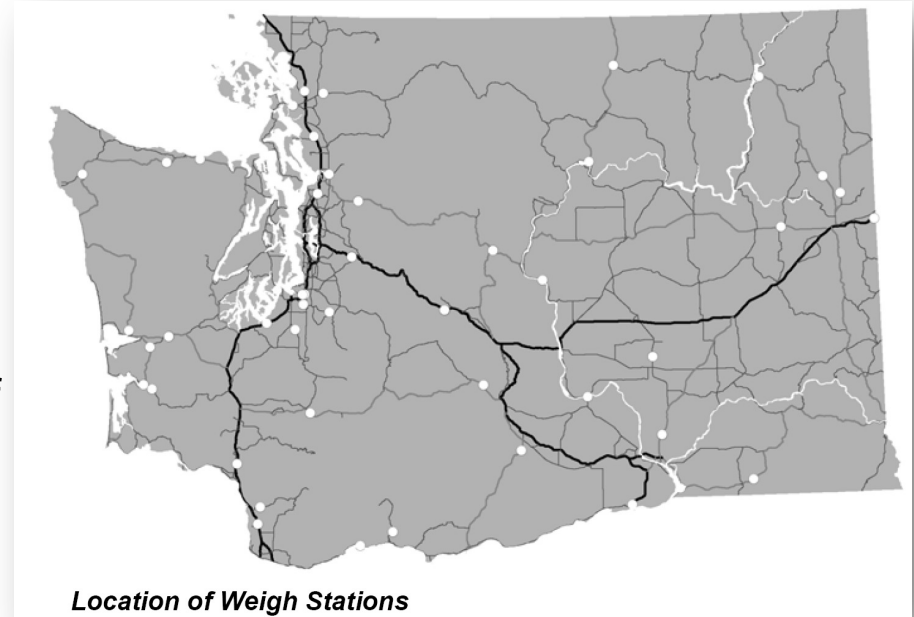
Use Performance knowledge to Incorporate Safety within all Asset Management Systems



Weigh Stations

Weigh Station Preservation

- Routine Periodic Maintenance
- Replace deteriorated and outdated facilities such as I-90 at Spokane Port of Entry and I-90 Eastbound at Cle Elum
- Replace or Rehabilitate systems at end of service life:
 - Weighing Facilities
 - Buildings
 - Electronic Equipment



Drainage Systems

Drainage System Preservation

Approaches:

- Replace deteriorated culverts prior to roadway failure.

Comprehensive inventory and condition assessment is needed to fully assess system needs. (in early stages)

Electrical Systems

Electrical System Preservation

Approaches:

- Replace fully depreciated assets prior to failure.
- Future high cost needs will include deteriorating operational systems and cameras

Comprehensive inventory and condition assessment is needed to fully assess system needs. (in early stages)

Slope Stabilization

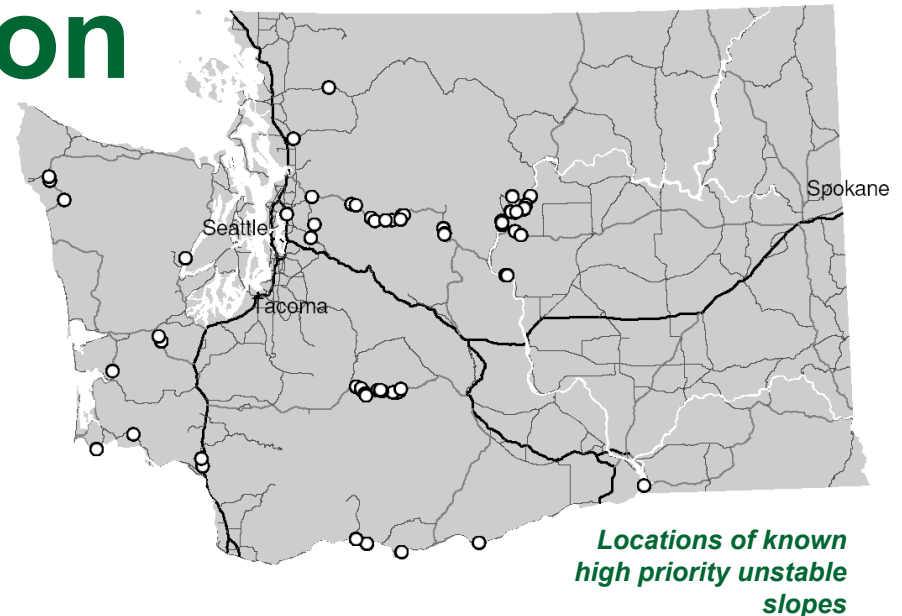
While not necessarily considered as an asset, roadway slopes both uphill cut slopes and downhill embankments have a significant impact on highway operations.

Slope failures can lead to unexpected roadway closures and potentially pose a risk to the traveling public.

The management approach included is from the report on Unstable Slopes Dated January 2006 prepared by WSDOT at the direction of the Governor of the State of Washington.

Priorities for addressing slopes;

- Respond to emergent conditions
- Ongoing rock scaling program
- Address highest risk slopes in priority order



Improving Highway Safety (Capital Investment)

Approaches to improving highway safety are driven by the Strategic Highway Safety Plan and include:

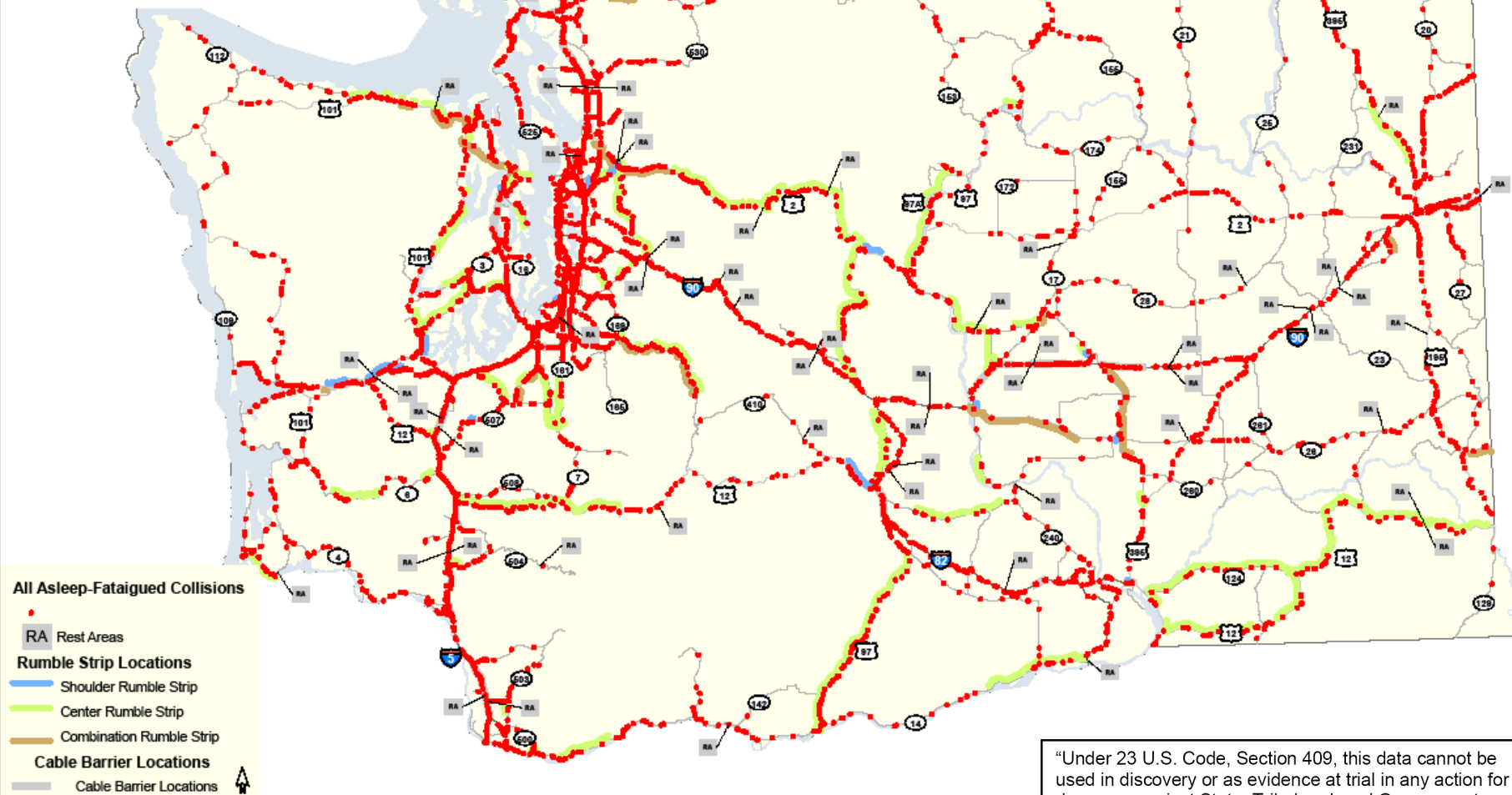
- Continuing Corridor Safety Program
- Reduce the Risk of Run off the Road Collisions and Improve the Roadside:
- Install Guardrail where needed
- Flatten Slopes
- Remove Fixed Objects from the roadside
- Install Shoulder Rumble strips
- Widen Shoulders
- Improve intersections:
 - New Signal Systems
 - New Roundabouts
 - New or Better Lighting
 - Turn Lanes
- Complete Median Crossover Prevention Program on Interstate and Non-interstate Highways
- Reduce the Risk of Crossover Collisions on Two Lane Highways by Installing Rumble Strips
- Provide Passing Opportunities on Rural Highways by Constructing Passing Lanes where cost effective
- Eliminate At-grade intersections where warranted
- Provide Adequate Pedestrian Facilities
- Improve work zones
- Modernize Highway Safety Features and Geometrics

Communicating the Assets Use and its Potential Benefits and Risks



Drowsy Driver Collisions Cable Barrier and Rumble Strip Installations

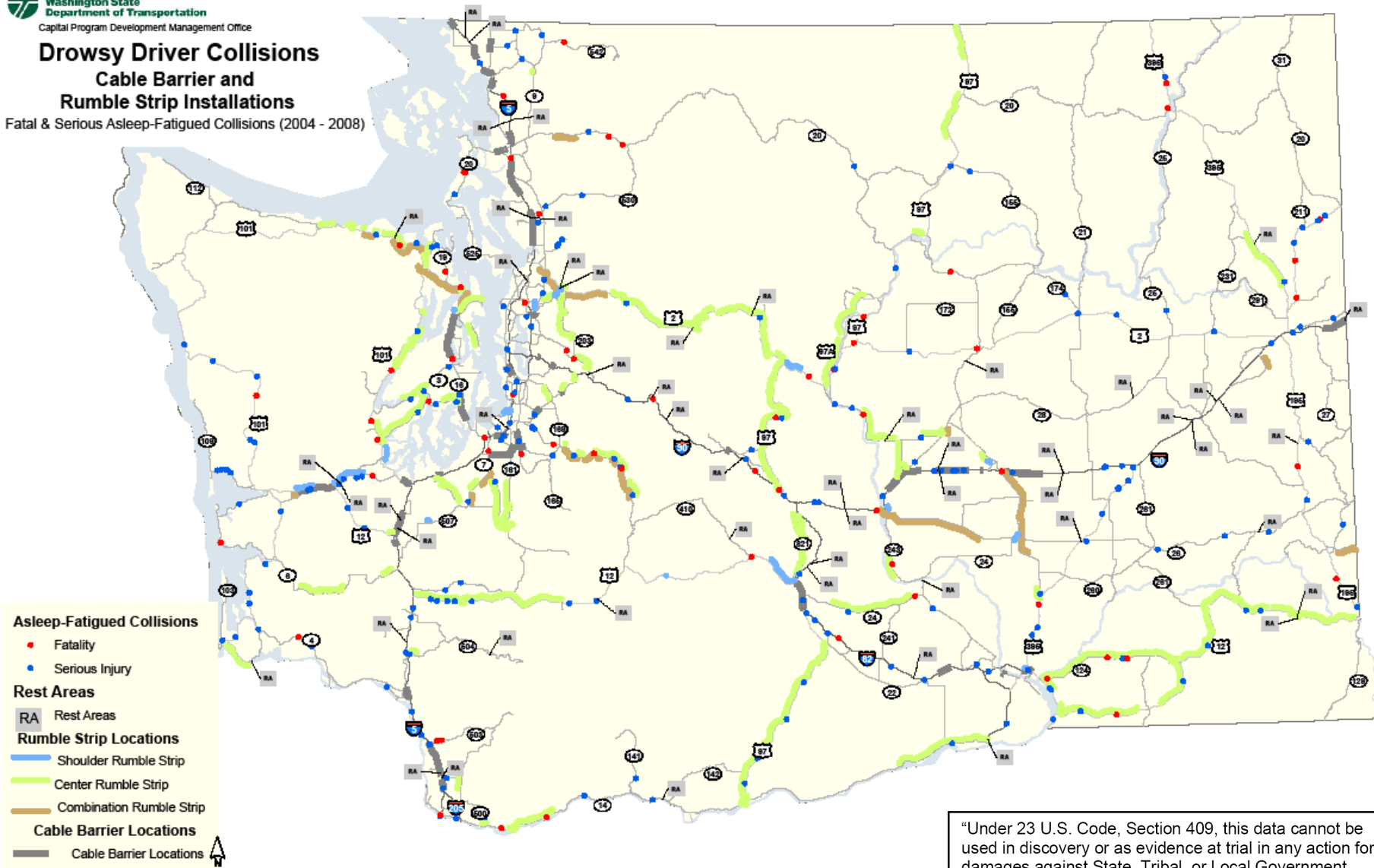
All Asleep-Fatigued Collision Types (2004 - 2008)



"Under 23 U.S. Code, Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal, or Local Government that involves the locations mentioned in this data."

Drowsy Driver Collisions Cable Barrier and Rumble Strip Installations

Fatal & Serious Asleep-Fatigued Collisions (2004 - 2008)



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Asset management

to support
safety

to manage
performance
& risk

Fatalities and Serious Injuries

Collision Types

Strategic investment to
maximize reduction in injuries
& death



PROGRAM RISK ASSESSMENT EVALUATOR TABLE

Safety Program: Run-Off-Road Crashes - Guardrail

Name: John Doe

Job Title: Safety Manager

Date: 7/30/2011

Description of Risk Event Collisions involving Guardrail where penetration occurs, result in increased severity

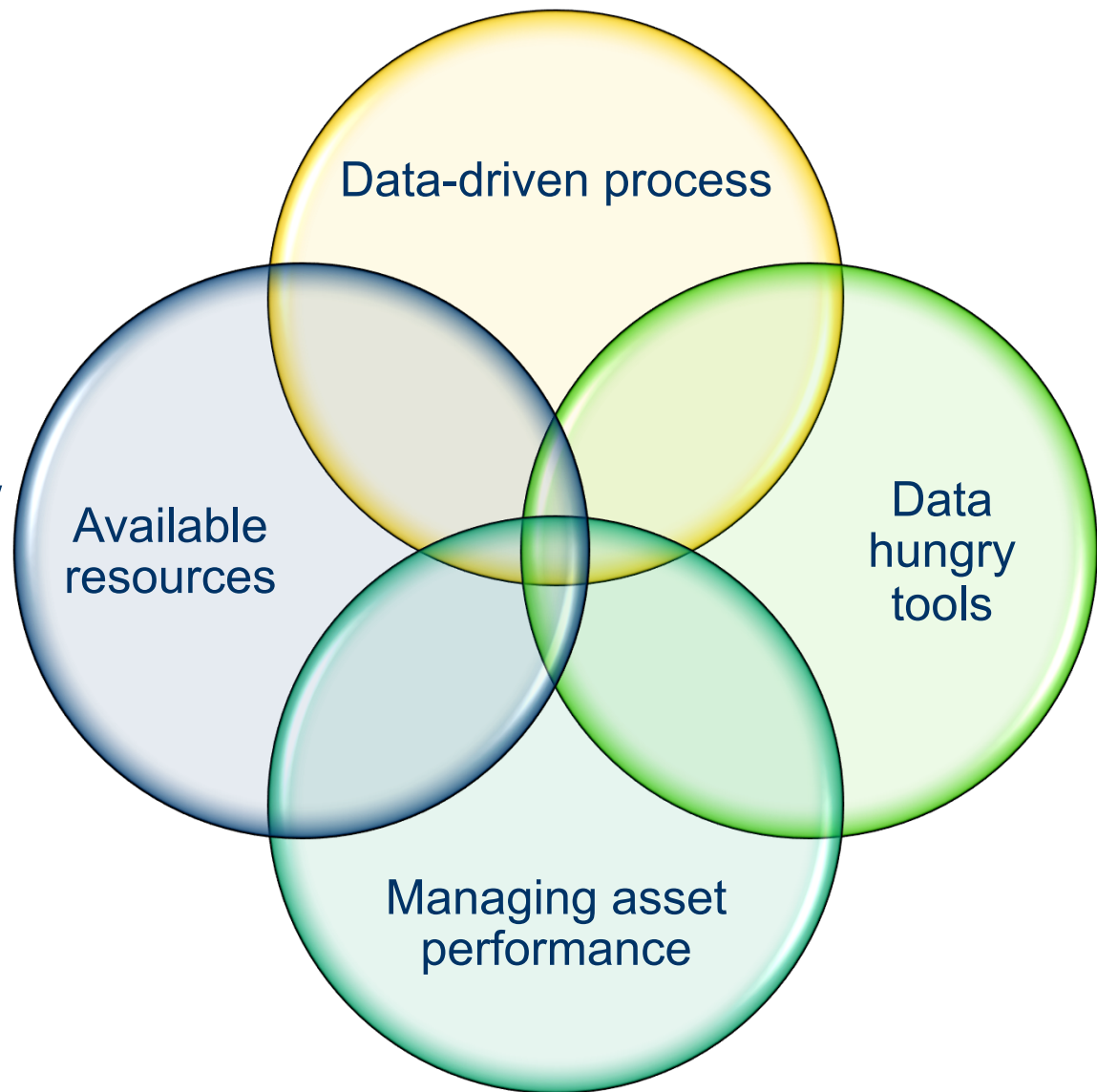
Description of Scenarios		Likelihood	Strategic Objectives																	
			(1) Safety			(2) Preservation			(3) Mobility			(4) Environment			(5) Steward- ship			(6) Economic Vitality		
			Impact			Impact			Impact			Impact			Impact			Impact		
		(1-100%)	min	ml	max	min	ml	max	min	ml	max	min	ml	max	min	ml	max	min	ml	max
A Posts	1) base condition	35	35	40	45	40	45	55	20	30	35	15	20	25	20	25	35	40	45	50
	2) risk condition	35	40	50	60	45	55	60	20	35	40	20	30	35	25	35	40	45	50	55
B Mounting height	1) base condition	20	35	40	50	35	40	50	20	25	30	20	25	30	20	30	40	25	35	45
	2) risk condition	20	40	45	55	40	50	55	25	30	35	20	30	35	25	35	45	30	45	50
C Terminal design	1) base condition	15	30	35	45	45	55	60	15	20	25	10	15	25	30	35	40	35	40	45
	2) risk condition	15	40	45	50	55	60	65	25	30	40	20	30	40	45	50	55	40	50	60
D Distance to travel lane	1) base condition	25	25	35	45	40	50	60	30	35	40	15	20	30	25	30	35	25	30	35
	2) risk condition	25	35	40	50	45	55	65	35	40	45	20	25	30	25	35	45	25	35	45

Creating the Asset Inventories



**We
know
what we
need:** how
do we get
there?

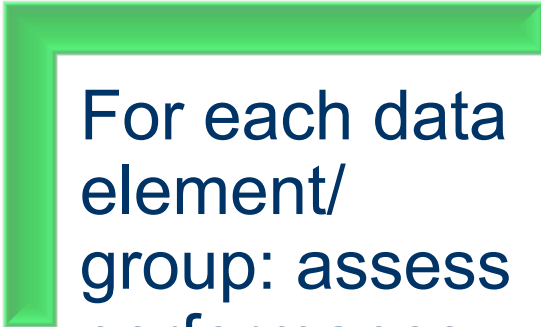
Or do we?



Our approach




Identify
attribute
weighting to
reflect agency
policies



For each data
element/
group: assess
performance
attributes



Rank relative
performance



**Top priority
data elements
to collect**

		Step 1	Step 2	Step 3								
Feature	Type	Collection Method		Immediacy	Effectiveness		Level of Effort				Score (100 scale)	E/LoE
		Minimum Accuracy Needed	Optimum Collection Method	Timeframe	Fatal Collision Ranking	Serious Injury Collision Ranking	Number of Collectors Needed (Statewide)	Safety Decision Timeframe	Cost to Collect (Equipment)	Data Volatility		
Guardrail (Priority 1)	Line	Planning	SRv	5	10	10	5	5	5	5	99	1.00
Tree (Priority 1)	Point	Mapping	HH	5	10	10	1	5	1	3	87	2.00
Concrete Barrier (Priority 1)	Line	Planning	SRv	5	6	6	5	5	5	5	78	0.60
Roadside Slope (Priority 1)	Line	Planning	WS	5	6	6	1	5	5	5	73	0.75
Ditch (Priority 1)	Line	Planning	WS	5	6	6	1	5	5	5	73	0.75
Support (Priority 2)	Point	Mapping	HH	3	6	3	1	3	1	5	50	0.90
Road Approach (Priority 3) (?)	Point	Planning	SRv	1	3	10	5	1	5	3	43	0.93
Rock Outcropping (Priority 2)	Point	Mapping	HH	3	4	2	1	3	1	5	41	0.60
Wall (Priority 2)	Line	Mapping	HH	3	2	2	1	3	1	5	35	0.40
Pedestal (Priority 2)	Point	Mapping	SRv	3	1	2	1	3	1	3	28	0.38
Fence (Priority 3)	Line	Planning	WS	1	3	3	1	1	3	3	22	0.75
Curb (Priority 3)	Line	Planning	SRv	1	2	2	5	1	3	3	22	0.33
Water Hazard & S.W. Pond (Priority 3) (?)	Line	Planning	SRv	1	1	1	5	1	3	1	13	0.20
Mailbox	Point	Planning	SRv	1	1	1	5	1	1	0	10	0.29
Hydrant	Point	Planning	SRv	1	0	1	5	1	3	0	7	0.11
Cabinet	Point	Mapping	HH	1	0	0	1	1	1	3	6	0.00
Regulatory Outfall(?)	Point	Mapping	HH	1	0	0	1	1	1	3	6	0.00
Weight				10	7	5	3	7	1	5		

Weighting Matrix

Score		Score Definition	Score	Score Definition	Score	Score Definition			
Fatal Ranking			Number of Collectors (Statewide)		Data Volatility				
	10	≥ 50	5	≤ 2	5	Fairly Stable; Changes are relatively rare and part of routine processes			
	6	$30 \leq x < 50$	3	$2 < x \leq 15$	3	Somewhat volatile; Changes are random and not tracked but trackable			
	3	$10 \leq x < 30$	1	> 15	1	Volatile; Changes occur randomly without notification or tracking			
	2	$5 \leq x < 10$	Safety Decision Timeframe		0	Extremely volatile; Changes occur randomly without notification or			
	1	< 5	5	To meet Sept. 30, 2011	Minimum Accuracy Needed				
	0	0	3	To meet Sept. 30, 2012	Visual	Visual Grade	Maximum Score Possible: 100		
Serious Injury Ranking			1	Beyond Sept. 30 2012	Planning	Planning Grade (≤ 10 ft)	Middle Possible Score: 50		
	10	≥ 100	Cost to Collect (Equipment)		Mapping	Mapping Grade (≤ 5 ft)	Minimum Score Possible: 0		
	6	$90 \leq x < 100$	5	Low cost	Survey	Survey Grade			
	3	$30 \leq x < 90$	3	Moderate Cost	Optimum Collection Method				
	2	$10 \leq x < 30$	1	High Cost	WS	Windshield Survey			
	1	< 10	0	Extremely High Cost	SRv	SRview			
	0	0			HH	Handheld GPS Survey			

The way forward

Continue performance measurement
then improve and adjust approaches
given asset management needs, risks
and strategic investment priorities

Questions?

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Washington State
Department of Transportation

2010 Priority Rankings

Priority 3

Priority 3 areas	% of total deaths ('06-'08)
Unlicensed Drivers	20.4%
Opposite Direction Multi-vehicle	18.7%
Motorcyclists	13.0%
Pedestrians	11.5%
Heavy Trucks	11.5%
Emergency Medical Services	n/a

2010 Priority Rankings

Priority 4

Priority 4 areas	% of total deaths ('06-'08)
Older Drivers	7.0%
Drowsy Drivers*	4.5%
Pedal cyclists	1.7%
Workzones	1.7%
Wildlife Involved	0.5%
Vehicle-Train Collisions	0.5%
School-Bus Involved	0.1%
Aggressive Drivers	n/a
Integrated Interoperability Communications	n/a

*Moved down from Priority level 3 in last edition of Target Zero