ZERO IS OUR GOAL

A SAFE SYSTEM IS HOW WE GET THERE

U.S. Department of Transportation

Federal Highway Administration

Alabama Roadway Departure Safety Implementation Plan

February 6th, 2024

Acknowledgements

FHWA

- Joseph Cheung
- Paul LaFleur
- Dick Albin

ALDOT

- John-Michael Walker
- Stuart Manson

RwD Focused Approach to Safety (FAS) 2021

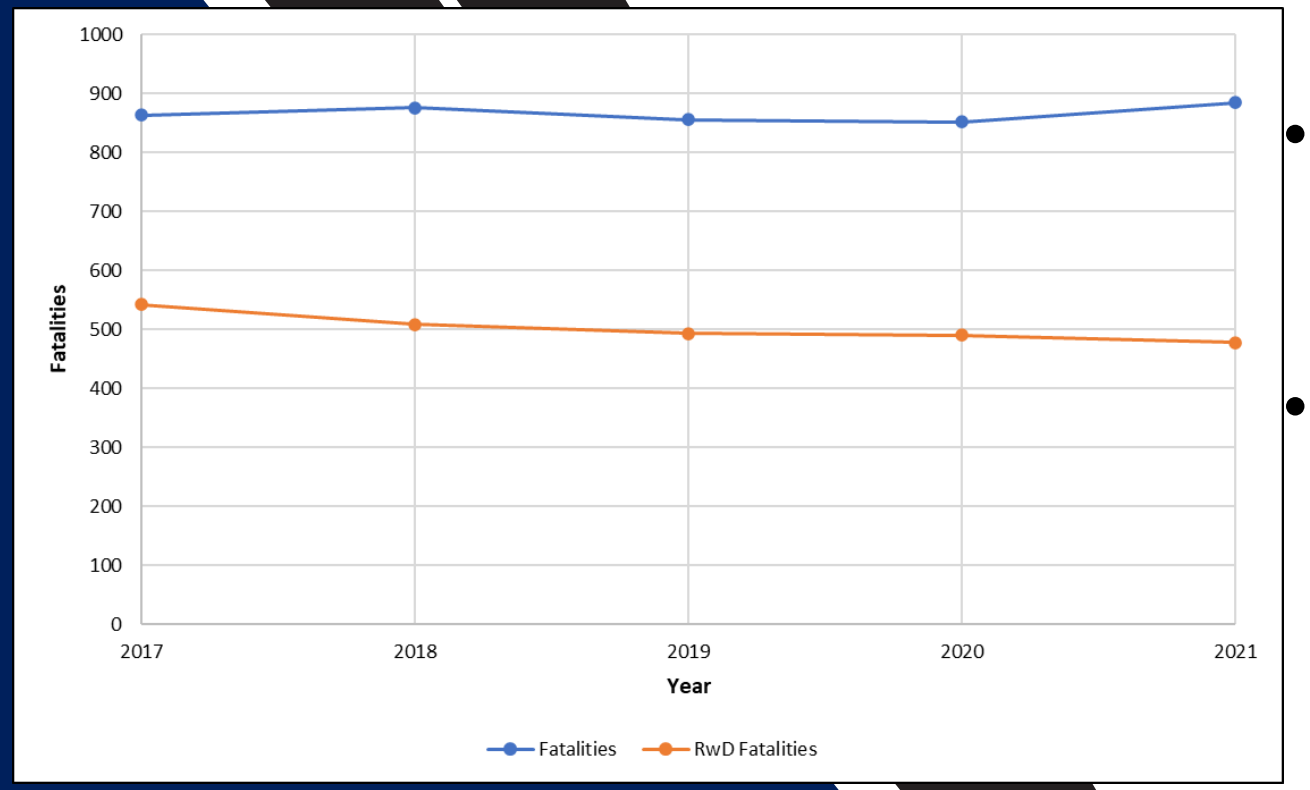
FAS background

- Started in 2004 and updated every few years (last in 2021)
- Data-driven approach to strategic planning
- Basis for focusing and prioritizing FHWA Safety Program resources for RwD, Intersections and Ped/Bike
- More info at https://safety.fhwa.dot.gov/fas/

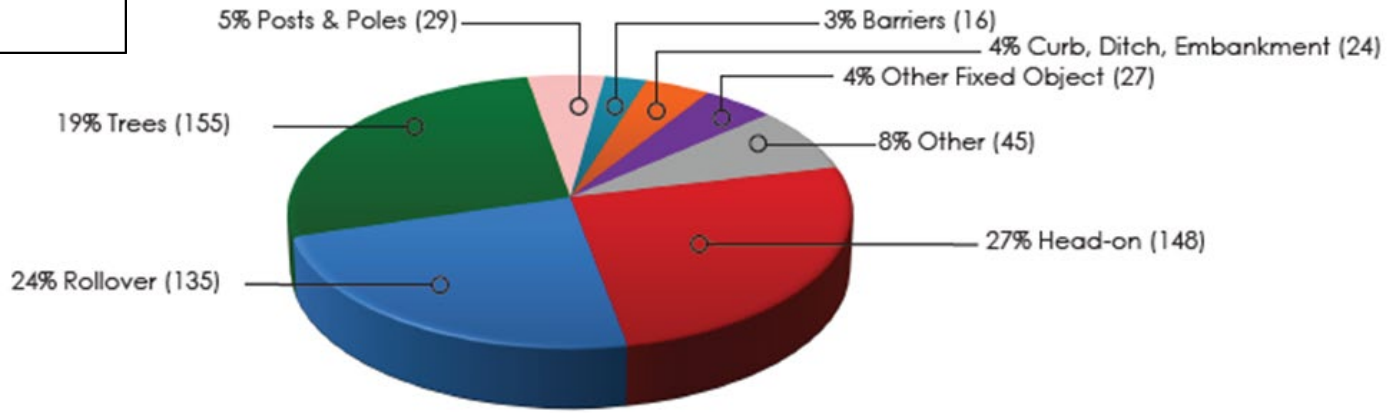
Benefits

- Increases awareness of critical severe crash types.
- Provides data analysis and action plan development from initiation to implementation.
- Leads to critical safety infrastructure improvements by promoting the use of effective safety countermeasures.
- Assists FHWA, State DOTs, and localities when prioritizing resources.
- Creates positive organizational changes in safety culture, policies, and procedures.

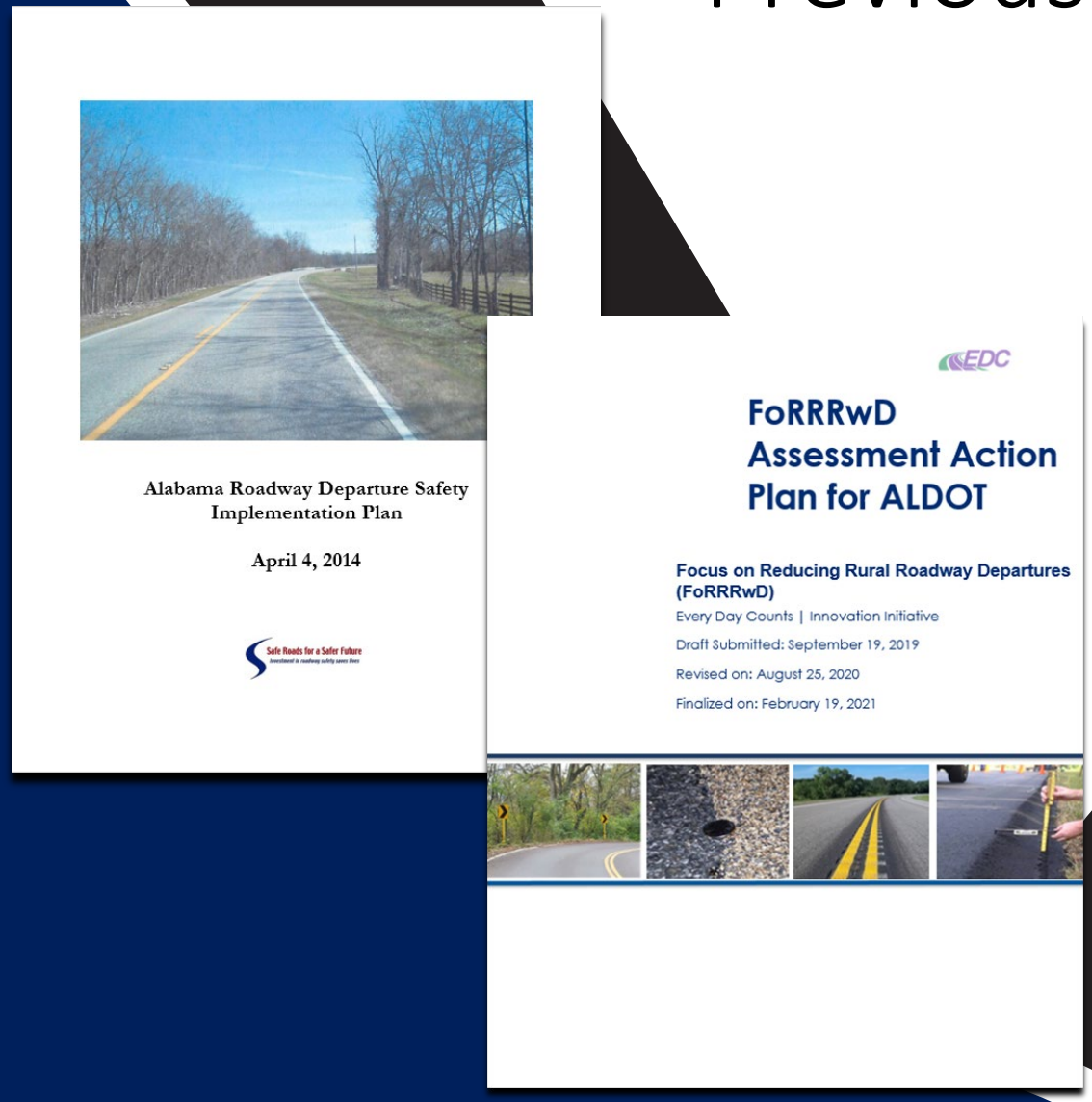
RwD Safety in Alabama



- Fatal Crashes (2017 – 2021)
  - 867 annually
  - RwDs 58 percent
- Primary Most Harmful Events
  - Head-On
  - Trees
  - Rollovers



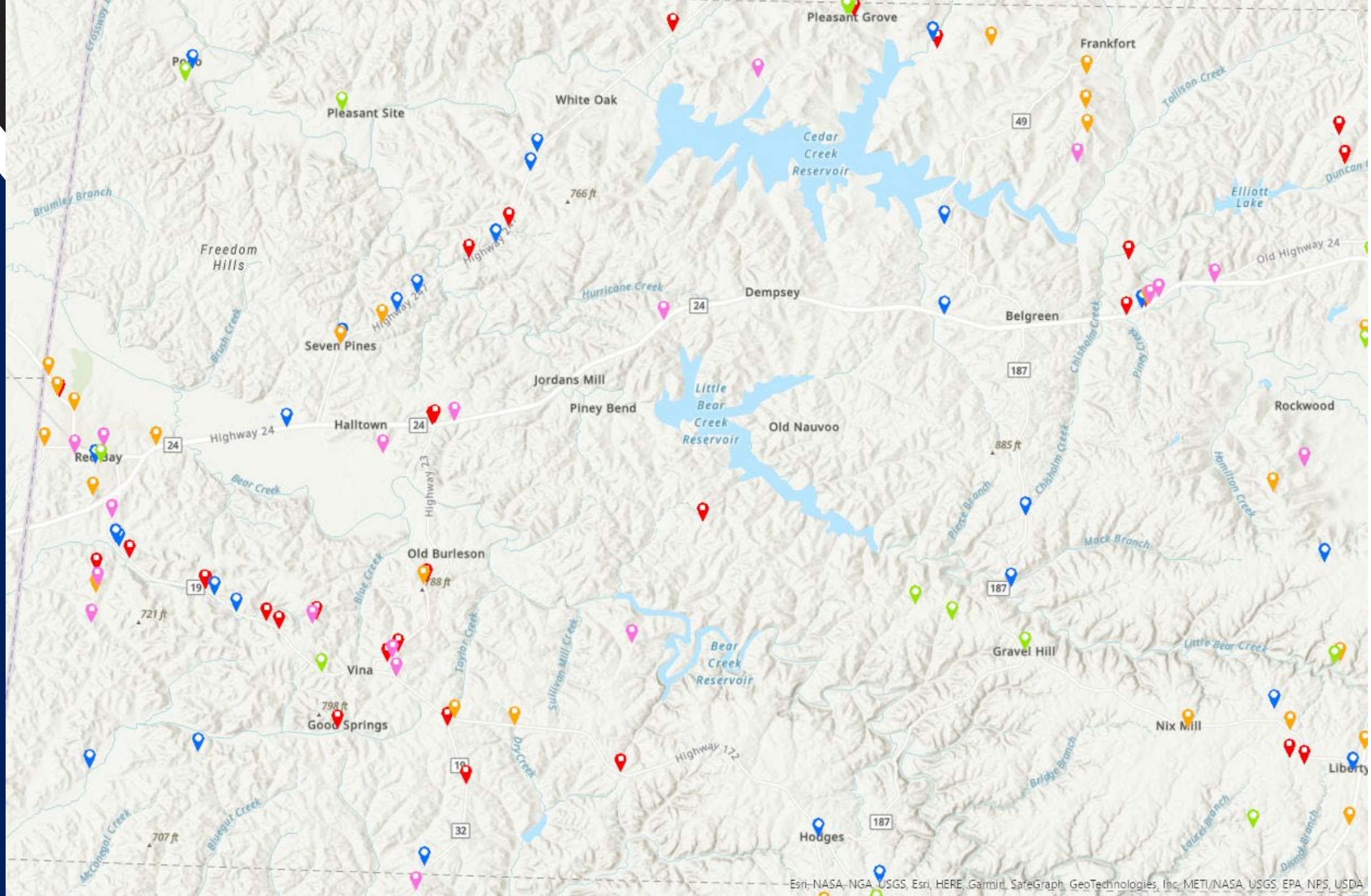
Previous RwD Safety Efforts



- 2014 RwD Safety Implementation Plan
  - Corridors were identified based on crash thresholds by type and roadway ownership
  - Estimated number of deployments and potential effectiveness
  - Actual deployment based on site investigation, or Road Safety Assessments (RSAs)
- 2021 FoRRRwD Assessment Action Plan
  - Included a review of documentation, reports, and onsite meetings with State and local stakeholders
  - Identified primary goals and supporting strategies
    - Expand use of Proven RwD Countermeasures
    - Integrate Systemic Safety
    - Increase Support for Local Safety Improvements

2024 ALDOT RwDSIP

- Builds on 2014 and 2021 RwD efforts
- Focuses on systemic safety approach
- Identifies priority locations for ALDOT follow-up
- Plan Development Process
  - Collect and integrate data
  - Identify focus crash types
  - Identify focus facility types
  - Assess risk factors on focus facilities
  - Develop prioritization
  - Recommend countermeasures


Pleasant Grove
Frankfort
Pleasant Site
White Oak
Cedar Creek Reservoir
Tallison Creek
Elliott Lake
Duncan
Brumley Branch
766 ft
Freedom Hills
Old Highway 24
Hurricane Creek
Dempsey
Belgreen
Seven Pines
Brush Creek
Chisholm Creek
Piney Creek
Jordans Mill
Piney Bend
Little Bear Creek Reservoir
Rockwood
Old Nauvoo
Halltown
Highway 24
Bear Creek
885 ft
Hamilton Creek
Old Burleson
788 ft
Blue Creek
Pierce Branch
Mack Branch
721 ft
Taylor Creek
Sullivan Mill Creek
Bear Creek Reservoir
Gravel Hill
Little Bear Creek
Vina
798 ft
Good Springs
Nix Mill
Dry Creek
Highway 171
Bridge Branch
Liberty
McConegal Creek
Bluegut Creek
707 ft
Hodges
Laurel Branch
Dimmit Branch
Esri, NASA, NGA, USGS, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

Alabama's Most Harmful Event – KABC RwDs

Collision Type	2017
Rollover	1,950
Trees	1,866
Curb, Ditch, Embankment	1,446
Post and Poles	787
Head-on	634
Other fixed object	582
Ran-off-road	475
Barrier	218
Crossed Centerline/Median	125

Collect and Integrate Data

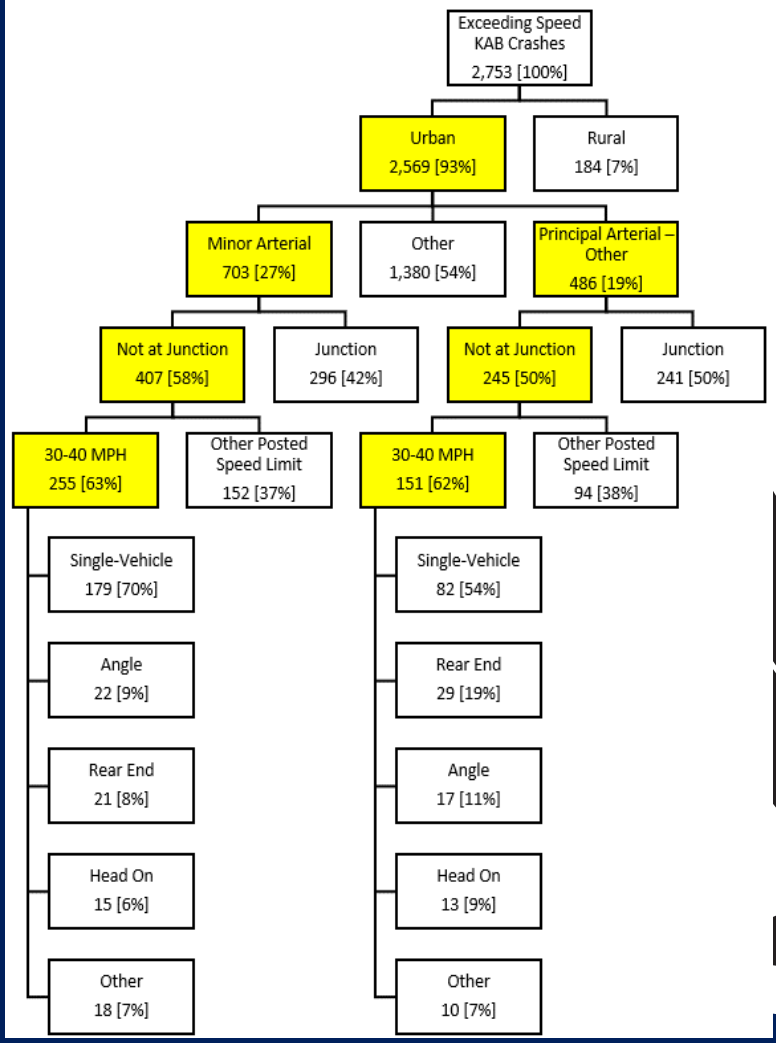
- ALDOT provided **crash**, **roadway**, and **traffic volume** data
  - Area type
  - Route Type
  - Number of lanes
  - Functional class
  - Speed limit
  - Shoulder width
  - AADT
- **Horizontal curves** estimated from ALDOT centerlines by University of Wisconsin
- **Elevation data** from U.S. Geological Survey's National Map to identify approximate roadway grades

Focus Crash Types

Characteristic Type	Characteristic	KA RwD Crashes		BC RwD Crashes	
		Number of crashes	%	Number of crashes	%
Collision Type	Barrier	215	1.67%	828	2.37%
	Curb, Ditch, Embankment	1,635	12.73%	5,188	14.84%
	Head-on	1,246	9.70%	1,929	5.52%
	Other	2,307	17.96%	10,533	30.14%
	Other fixed object	513	3.99%	1,996	5.71%
	Post and Poles	829	6.45%	3,049	8.72%
	Rollover	3,000	23.35%	5,526	15.81%
	Trees	3,102	24.15%	5,901	16.88%
Lighting Conditions	E Dark - Unknown Roadway Lighting	37	0.29%	145	0.41%
	Dusk	333	2.59%	938	2.68%
	E Dark - Spot Illumination One Side of Road	461	3.59%	1,620	4.64%
	E Dark - Spot Illumination Both Sides of Road	496	3.86%	1,814	5.19%
	Daylight	7,200	56.04%	21,089	60.34%
	E Dark - Continuous Lighting Both Sides of Road	187	1.46%	758	2.17%
	Dark - Roadway Lighted	16	0.12%	239	0.68%
	E Dark - Continuous Lighting One Side of Road	36	0.28%	207	0.59%
	Dark - Roadway Not Lighted	3,779	29.42%	7,391	21.15%
	Dawn	281	2.19%	691	1.98%
	Unknown	19	0.15%	27	0.08%
	Other	0	0.00%	4	0.01%
	Not Applicable	2	0.02%	27	0.08%

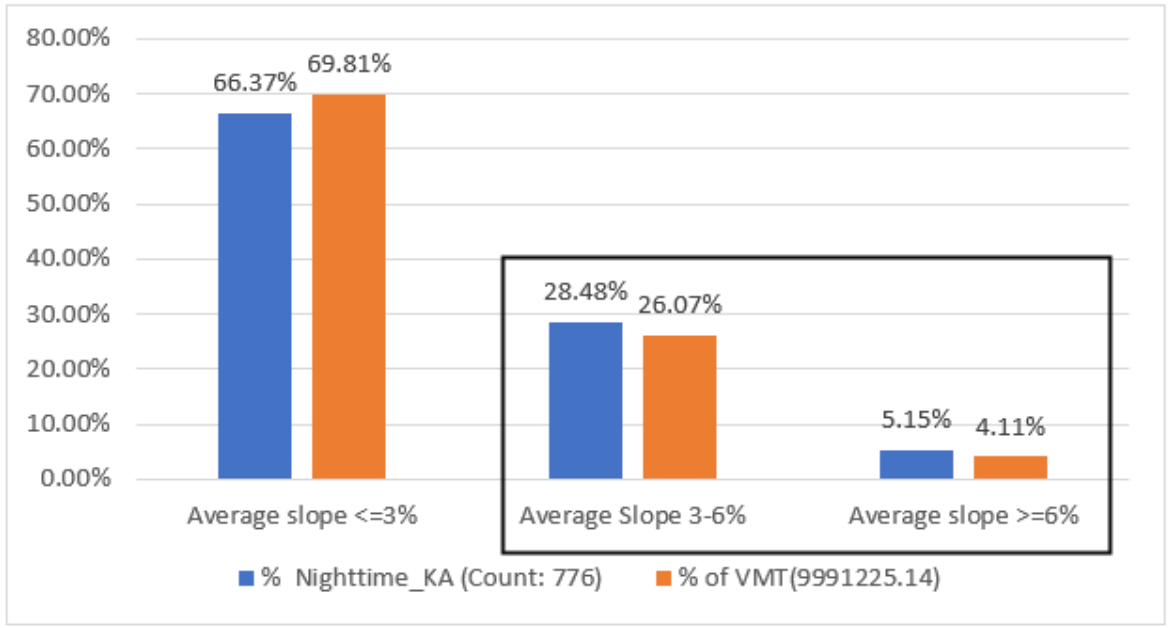
- Focus Segment Crash Types
  - **Head-on** KA crashes
  - **Tree** KA crashes
  - **Nighttime** KA crashes
  - **Rollover** KA crashes
- Focus Curve Crash Types
  - **RwD** KA crashes
  - **Tree** KA crashes
  - **Nighttime** KA crashes
  - **Rollover** KA crashes

Focus Facility Types



- State-Owned Roads
  - Rural two-lane minor arterials and major collectors
- Local Roads
  - Rural two-lane minor arterials and major collectors
  - Urban two-lane minor arterials and major collectors
- Consistently the most prevalent and over-represented for each crash type

Risk Factor Assessment



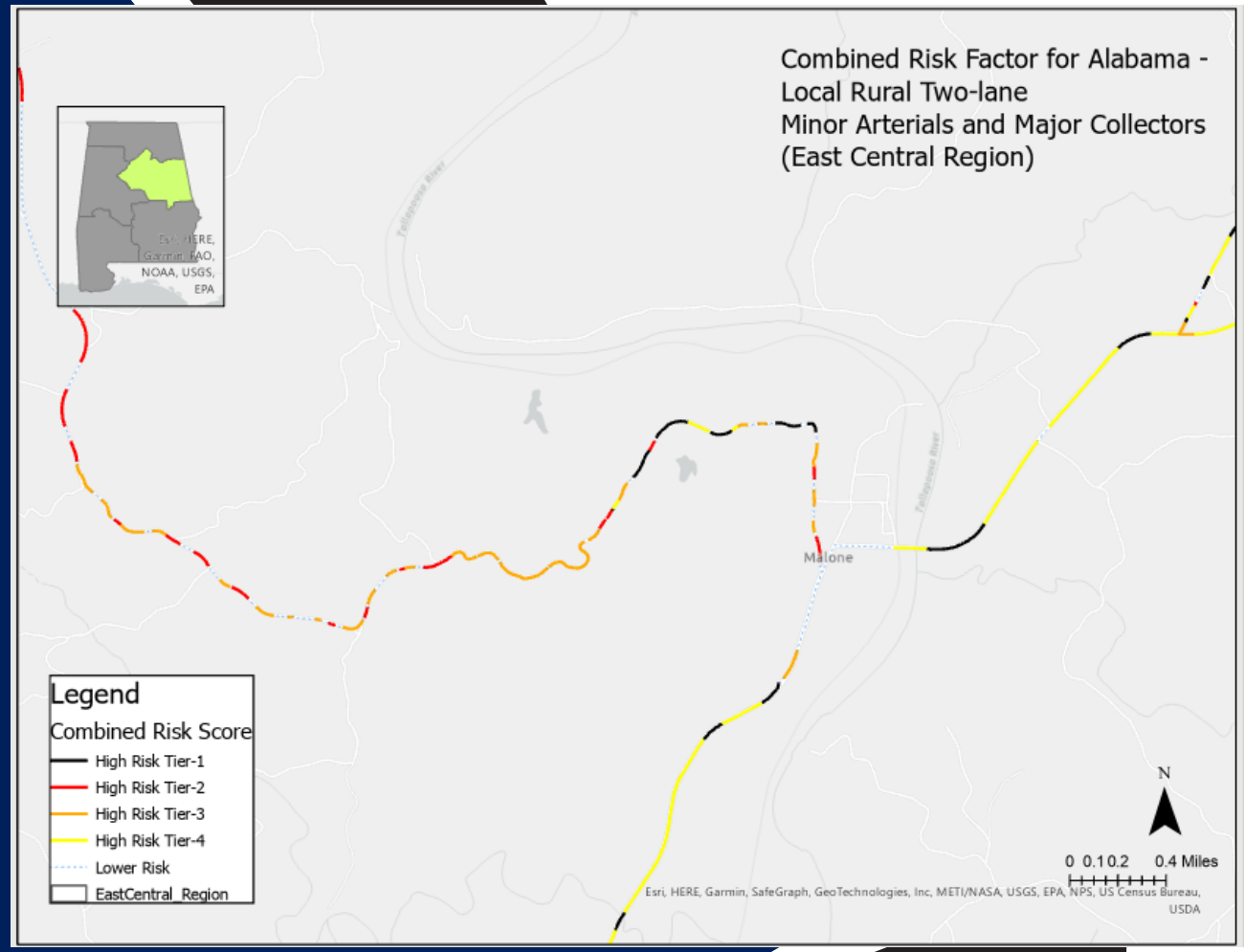
Over-representation analysis

- Proportion of crashes on facilities with attribute
- Proportion of vehicle-miles traveled (VMT) on facilities with attribute
- Identify where proportion of crashes is higher than proportion of VMT
- Weighting for risk factor assigned based on degree of over-representation

Risk Factor Results for Local Rural Two-lane Minor Arterials and Major Collectors

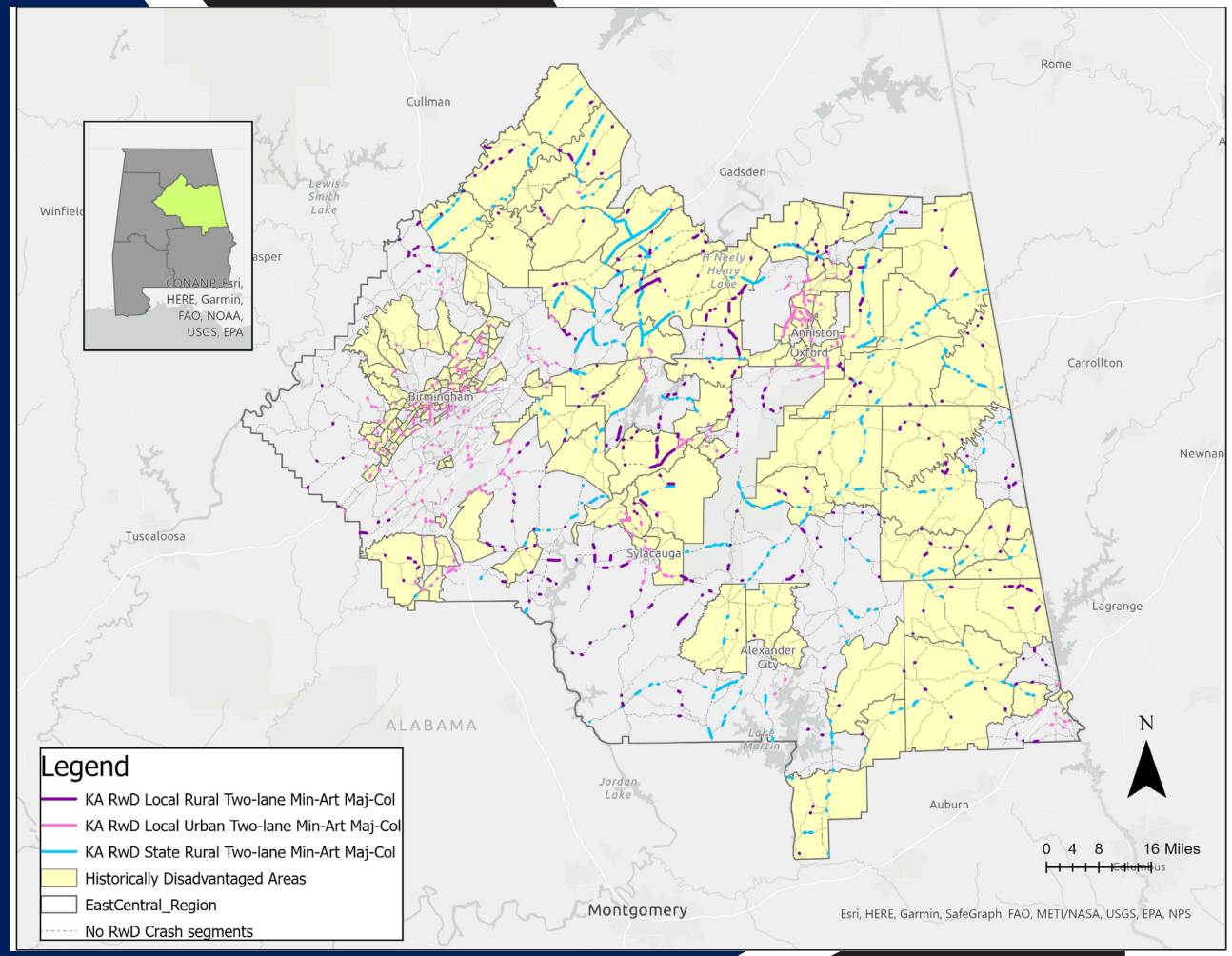
Focus Crash Type	Grade	Curve Radius	AADT
All RwD (curve)		≤ 656 ft [2] 657 ft – 1,312 ft [1]	≤ 500 [2] 501 – 1,000 [1]
Tree	> 3 percent [1]	≤ 1,312 ft [2]	≤ 500 [2] 501 – 1,000 [1]
Tree (curve)	> 3 percent [1]	≤ 656 ft [2] 657 ft – 1,312 ft [1]	≤ 500 [2] 501 – 1,000 [1]
Nighttime	> 3 percent [1]	≤ 1,312 ft [1]	≤ 500 [2] 501 – 1,000 [1]
Nighttime (curve)		≤ 656 ft [2] 657 ft – 1,312 ft [1]	≤ 500 [2] 501 – 1,000 [1]
Rollover	> 6 percent [1]	≤ 1,312 ft [1]	≤ 500 [2] 501 – 1,000 [1]
Rollover (curve)	≤ 3 percent [1]	≤ 1,312 ft [1]	≤ 500 [2] 501 – 1,000 [1]
Head-on	> 3 percent [1]	≤ 656 ft [1] 657 ft – 1,312 ft [2]	1,001 – 3,000 [1]

RwD Risk Prioritization



- Weighted risk scores combined to create prioritization
- Provided as separate GIS file containing layers for
  - Location Details
  - Risk Level
  - Risk Attributes
  - Supporting Crash Data

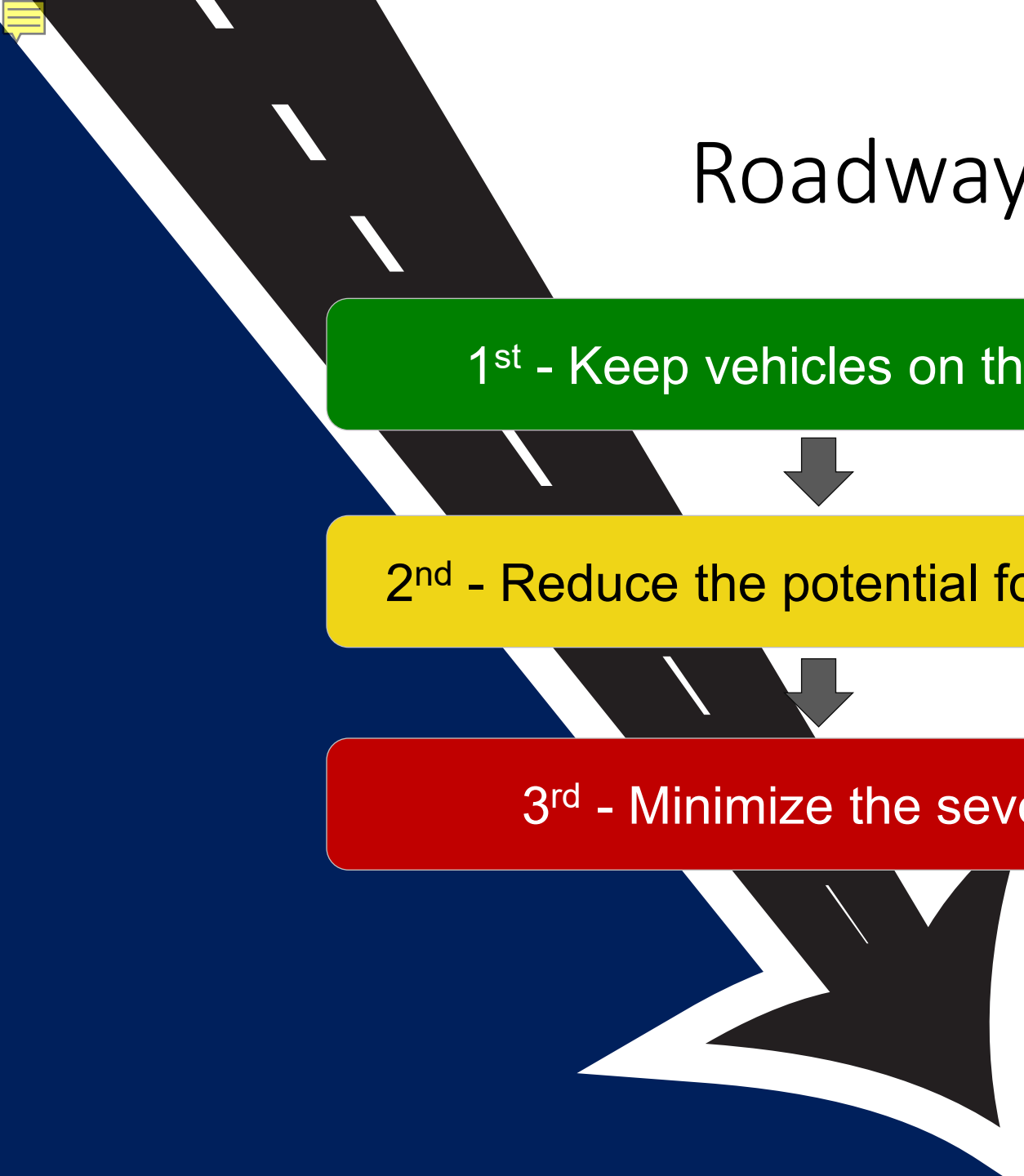
Site-Specific KA RwD Crash Locations



- Separate file provided containing locations with at least one KA RwD crash over last 5 years
- Can be used for site specific evaluation or to identify tie-breakers for priority locations

Note: Locations shown include corridors with one or more KA RwD crashes over a five-year period, not exact locations

Roadway Departure Objectives



1st - Keep vehicles on the road

- Curve Signing
- Pavement Markings
- Delineators
- Friction Treatments
- Rumbles
- Lighting

2nd - Reduce the potential for crashes

- Widen Shoulders
- Sloped Pavement Edge
- Center Line Buffer
- Clear Zone
- Traversable Slopes

3rd - Minimize the severity

- Breakaway Devices
- Barriers

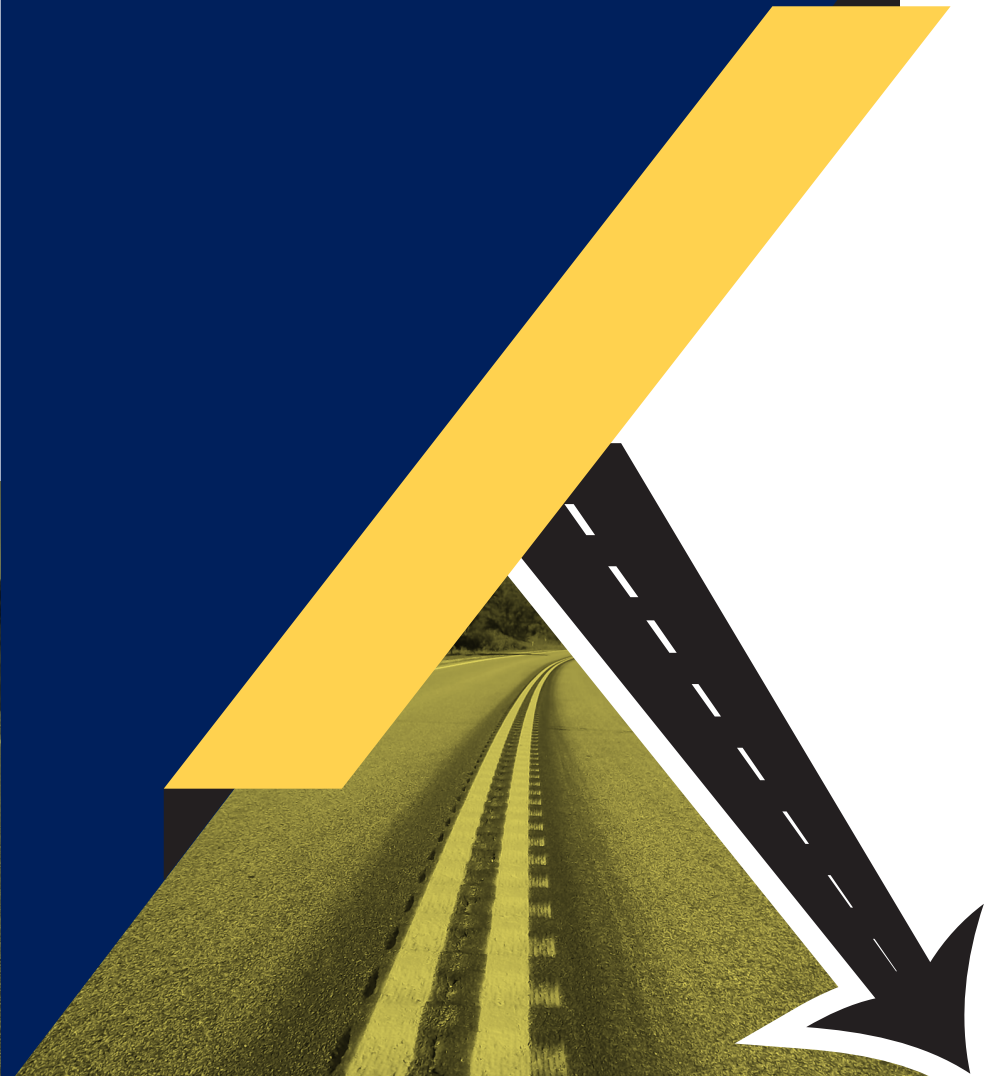
Plan Implementation

Strategy	Countermeasure	Crash Types				Locations		Curve Packages			Cost H-M-L	Contributing Factors	Risk Factors
		Head-On	Roll Over	Fixed Object	Night-time	Curves	Tangent	Level 1	Level 2	Level 3			
Keep Vehicles on the Roadway	Edge line markings (4",5")	•	✓	✓	✓	✓	✓			P	L	DD, DE, ID, LM, VO	LTV, NSW, SR
	Center line markings	✓	•	•	✓	✓	✓			P	L	AD, DD, DE, ID, LM, VO	LTV, LW
	Centerline raised pavement markers				•	•	•			P	L	AD, DD, DE, ID, LM, VO	LTV, NSW, SR
	MUTCD compliant curve warning signs	✓	✓	✓	✓	✓		P			L	AD, DD, DE, ID, LM, PF, TCD, VO	LTV, NSW, SR, HF
	Enhanced curve signs	✓	✓	✓	✓	✓			P	P	L-M	AD, DD, DE, ID, LM, PF, TCD, VO	LTV, NSW, SR, HF
	Shoulder rumble strips		✓	✓	•	✓	✓				L	AD, DD, DE, ID	LTV, NSW
	Centerline rumble strips	✓	•	•	•	✓	✓				L	AD, DD, DE, ID	LTV, LW
	HFST		•	•		•				P	M	AD, PF	HF, DR
	Lighting				•	•					M	AD, DD, DE, ID, LM, VO	SR
Reduce Potential for a Crash	Widen shoulders		✓	✓		✓	•			P	M-H	AD, DD, DE, ID, LM, PF, VO	NSW, SR, HF
	Sloped pavement edge		•	•		•	•			P	L	AD, DD, DE, ID	LTV, NSW, SR, ED
	Centerline buffer area	•			•	•	•				L	AD, DD, DE, ID, LM	HTV, NSW
	Remove fixed objects/widen clear zone		•	✓		•				P	L-H	AD, DD, DE, ID	NSW, SR, RS, FO
	Flatten slopes		✓	•		✓	✓			P	M-H	AD, DD, DE, ID, PF	NSW, SR, RS
Minimize Severity	Barriers	•	•	•		•	•			P	M-H	AD, DD, DE, ID, PF	NSW, SR, LW, RS, FO
	Breakaway supports			•		•	•		P		M	AD, DD, DE, ID	NSW, SR, FO

- Consists of engineering, education, and enforcement actions
- Details toolbox of countermeasures, including when to use, how to enhance, and potential effectiveness
- Emphasizes reviewing priority locations with road safety assessments (RSAs)
- Includes decision framework for selecting appropriate countermeasures

Plan Implementation

- Plan provides an estimate of countermeasure installations and potential benefits
- Largest benefits may be derived from the following:
  - Local Rural Two-Lane Minor Arterials and Major Collectors:
    - Installing wider edge line markings
    - Installing raised pavement markers
    - Installing center line rumble strips
    - Installing shoulder/edge line rumble strips
    - Installing sloped pavement edge
  - Local Urban Two-Lane Minor Arterials and Major Collectors
    - Installing wider edge line markings
    - Installing raised pavement markers
    - Installing sloped pavement edge
  - State Owned Rural Two-Lane Minor Arterials and Major Collectors
    - Installing center line rumble strips
    - Installing sloped pavement edge



Future Efforts

- FHWA will share final plan with ALDOT
- ALDOT will use priority locations to identify
  - Locations for potential RSA follow-up
  - Additional needs for projects already ongoing at these locations
- ALDOT will share data on local roads with local agencies

Questions

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