CHARLES ROAD
CORRIDOR SAFETY IMPROVEMENTS

Road Safety Assessment

Kimley»Horn

May 9, 2022

Agenda

- Introductions
- RSA Schedule
- Overall Project Purpose and Schedule
- RSA Overview and Crash Data
- Human Factors
- Countermeasures for Consideration
- Next Steps

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Introductions

RSA Schedule

May 9, 2022

- 3:00 PM – 4:00 PM: Briefing Meeting
- 4:30 PM – 6:00 PM: Afternoon Field Review
- 6:00 PM – 7:30 PM: Debrief with Dinner
- 7:30 PM – 9:00 PM: Evening Field Review (followed by quick night review debrief)

May 10, 2022

- 7:30 AM – 8:30 AM: Morning Field Review
- 8:30 AM – 10:00 AM: Breakfast and Close-Out

IDOT 2017 Local Jurisdiction Safety Tier Analysis

Analysis period: 2011-2015

Overall Project Schedule

Preliminary Engineering	Design Engineering	Construction
2022 - 2024	2025 - 2026*	2027*

** Contingent on project readiness and availability of funds*

RSA Overview and Crash Data

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What is a Road Safety Assessment (RSA)?

RSAs are formal evaluations of roadways performed by an independent, multidisciplinary assessment team. The team looks for **potential safety hazards** that may affect any type of road user and **suggests measures to mitigate those safety issues**. The team:

- Evaluates all roadside features, design elements, and local conditions
- Reviews firsthand interaction of various design elements
- Explores operational trends
- Observes how road users are interacting with the roadway
- Determines if the needs of all road users have been safely met

What to look for when conducting an RSA?

- Road function, classification, environment
- Road alignment and cross section
- Auxiliary lanes
- Intersections
- Signs and lighting
- Marking and delineation
- Barriers and clear zones
- Traffic signals
- Older drivers
- Bridges and culverts
- Pavement
- Parking
- Provisions for heavy vehicles
- Floodways and causeways
- Other safety issues
- Pedestrians
- Bicyclists

USE PROVIDED PROMPT LIST

Source: FHWA Road Safety Audit Guidelines

Study Corridor

Charles Road from IL 47 to IL 120 (Greenwood Road)

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Road Safety Assessment

Average Daily Traffic (ADT)

Source: Illinois Department of Transportation (IDOT) Annual Traffic Counts, 2019 - 2021

Overview of Crashes

- **5 years** of data from **January 1, 2016** to **December 31, 2020**
- **101** total crashes

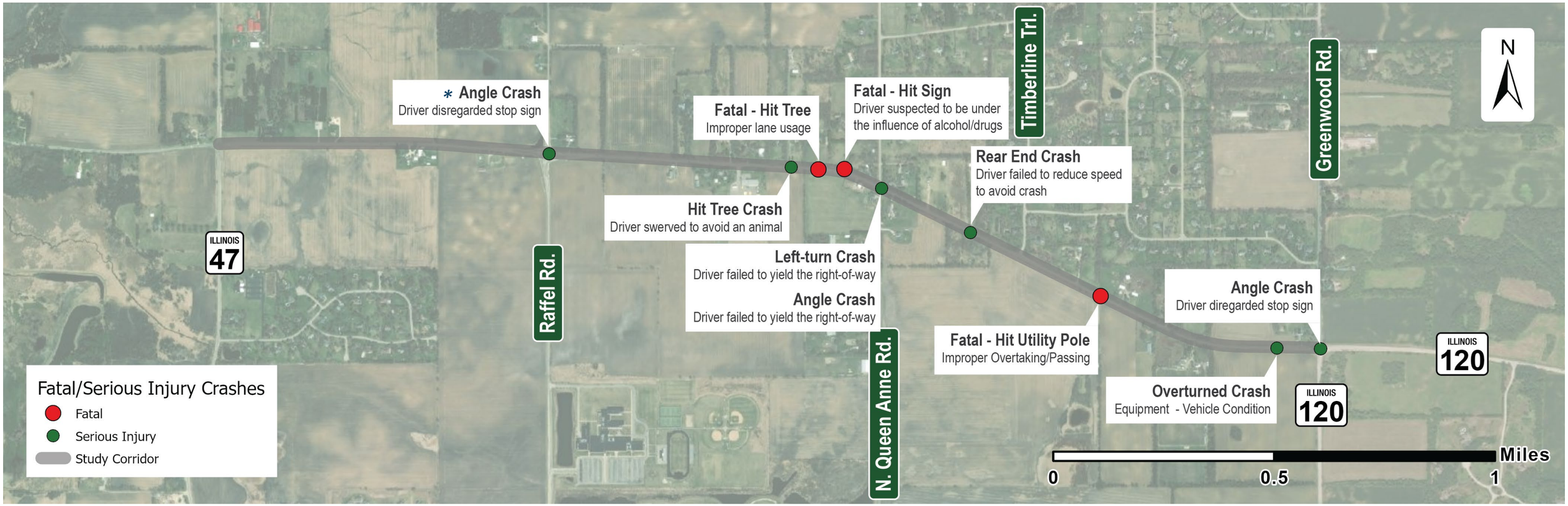
3	7	9	10	72
Fatal Crashes	Serious Injury Crashes	Evident Injury Crashes	Possible Injury Crashes	Property Damage Only Crashes

- Additional crash data visualizations can be viewed on the project website at **www.charlesroadcorridor.com**

Corridor Crashes: All Crashes

Data years: 2016-2020

Fatal and Serious Injury Crashes



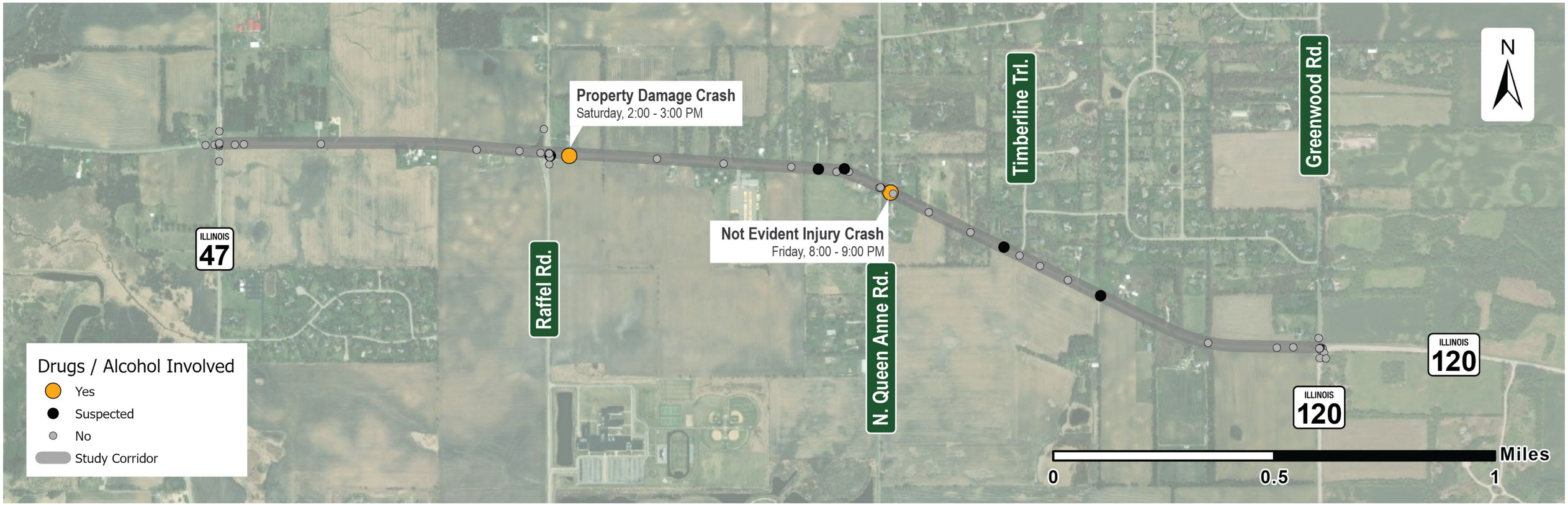
Data years: 2016-2020

** Occurred before construction of Roundabout*

Single-Vehicle Crashes

Data years: 2016-2020

Drug/Alcohol-Related Crashes



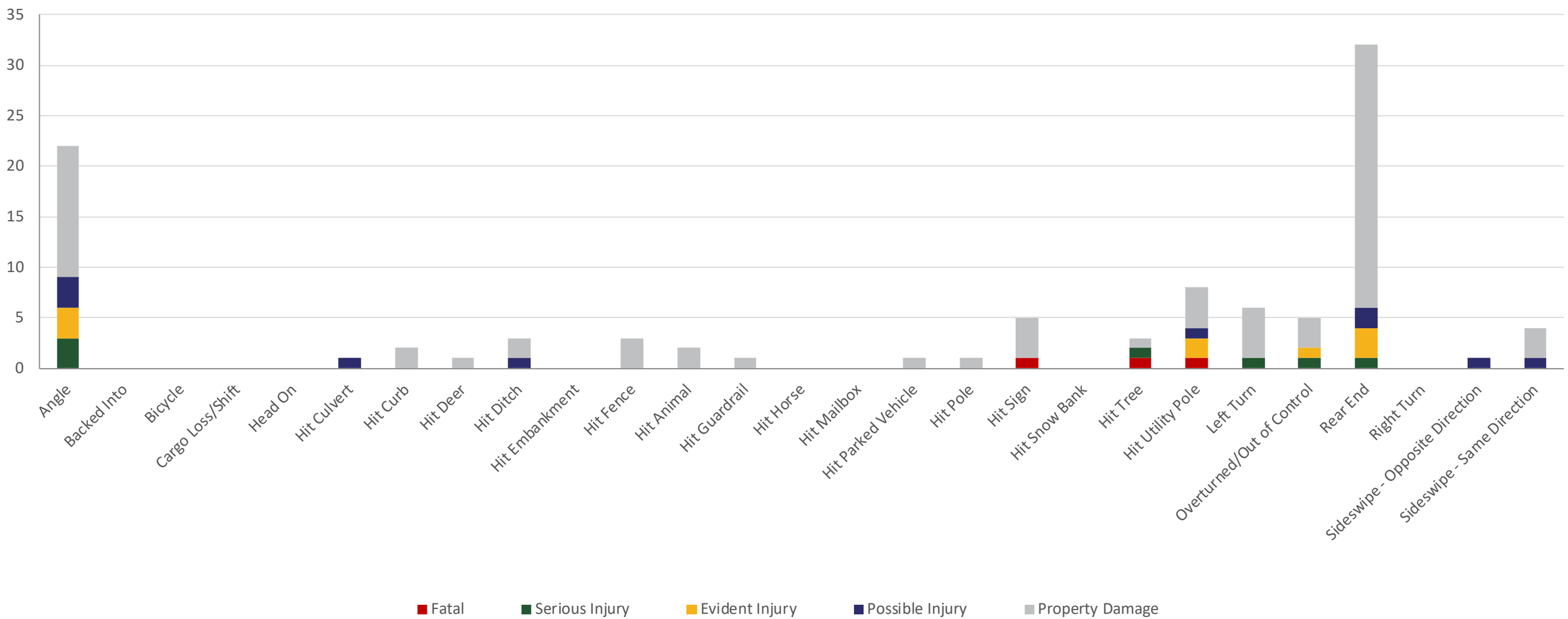
Data years: 2016-2020

Crash Rate (2015 - 2020)

Charles Road exhibits an overall crash rate lower than statewide averages, although the combined rate of fatal and serious injury crashes is higher than statewide averages for two segments along the corridor.

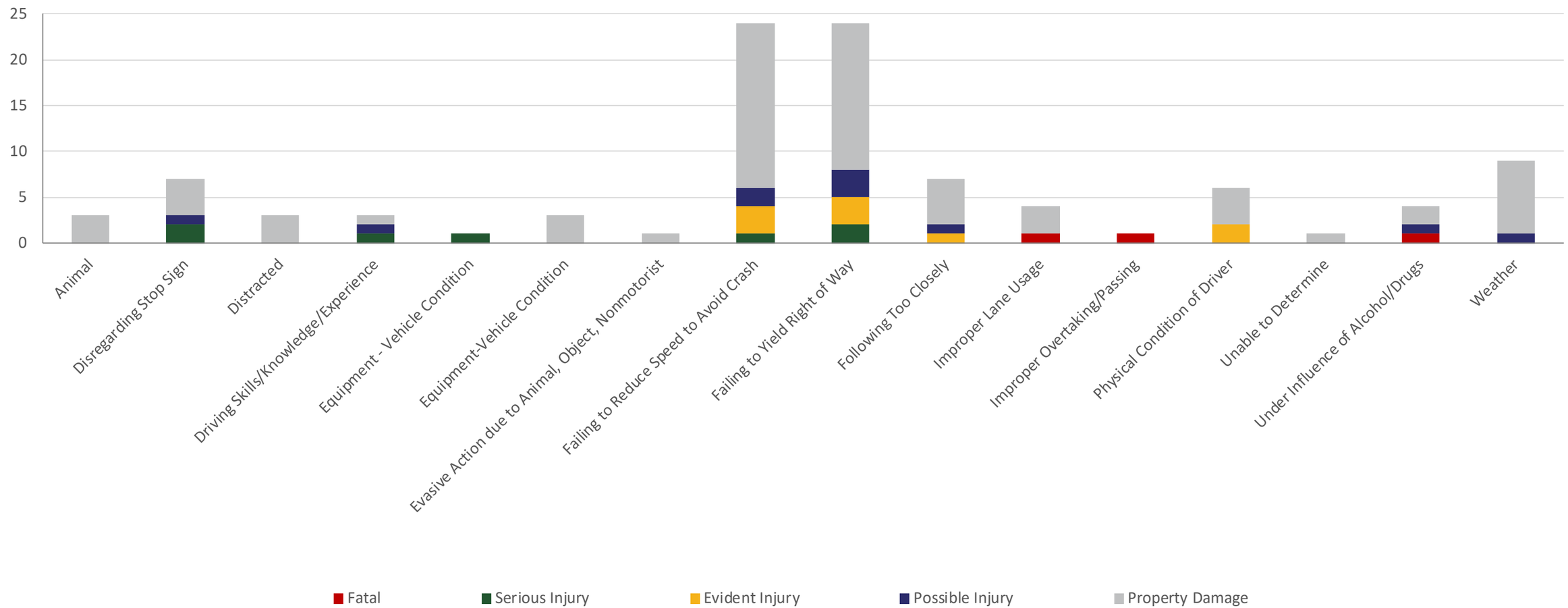
Segment	Distance (miles)	2021 Annual Vehicle Miles (AVM)	5-Year Total Crashes	Total Crash Rate	5-Year Fatal Crashes	Fatal Crash Rate	5-Year Serious Injury Crashes	Serious Injury Crash Rate	5-Year Fatal and Serious Injury	Fatal and Serious Injury Crash Rate
A 28 (Charles Road) between IL Route 47 and Raffel Road	0.720	1,642,500	3	36.53	0	0	0	0	0	0
A 28 (Charles Road) between Raffel Road and N Queen Anne Road	0.739	1,712,817	7	81.74	1	11.68	0	0	1	11.68
A 28 (Charles Road) between N Queen Anne Road and Timberline Trail	0.341	790,353	4	101.22	1	25.31	0	0	1	25.31
A 28 (Charles Road) between Timberline Trail and IL Route 120/Greenwood Road	0.720	1,668,780	5	59.92	0	0	0	0	0	0
Total	***2.520***	***5,814,056***	***19***	***65.36***	***2***	***6.88***	***0***	***0***	***2***	***6.88***
Statewide		104,599,958,619	1,515,038	**289.68**	4975	**0.95**	42,320	**8.09**	47,295	**9.04**

Crash Severity by Type



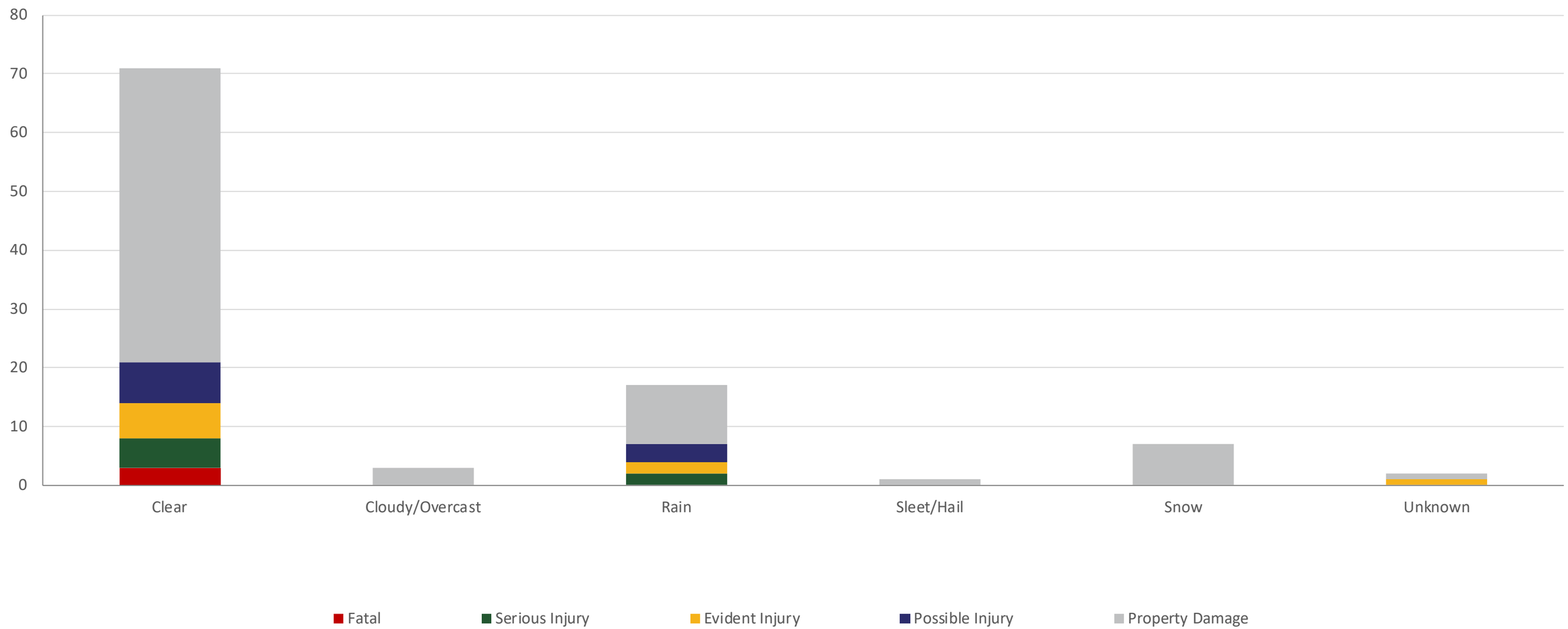
Data years: 2016-2020

Crash Severity by Cause



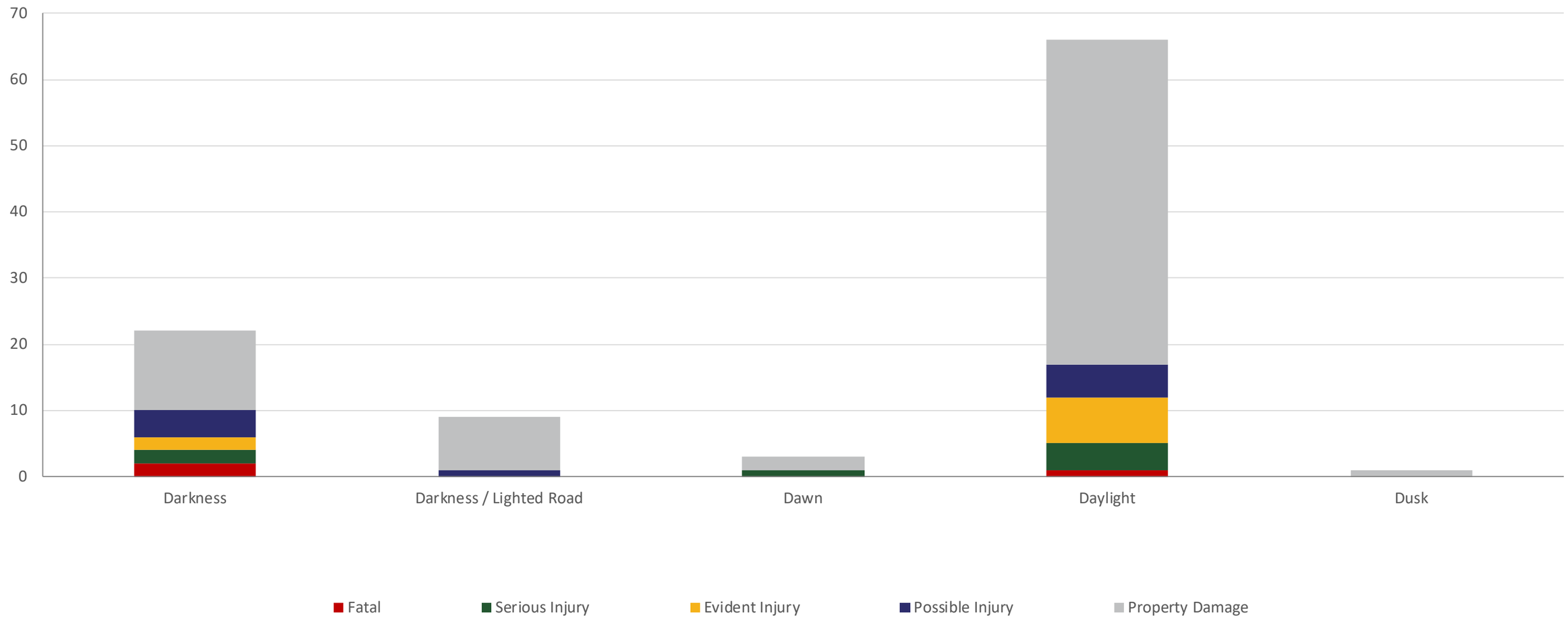
Data years: 2016-2020

Crash Severity by Weather Conditions



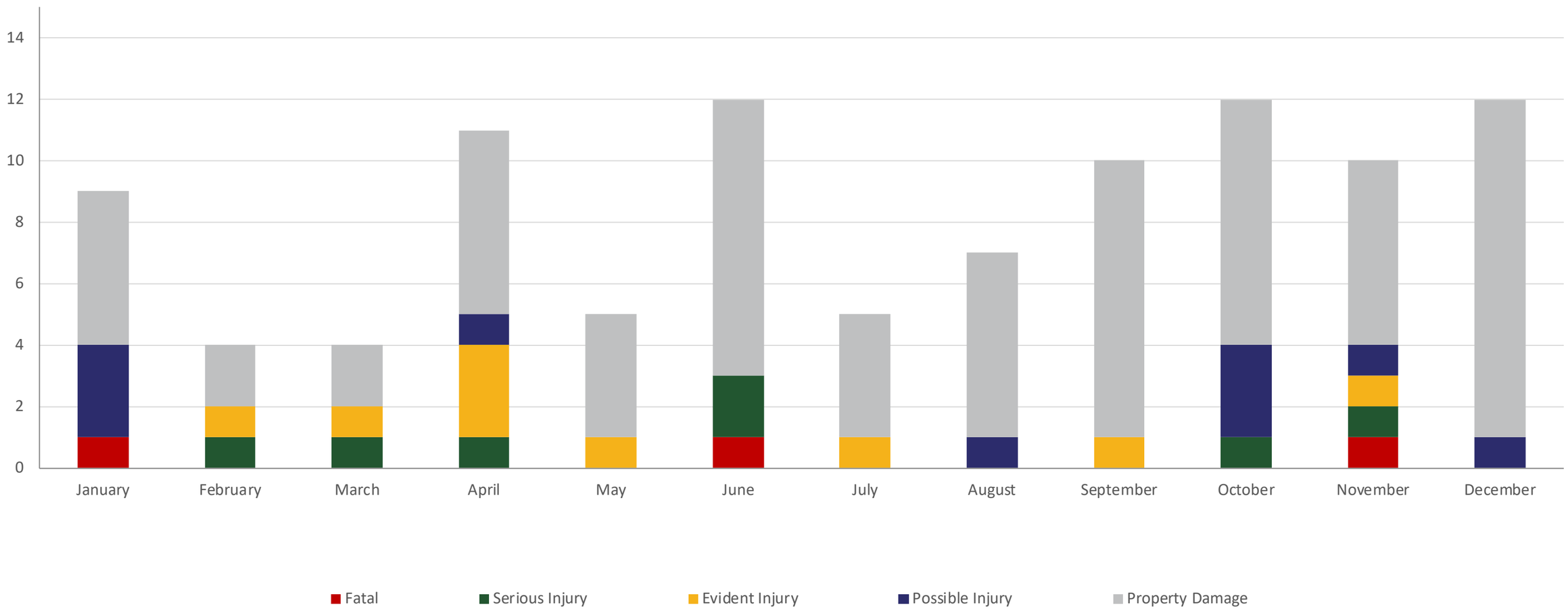
Data years: 2016-2020

Crash Severity by Lighting Conditions



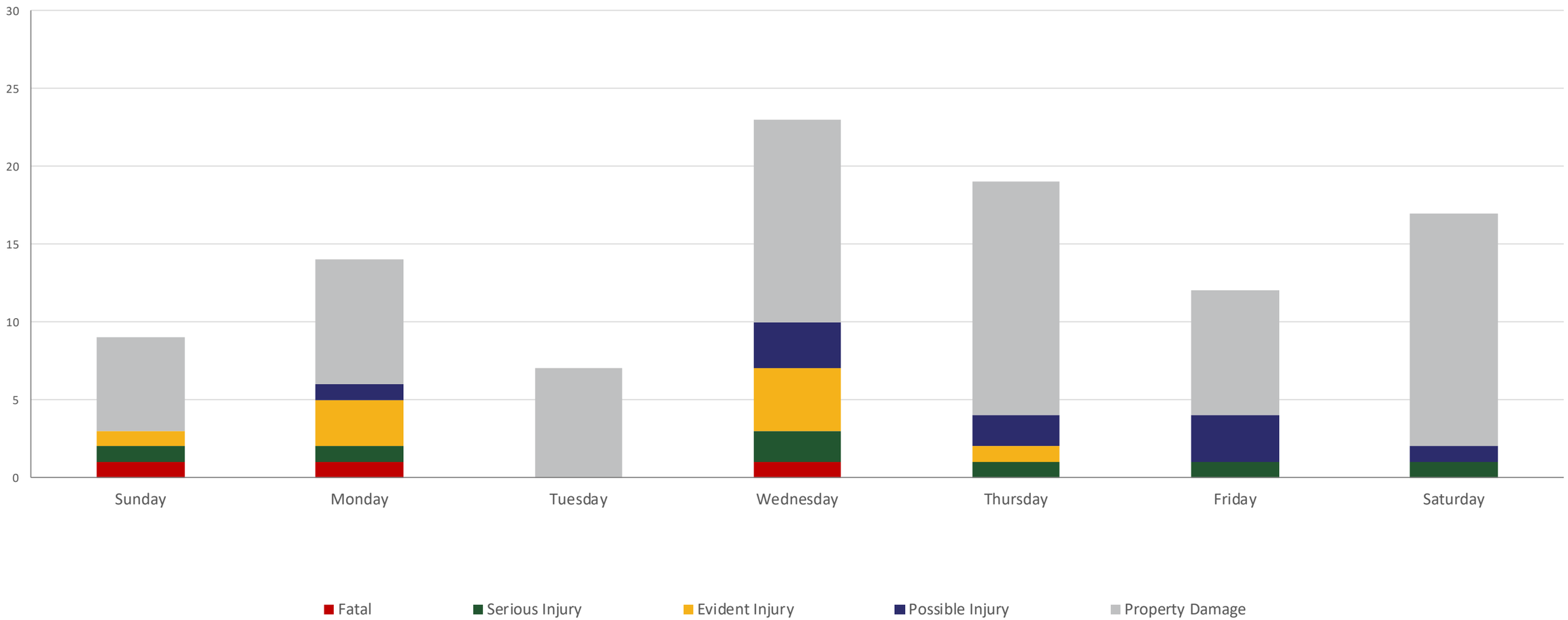
Data years: 2016-2020

Month of Year



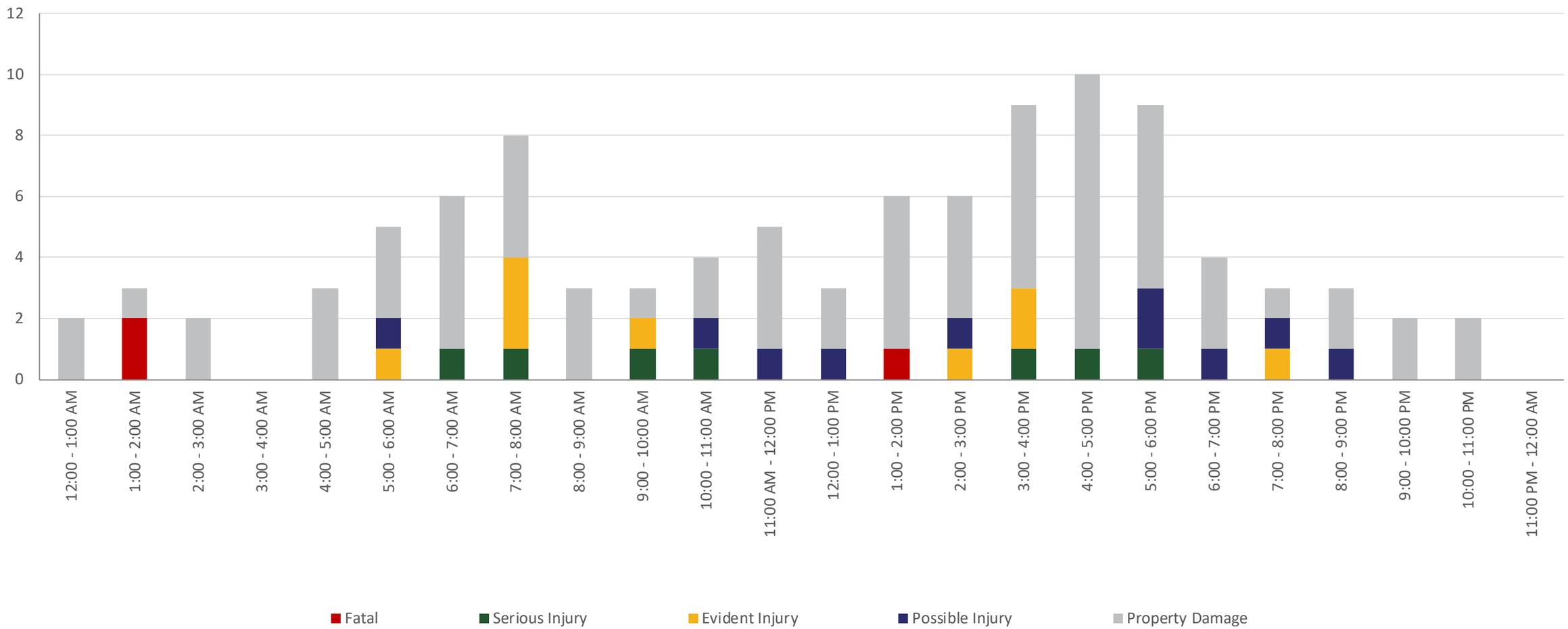
Data years: 2016-2020

Day of Week



Data years: 2016-2020

Time of Day



Data years: 2016-2020

Summary of Corridor Crash Data and Trends

- 101 corridor crashes
- 3 fatalities (**3%** of all crashes)
  - 1 hit utility pole, driver was attempting to passing another vehicle
  - 1 hit tree, driver did not continue lane path after navigating curve
  - 1 hit sign, driver was suspected to be under the influence of drugs/alcohol
- 10 serious injuries across 7 crash events (**7%** of all crashes)
  - 5 were angle or left-turn collisions
  - 2 were part of the fatal crash where the driver was suspected to be under the influence of drugs/alcohol
- 71 crashes along the corridor were intersection-related (**71**%)
  - 29 of those crashes were rear end collisions (32% of total)
  - 22 of those crashes were angle collisions (22% to total)
- 35 crashes involved only one vehicle (**35%** of total)
- 9 weather-related (**9%** of total)
- 2 crashes involved impairment and impairment was suspected for 5 additional crashes (**7%** of total)
- 3 crashes animal-related (**3%** of total)

Summary of Intersection-Related Crashes

Raffel Road (15 crashes*)

- Severity: 1 A, 1 B, 2 C, 11 O
- 4 hit sign/pole
- 4 rear-ends
- 3 angle, 2 hit curb/ditch
- 2 sideswipe same direction

*Includes crashes before and after roundabout construction

Timberline Trail (1 crash)

- Severity: 1 B
- 1 rear-end

N Queen Anne Road (12 crashes)

- Severity: 2 A, 4 B, 1 C, 5 O
- 6 angle
- 3 rear-ends
- 1 left-turn
- 1 overturned
- 1 hit utility pole

Summary of Intersection-Related Crashes

IL 120/Greenwood (31 crashes)

- Severity: 1 A, 1 B, 3 C, 26 O
- 15 rear-end
- 8 angle, 5 left-turn
- 3 hit fence, sign, guardrail, or pole

IL 47 (12 crashes)

- Severity: 1 B, 11 O
- 6 rear-ends
- 5 angle
- 1 sideswipe same direction

Raffel Road Roundabout

Before RAB		*After* RAB
January 1, 2013 to May 31, 2017	→	*September 1, 2017 to December 31, 2020*
13 injuries		**1** injury

- Decrease in crash severity
- **Intersection closed**: May 31, 2017 to September 1, 2017

Before Roundabout at Raffel Road

- **3.5 years** of data from **January 1, 2013** to **May 31, 2017**
- **14** total crashes resulting in 13 injuries (2 A, 8 B, and 3 C)

0	2	6	2	4
Fatal Crashes	Serious Injury Crashes	Evident Injury Crashes	Possible Injury Crashes	Property Damage Only Crashes

- 4 turning, 3 angle, 3 rear end
- 2 sideswipe same or opposite direction, 1 overturned, 1 fixed object

After Roundabout at Raffel Road

- **3.5 years** of data from **September 1, 2017** to **December 31, 2020**
- **15** total crashes resulting in 1 C injury

0	0	0	1	14
Fatal Crashes	Serious Injury Crashes	Evident Injury Crashes	Possible Injury Crashes	Property Damage Only Crashes

- 8 fixed object, 4 rear end
- 1 angle, 1 sideswipe same direction, 1 turning

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Human Factors

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Incorporating Human Factors

- Safe roads are those that are **self-explaining** - users know **how to behave solely because of the design and control of the road**

- 2nd Edition of the full Human Factors Guidelines (HFG) for Road Systems NCHRP Report 600:
  http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_600Second.pdf
  - Complements existing design resources
  - Focuses on road user needs, capabilities, and limitations

Incorporating Human Factors

- Recognize the challenges road users face
- Human factors especially important at critical decision points
- Applicable guidelines
  - Sight distance guidelines
  - Curves and grades
  - Tangent sections and roadside
  - Non-signalized intersections
  - Special considerations for rural environments
  - Signing, markings and lighting

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Countermeasures for Consideration

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Crash Reduction Factors (CRF)

- Percentage crash reduction expected after implementing a countermeasure

FHWA Proven Safety Countermeasures

Potentially relevant countermeasures

- Systemic application of low-cost countermeasures at stop-controlled intersections
- Dedicated left and right turn lanes
- Wider edge lines
- Enhanced delineation and friction for horizontal curves
- Longitudinal rumble strips/stripes
- Safety edge
- Roadside design improvement at curves
- Additional: https://safety.fhwa.dot.gov/provencountermeasures/

FHWA Guidance

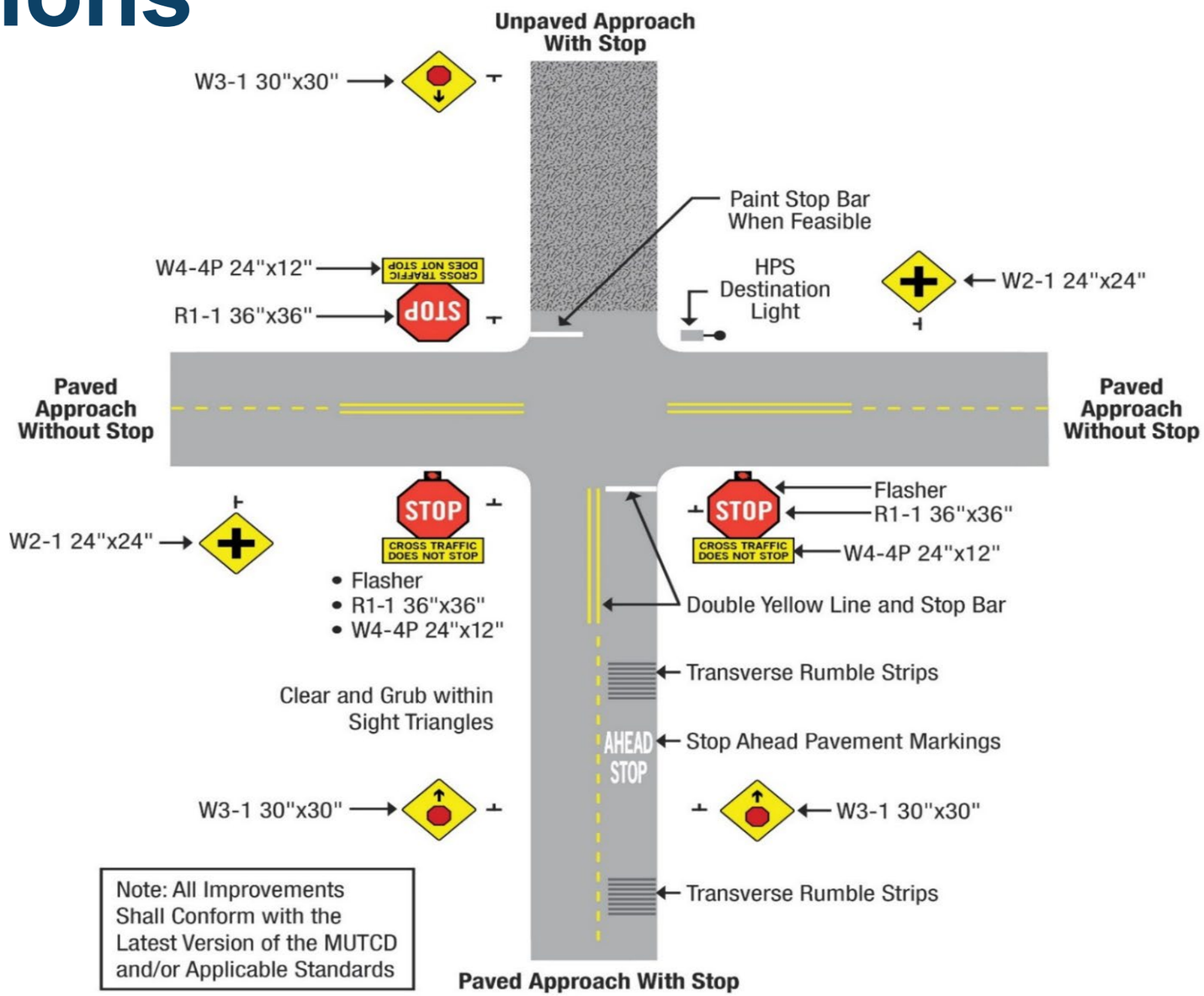
Toolbox of Countermeasures and Their Potential Effectiveness for Intersection Crashes

- Turns and other geometric countermeasures
- Signing and marking countermeasures
- Regulatory, lighting and operational countermeasures

Intersection Crashes

- **82 crashes**
- Potential countermeasures
  - Provide left and/or right turn lanes
  - Modify turning maneuvers
  - Enhanced pavement markings that delineate through lane edge lines
  - Doubled up (left and right), oversized advance “Stop Ahead” intersection warning signs with street name sign plaques
  - Doubled up (left and right), oversized Stop signs
  - Retroreflective sheeting on sign posts.
  - Stop bar placed at optimal location
  - Removal of any vegetation or physical obstruction that limits sight distance.
  - Double arrow warning sign at stem of T-intersections

Countermeasures at Stop-Controlled Intersections



Roadway Departure Crashes

- **33 crashes**
- Potential countermeasures
  - Widen shoulders
  - Slope flattening
  - Edge rut repair
  - Guideposts
  - Wider edgeline (4” to 6”)
  - Edgeline rumble strips
  - Relocate fixed objects

Roadway Departure Crashes

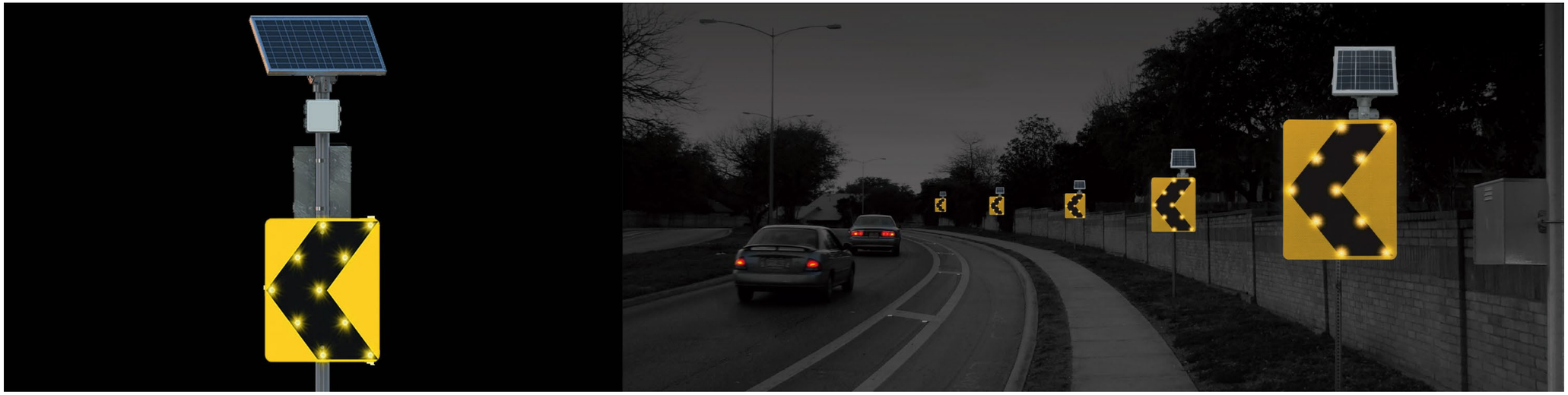
Crash Type	Count
Hit Culvert	1
Hit Curb	2
Hit Ditch	3
Hit Fence	3
Hit Guardrail	1
Hit Parked Motor Vehicle	1
Hit Pole	1
Hit Sign	5
Hit Tree	3
Hit Utility Pole	8
Out of Control	1
Overturned	4

Speed-Related Crashes

- Failing to reduce speed to avoid crash: **24 crashes**
- Potential countermeasures
  - Speed feedback signs (Permanent or mobile)
  - Enforcement

Curve Crashes

- **Approximately 8 crashes**
- Potential countermeasures
  - Reduce spacing between chevrons
  - Blinker chevron warning system
  - Speed feedback signs



Crossed Centerline Crashes

- **Approximately 7 crashes**
- Potential countermeasures
  - Centerline rumble strips

Animal-Related Crashes

- **3 crashes**
- Potential countermeasures
  - Clear and grubbing
  - Population control
  - Fencing
  - Improve visibility through lighting
  - Dynamic animal detection system
  - Wildlife crossings

Other Countermeasures

- Retroreflectivity on guardrail
- Advanced street name signs

Next Steps

- Conduct field review
- Review all recommendations
- Assign priority (near-term, mid-term, long-term)
- Prepare draft RSA report
- Solicit comments on draft RSA report
- Finalize RSA report
- Incorporate findings into larger study

Thank you!

We appreciate you participating in this road safety assessment.