

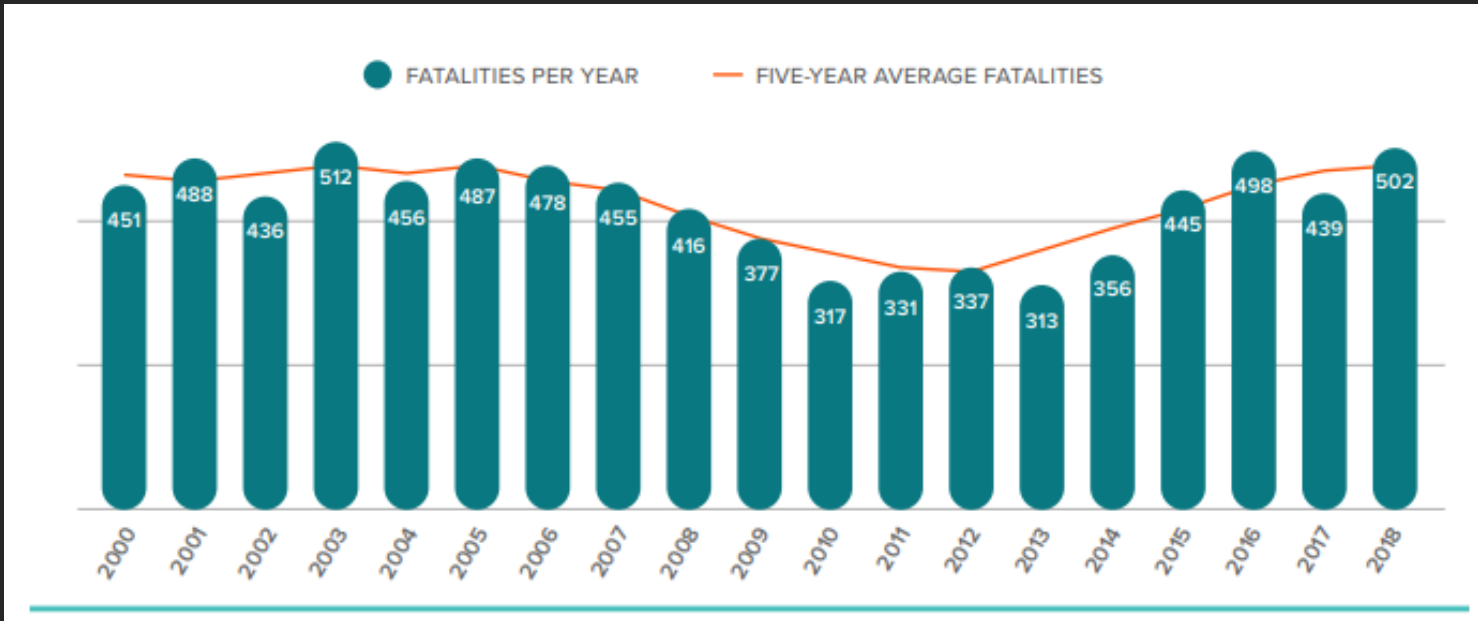
Safely Navigating Roadways in Dark & Rainy Conditions

A mission toward Zero

Our goal is to help
drive roadway deaths
to zero using a suite of
products that address
safety concerns on
every facet of the
road



Oregon stats

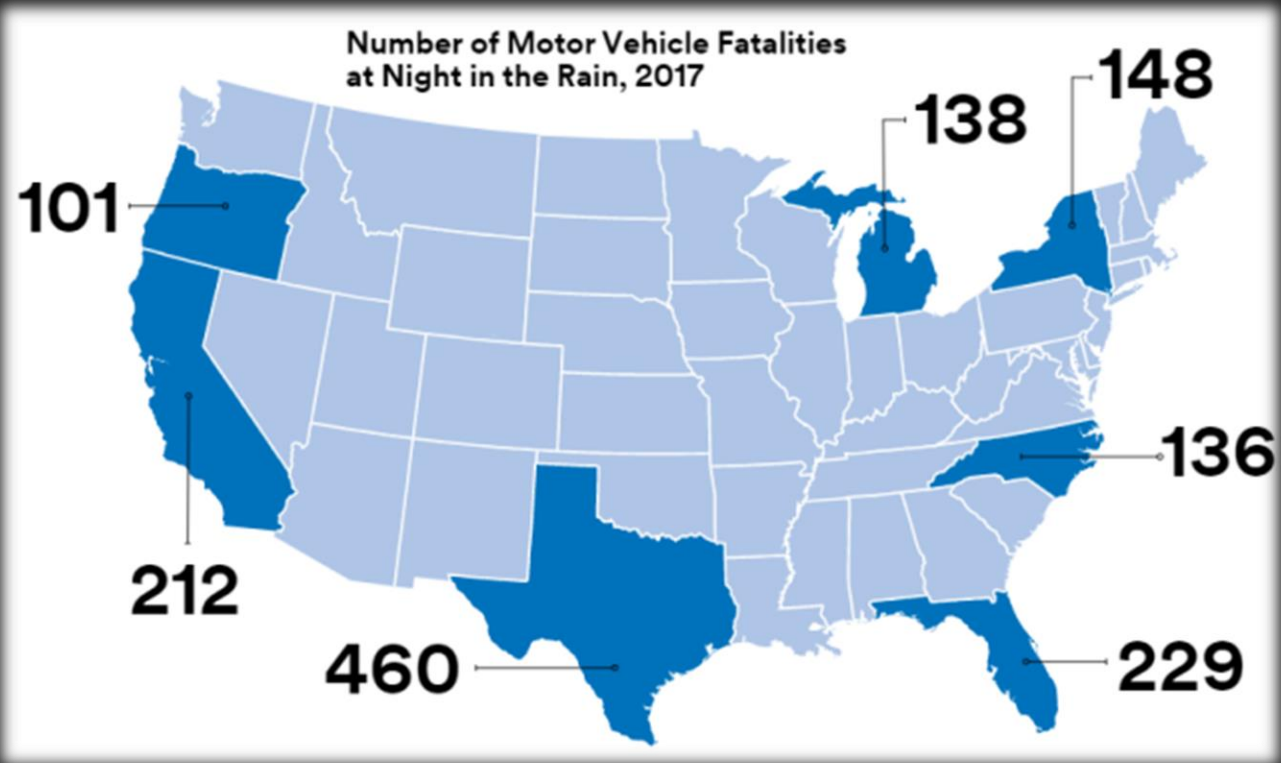


Oregon Transportation Safety Action Plan
[2021 Oregon TSAP.pdf](#)

- 2021 fatalities – 543
- **2022 fatalities – 512 as of Nov 28**

Driving at night in the rain
is a problem

Oregon stats cont.



Statistics tell the story.

There's a lot on the line—know the numbers.

In 2017, 6,952 people died in crashes on U.S. roads when it was raining. Despite the fact that only 25% of travel occurs at night, a staggering 55% (or 3,811) of those deaths occurred at night or in low-light conditions.⁶

US DOT National Highway Traffic Safety Administration, Fatality Analysis Reporting System (FARS), 2017 - <https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars>

Oregon stats cont.

2020 crash totals

- 25% in dark conditions (9,763/38,141)
- 22% in wet conditions (8,736/38,141)

2020 fatality totals

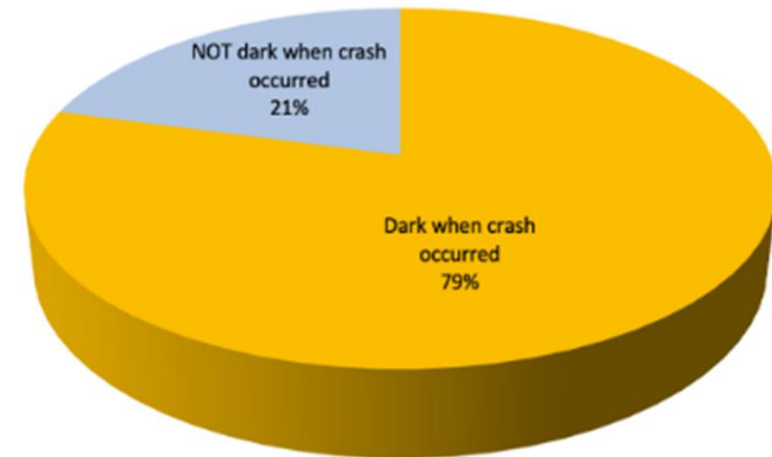
- Total fatal crashes: 460
- approx 43% in dark or wet conditions: (200/460)



**2020
STATE HIGHWAY
CRASH RATE
TABLES**

ODOT, Crash Statistics & Reports, 2020
<https://www.oregon.gov/odot/data/pages/crash.aspx>

Fatal Pedestrian Crashes, Portland 2017-2019 Darkness



79% of fatal pedestrian crashes occurred when it was dark.

Oregon Walks, Fatal Pedestrian Crash Report, 2019
<https://oregonwalks.org/fatal-pedestrian-crash-report/>

What happens when traffic devices stop performing?



Increased
Discomfort³



Less Effective
Lane Guidance⁴



Increased
Crash Risk⁵

3) Konstandinos Diamandouros, and Michael Gatscha. "Rainvision: The impact of road markings on driver behavior – wet night visibility". 6th Transport Research Arena, April 18-21, 2016. European Road Federation

4) Pike, A., Clear, S., Hedblom, T., and Whitney, J. "How Might Wet Retroreflective Pavement Markings Enable More Robust Machine Vision?" Transportation Research Record 1-6, 2019

5) Omranian, S., Sharif, H., Dessouky, S., Weissmann, J., "Exploring rainfall impacts on the crash risk on Texas roadways: A crash-based matched-pairs analysis approach." Accident Analysis and Prevention, vol. 117, 2018, pp. 10-20

Other increasing risk factors

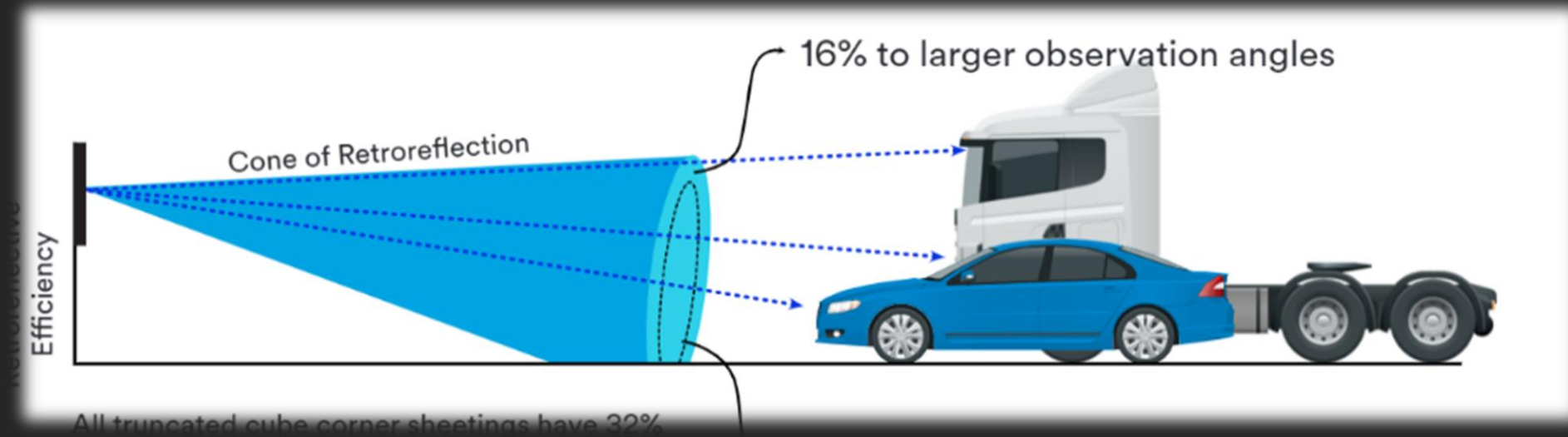
- Distracted driving
- Visual Clutter
- Age of driver
- Size of vehicle
- Vehicle lighting conditions/angles

Based on these factors, the performance of a sign changes drastically



Outsmart the dark

What can signs do?



Sign sheeting levels in action

Type I



Type IV



Type XI



Key advantages of brighter signs

- More light for disadvantaged drivers
- Faster readability at greater distances
- Improved driver reaction time



Visibility matters.

Studies have found that where more-visible signs are installed, **crash numbers have fallen**

25% to 46%

in three to six years.

Ripley, D.A, Howard R. Green Company, ITE
AB04H313, Quantifying the Safety Benefits of Traffic
Control Devices—Benefit-Cost Analysis of Traffic
Sign Upgrades, 2005 Mid-Continent Transportation
Research Symposium Proceedings.

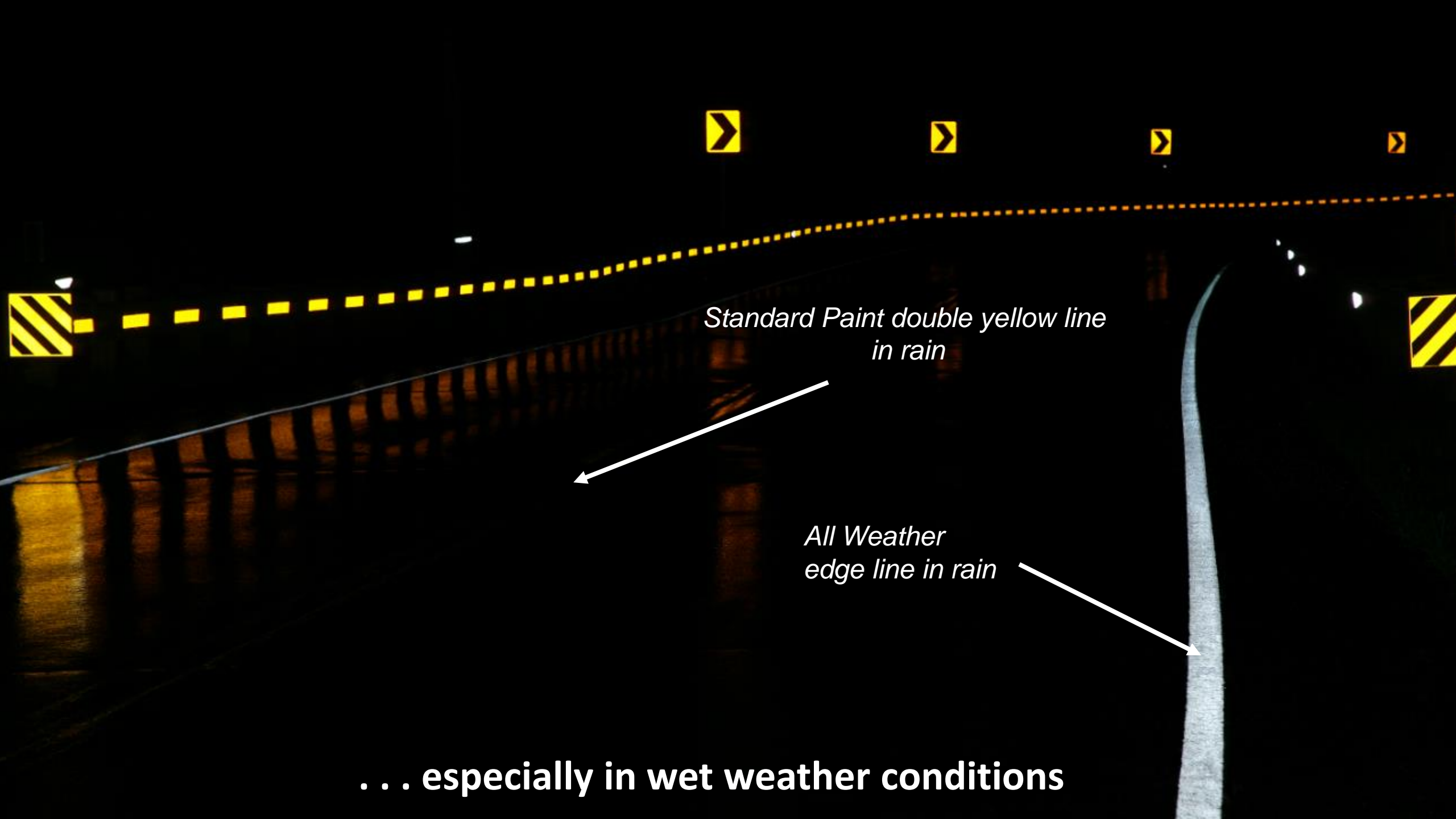
What happens when you
add rain?



What you see during daytime on the road,



... is not always what you see at night



*Standard Paint double yellow line
in rain*



*All Weather
edge line in rain*



... especially in wet weather conditions

Relevant studies

Evaluation of Wet Reflective Pavement Markings: FHWA-
HRT-15-083

Reduction in
Run-off-road crashes on
multi-lane roads

46%

Reduction in
crashes with injury on multi-
lane roads

41%

Reduction in
crashes with injury on
freeways

12%

Safety Effects of Wet-Weather Pavement Markings: TRB
19-04199

Reduction in
Wet – Night Crashes

32%

Reduction in
Wet – Night Fatalities

49%



Daytime Dry

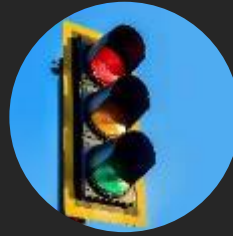


Night-time Dry



Night-time Rainy

Urban Safety Solutions



- Parking and wayfinding
- Bike lane and scooters
- Traffic light backplates
- Anti-graffiti



- Delineators between bicycle/scooter lanes and vehicle lanes
- Sheeting for traffic cones and barrels
- Bollard sheeting



- Symbols and legends
- Intersection markings
- Raised pavement markers
- Bike lanes
- Parking for multi-modal transportation



- Bicycles
- Scooters
- School buses
- Delivery vehicles and other small trucks
- Public works vehicles

Crosswalk visibility enhancements such as markings and warning signage can reduce crashes by 23-48%

Source: [FHWA Crosswalk Visibility](#)

Thank you!