



ROADWAY SAFETY
COUNCIL

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Agenda

- ★ Solve or Treat?
- ★ Systemic vs. Unique
- ★ \$1.5 Million for 2021 Deployment of Enhanced Signing, Pavement Markings & Cameras
- ★ Home grown notification system
- ★ Unique treatments worth sharing
- ★ In-Car notification efforts





After collection WWD Data for
10 years with \$0 budget...

I got \$1.5 Million of HSIP
funding for enhanced signing
and pavement markings.





Where to Spend?

467 Interchanges in Iowa



Network Screening



★ By Dr. Huaguo Zhou
Md Atiquzzaman of
Auburn University

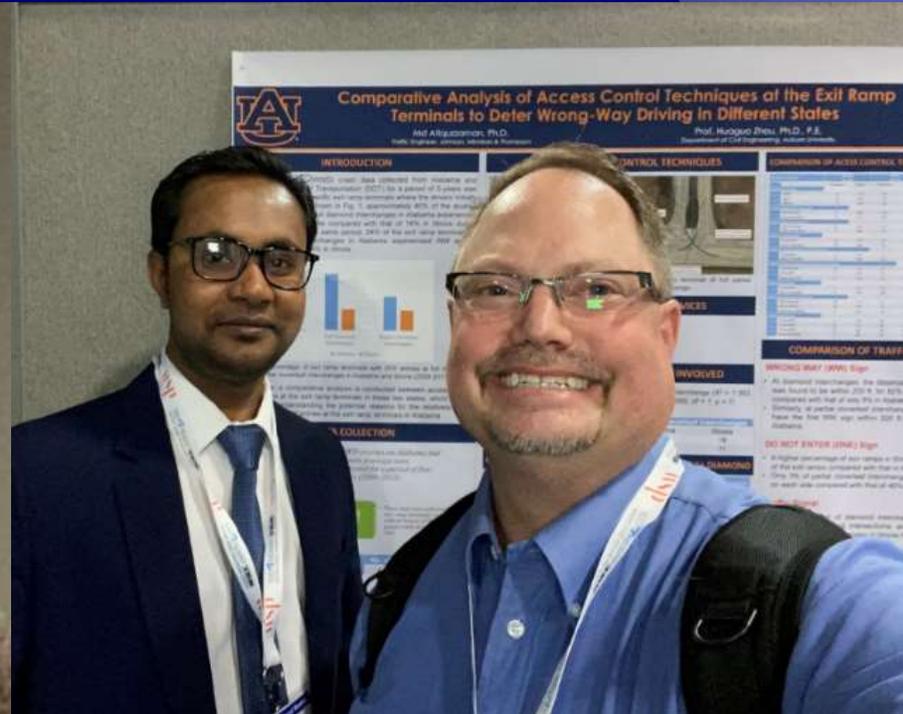
Article

Modeling the Risk of Wrong-Way Driving Entry at the Exit Ramp Terminals of Full Diamond Interchanges

Md Atiquzzaman¹ and Huaguo Zhou¹

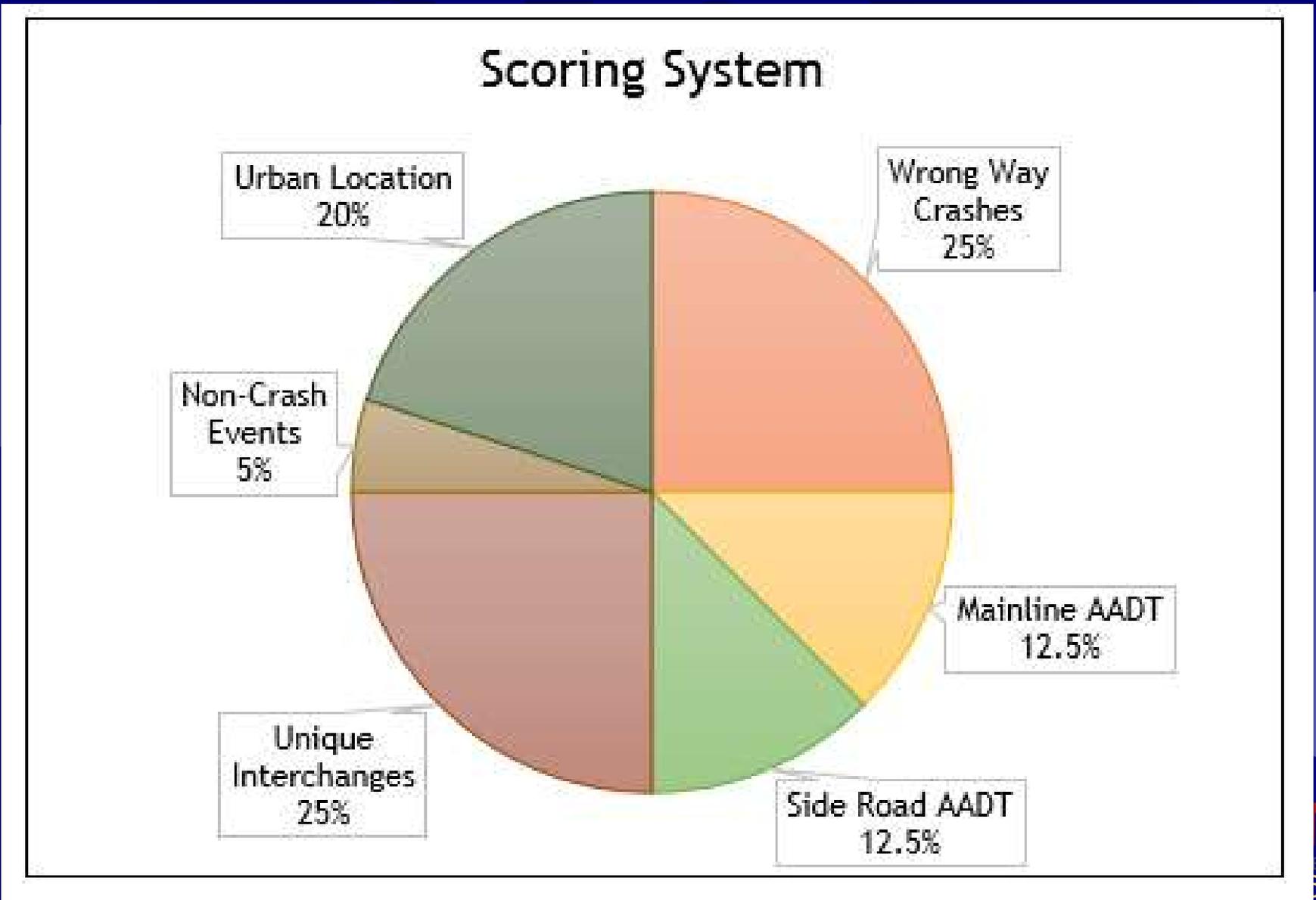
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SAGE





Iowa's Modification Scoring System

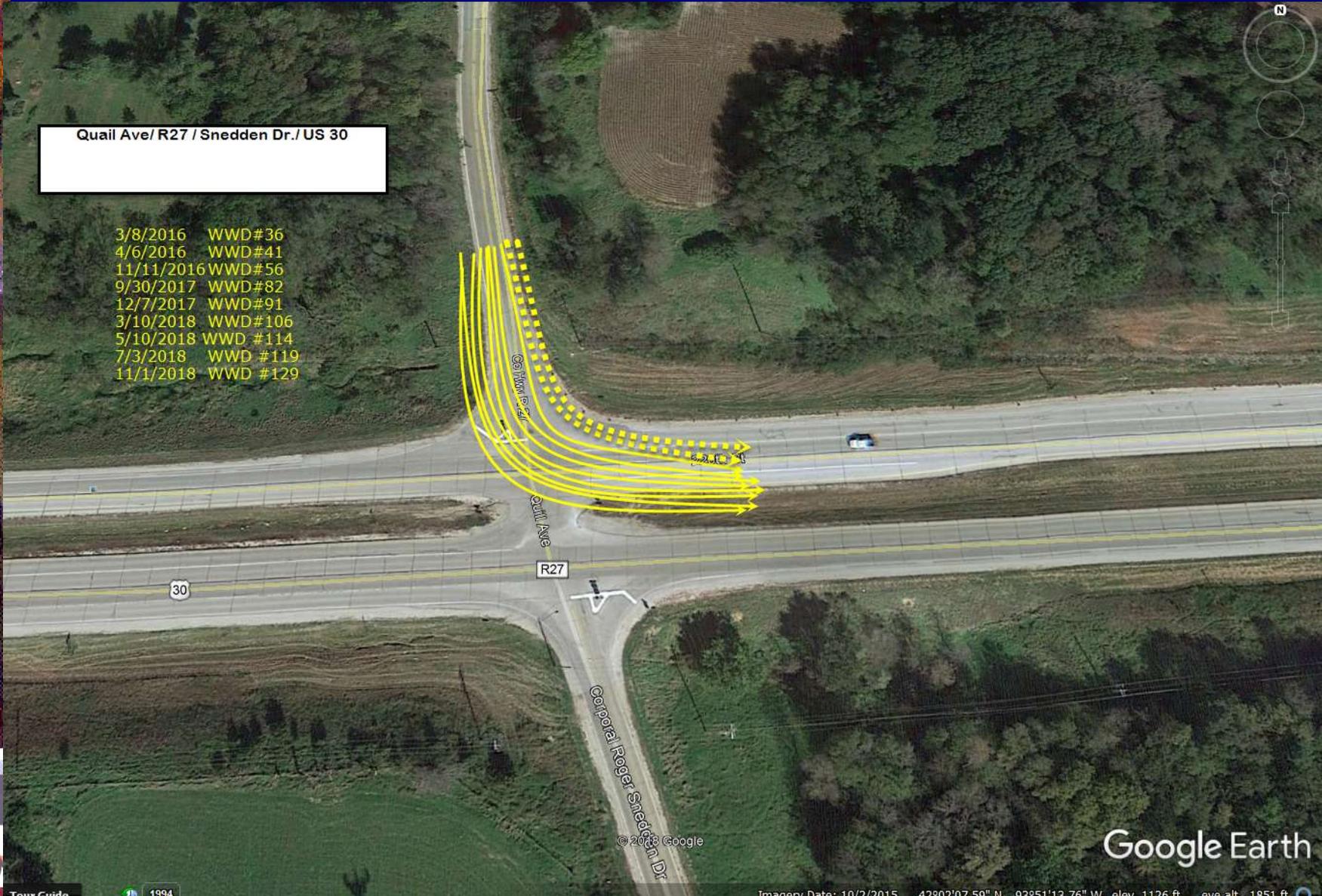




Don't forget about At-Grades

Quail Ave/ R27 / Snedden Dr./ US 30

- 3/8/2016 WWD#36
- 4/6/2016 WWD#41
- 11/11/2016 WWD#56
- 9/30/2017 WWD#82
- 12/7/2017 WWD#91
- 3/10/2018 WWD#106
- 5/10/2018 WWD #114
- 7/3/2018 WWD #119
- 11/1/2018 WWD #129



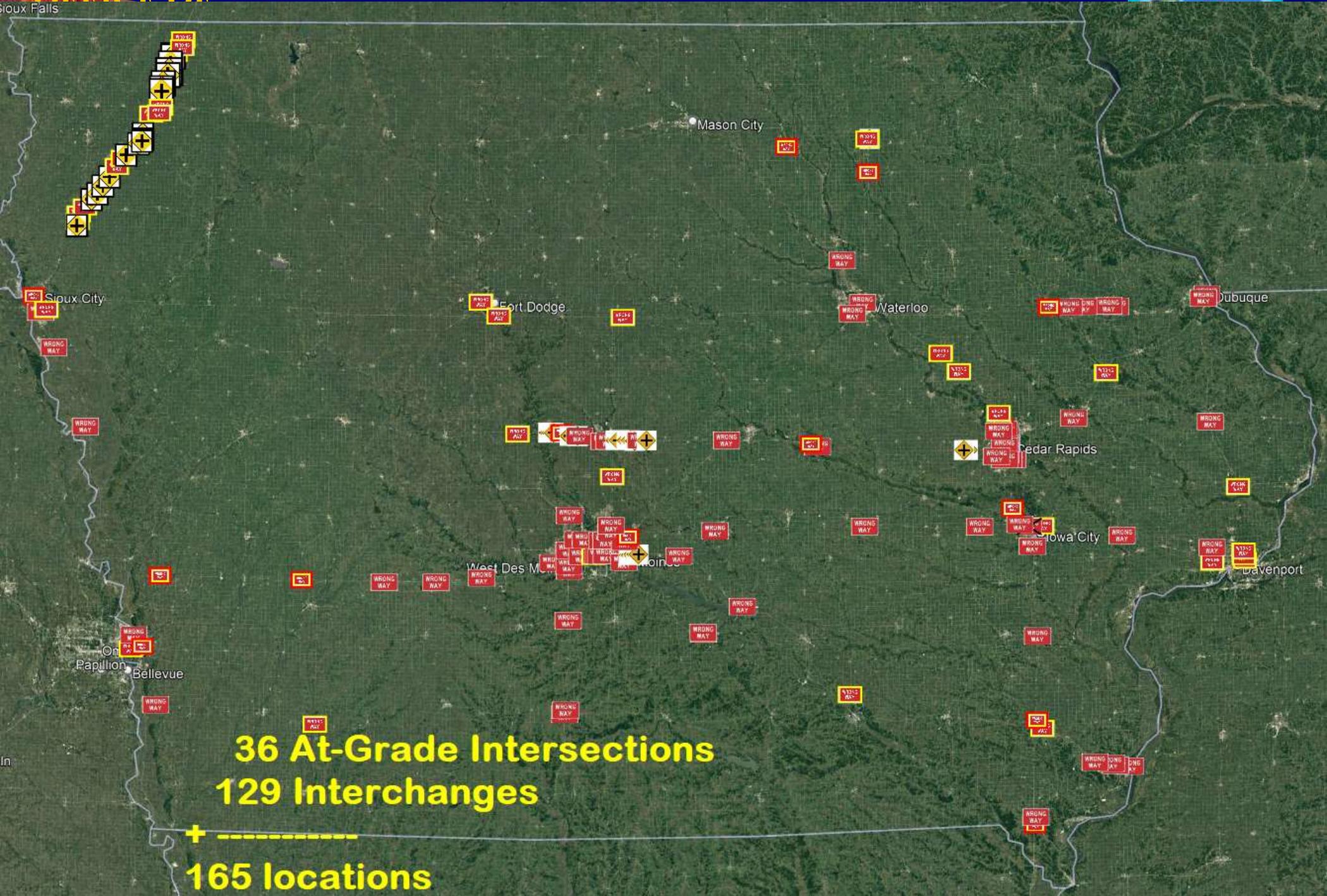
© 2018 Google

Google Earth

OT

Imagery Date: 10/2/2015 42°02'07.59" N 93°51'13.76" W elev. 1126 ft eye alt. 1851 ft

USER DRIVEN

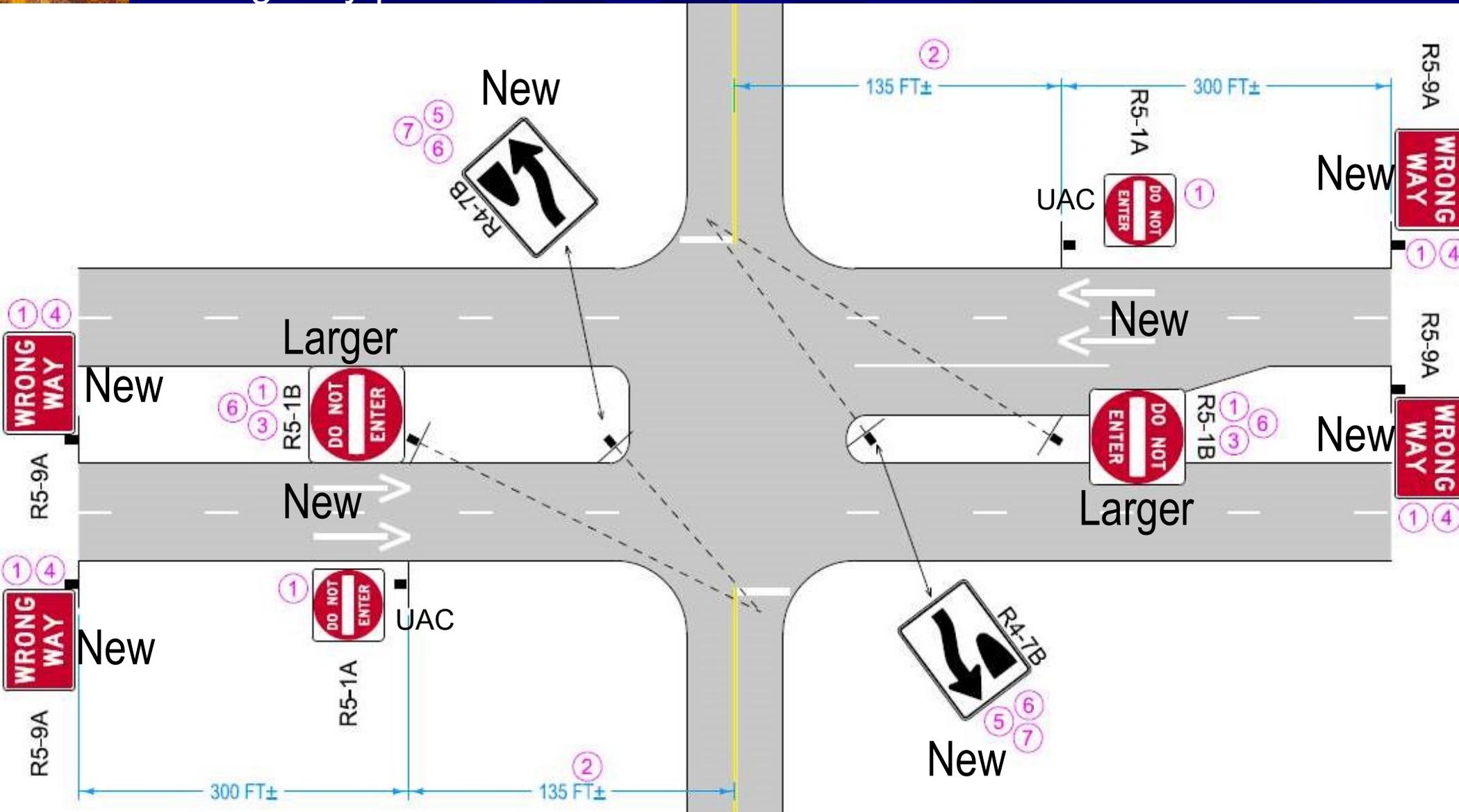


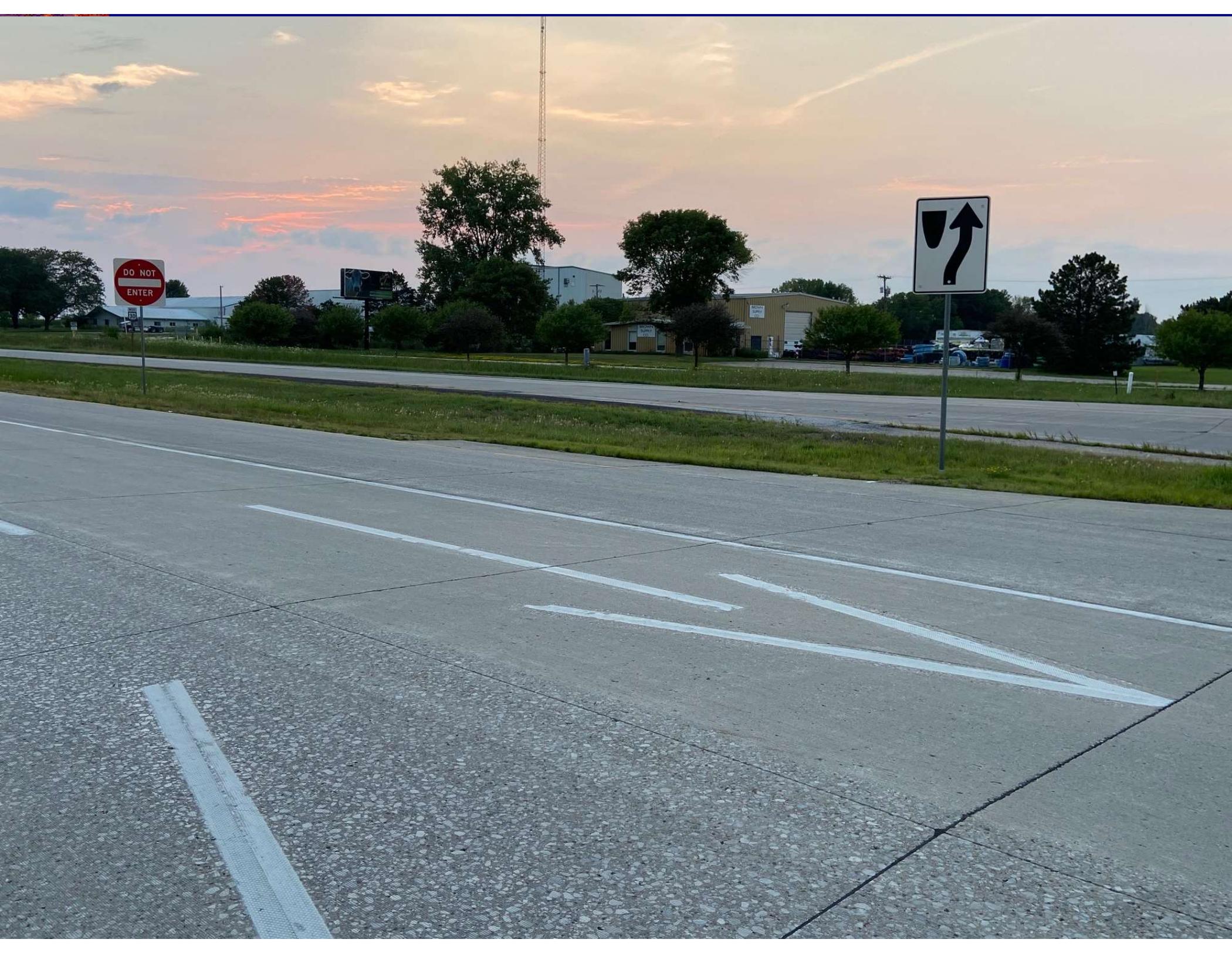
36 At-Grade Intersections
129 Interchanges

165 locations



- ★ New Signs/Pavement Markings
- ★ Larger Signs
- ★ Strategically placed & aimed





DO NOT
ENTER



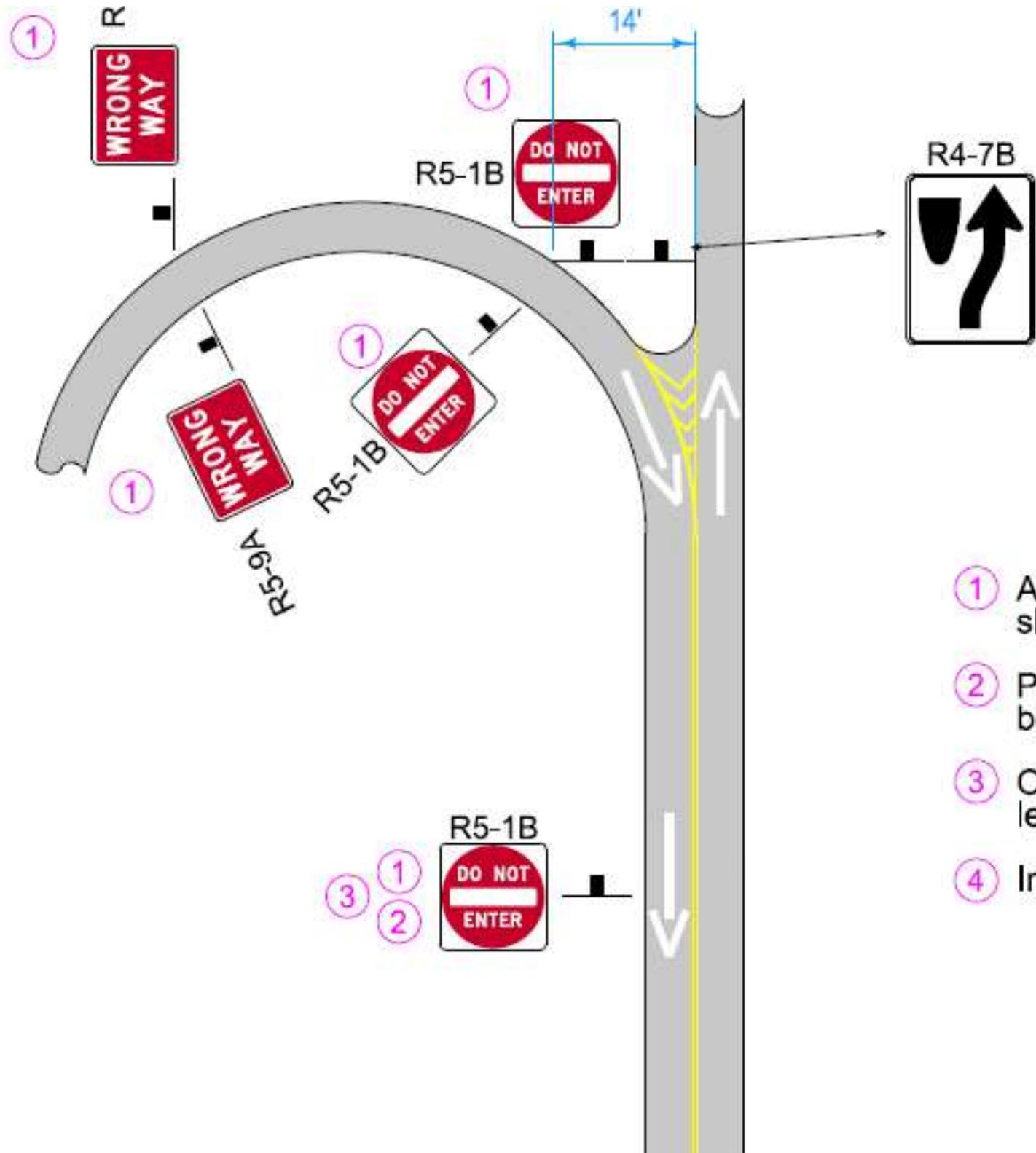
Before



After



Folded Diamond Interchange





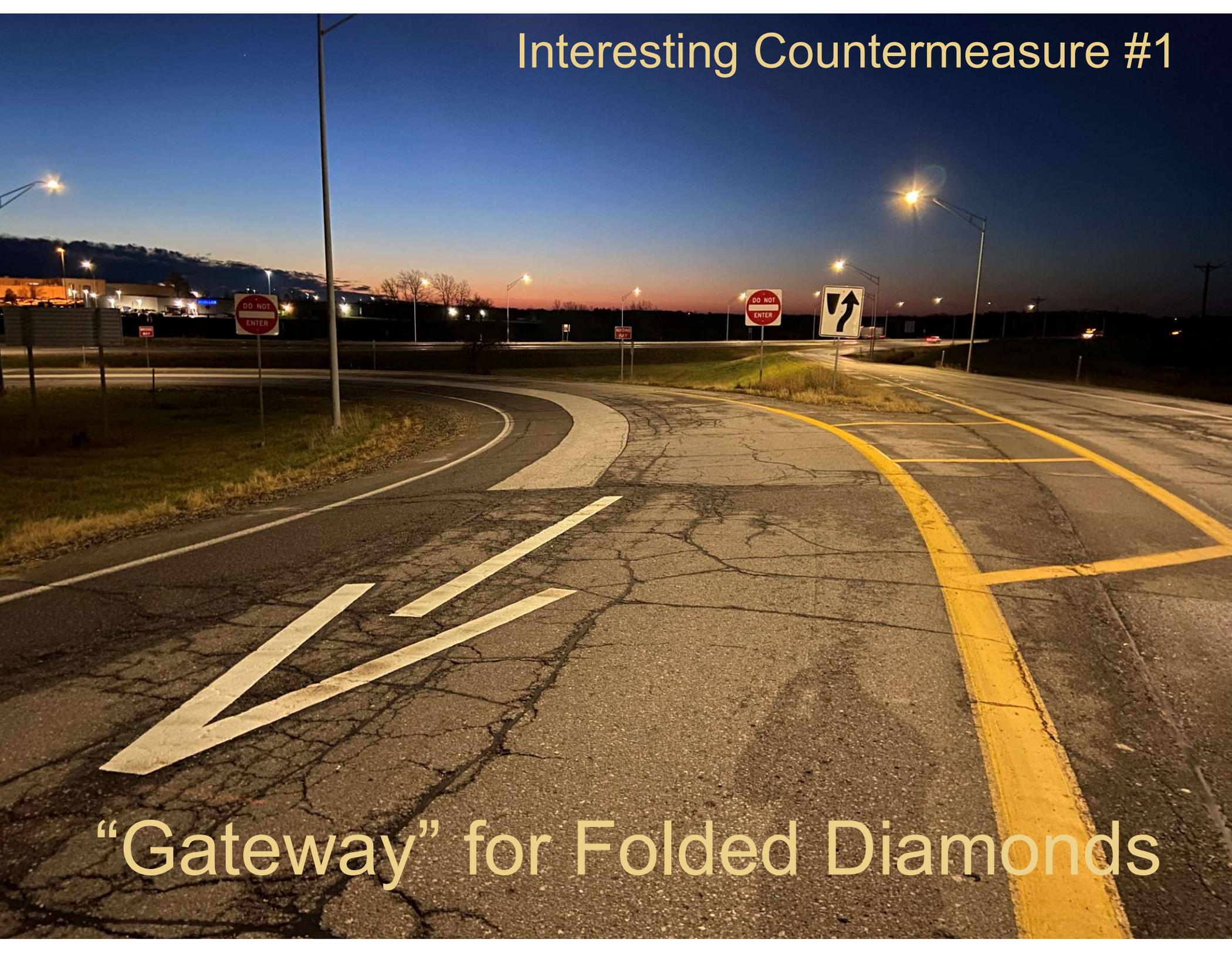


DO NOT
ENTER

DO NOT
ENTER

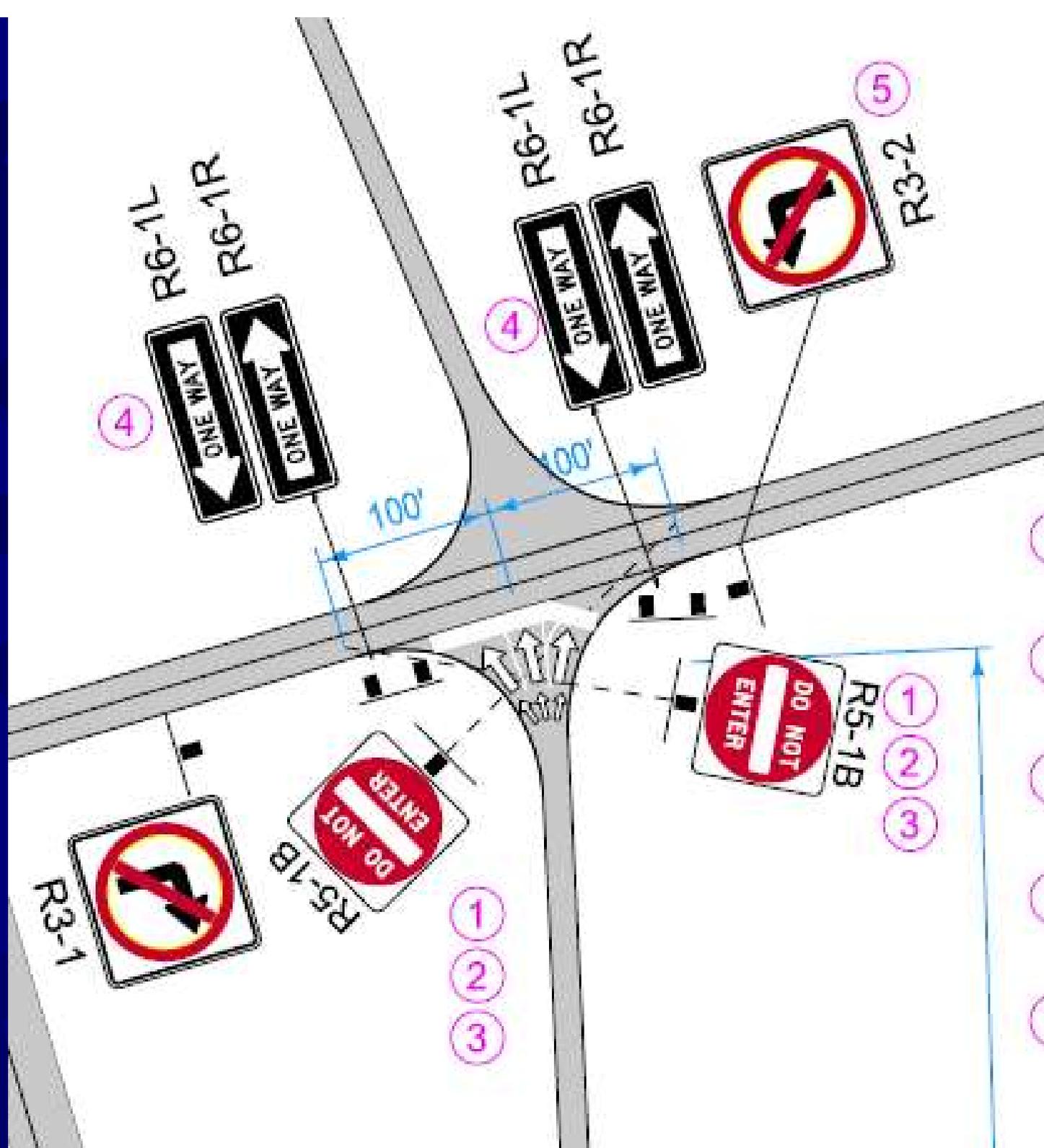
Yield

Interesting Countermeasure #1



“Gateway” for Folded Diamonds

Standard Diamond Interchange



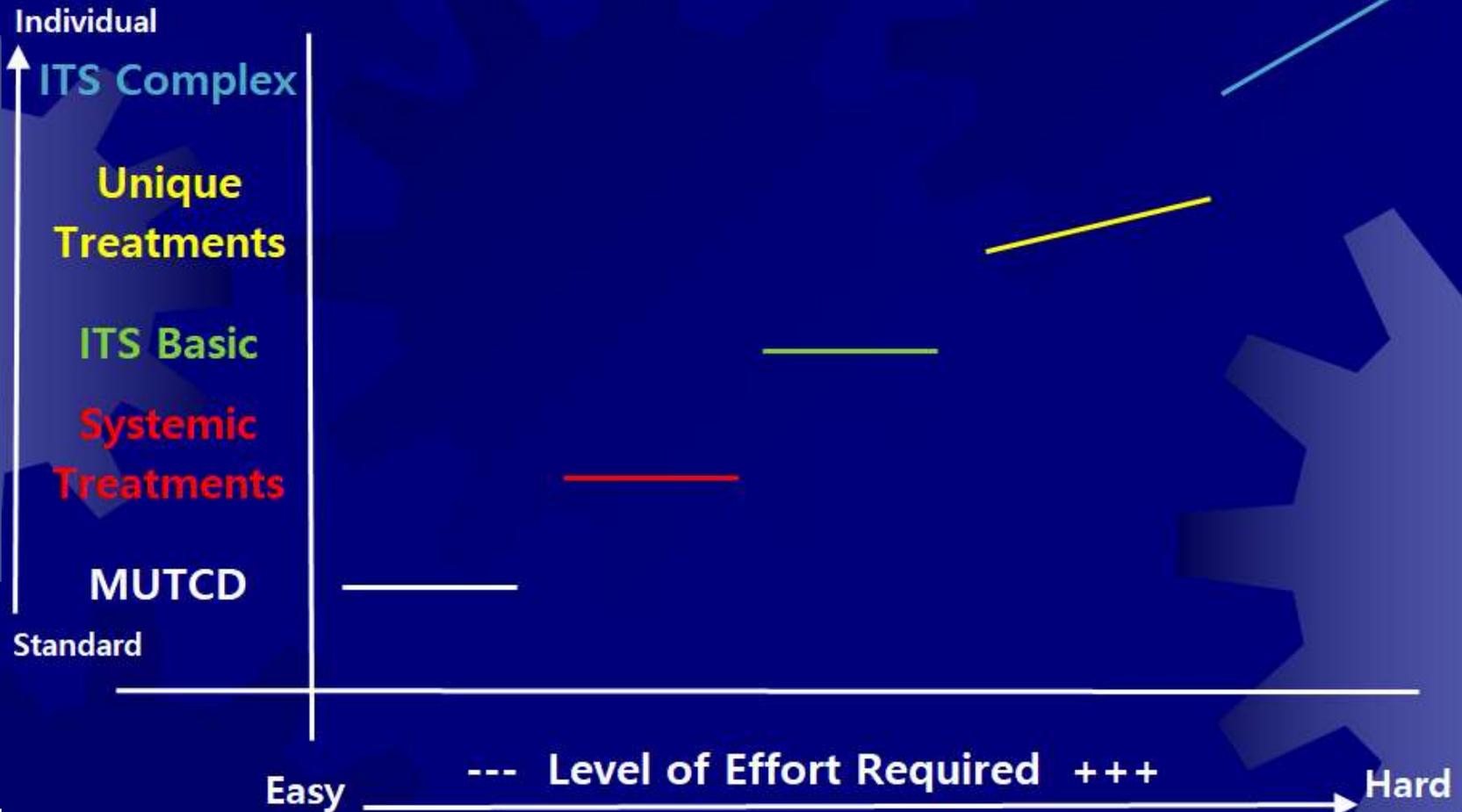


Zac's Sign





Level of Effort for WWD



The goal....



Determine Points of Entry (fix the problem/eliminate the headache)



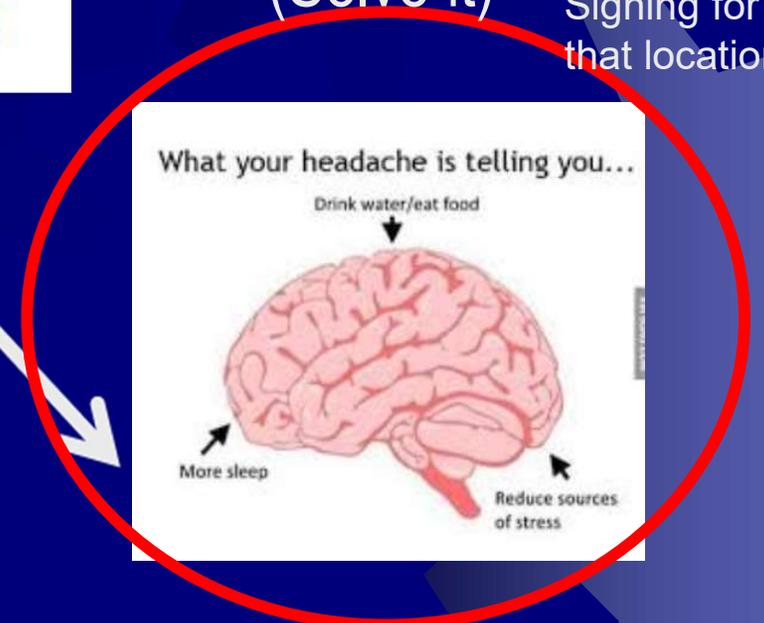
Option A
(Treatment)



Enhanced
Signing
Everywhere

Option B
(Solve it)

Specific /
Targeted
Signing for
that location



★ Solve with signing, painting & lighting



Special “Wrong Way Driving Detection” Cameras w/ Video Analytics & alerting.



**WWD Camera Locations
(35) w/ existing camera.**

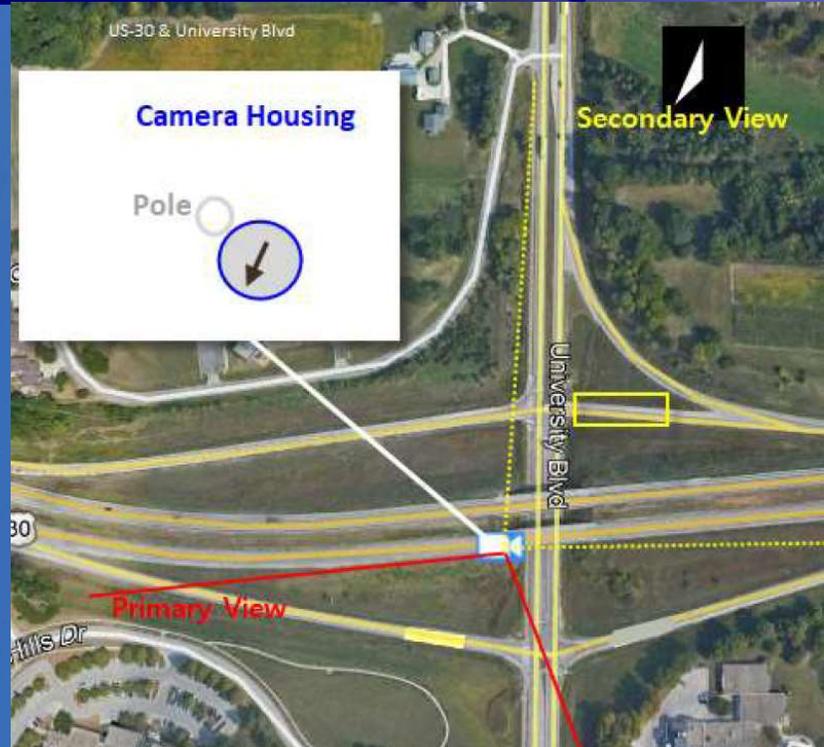


**WWD Camera Locations
(14) needing electrical**



60 Cameras + Installation for \$300,000

- ★ 42 cameras at 35 sites with existing camera
- ★ 18 cameras at 14 completely new sites



☀ WWD Camera Detection Project:

- ☀ 60 have been installed
- ☀ Roughly 85% self correct, but 15% did not.
- ☀ Thousands of other events...



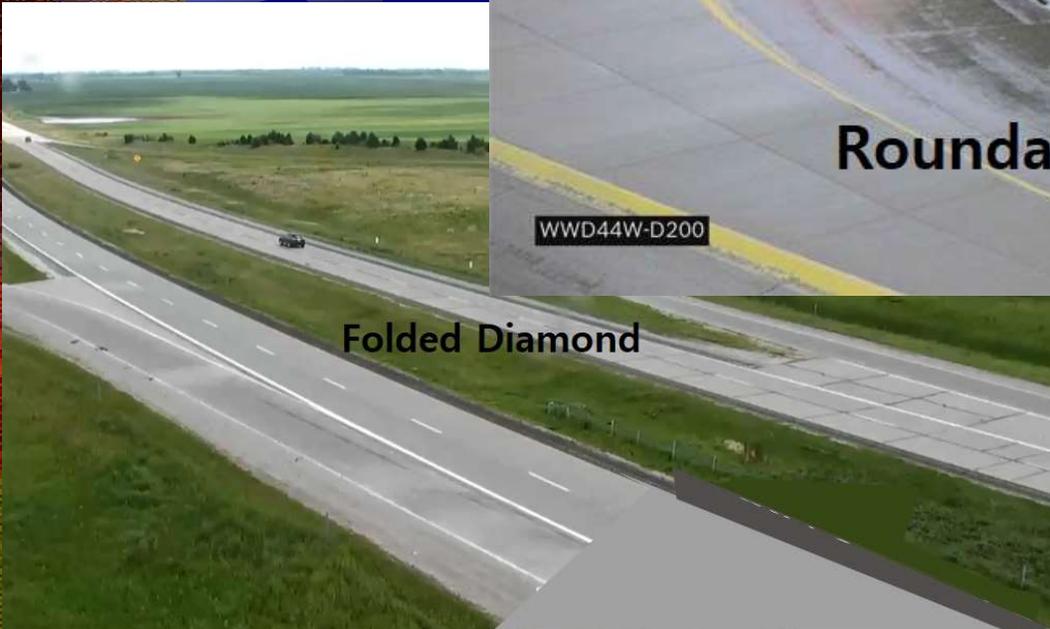
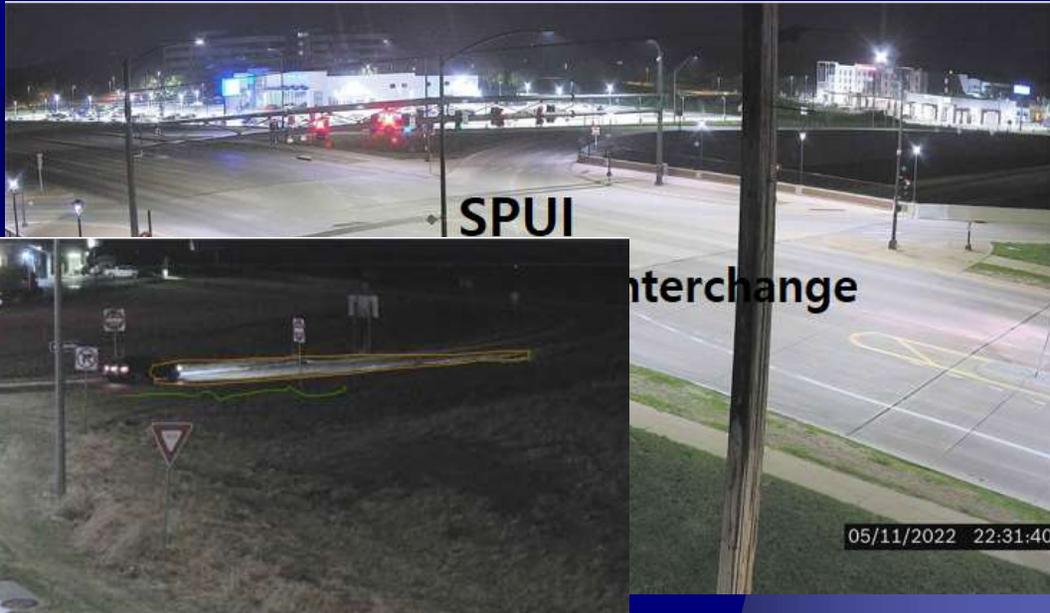
Why Video Analytics?



- ☀ Confirmation
- ☀ Multiple areas
- ☀ Did they self-correct?
- ☀ Multiple install locations/ Viewing Angles
- ☀ What were they doing before WWD
- ☀ Type of Vehicle
- ☀ How far did they go?



Flexibility for Install Locations



Folded Diamond

Roundabout

At-Grade
Intersection

SPUI

Interchange



Each WWD “trips” an e-mail alarm

📎 WWD Detected at US 30 EB Exit & University (IV)	464 KB	BoschWWD01_IV@iowadot.us	Sun 2/13/2022 1:41 PM
📎 WWD Detected at US 30 EB Exit & University (III)	466 KB	BoschWWD01_III@iowadot.us	Sun 2/13/2022 1:41 PM
📎 WWD Detected at US 30 EB Exit & University (II)	467 KB	BoschWWD01_II@iowadot.us	Sun 2/13/2022 1:41 PM
📎 WWD Detected at US 30 EB Exit & University (I)	469 KB	BoschWWD01_I@iowadot.us	Sun 2/13/2022 1:41 PM

WWD Detected at US 30 EB Exit & University (I)



BoschWWD01_I@iowadot.us

To Sorenson, Willy



2/13/2022



20220213_134016_Image I.jpg
429 KB

Alarm Mail from BoschWWD01_I@iowadot.us

Unit name: WWD01-AMTV16

Local Unit time: 02/13/2022 13:40:16

Condition of the alarm inputs (logical states):

Local Input 01 'Input 1 ': idle

Local Input 02 'Input 2 ': idle

VCA alarm cam 1: : idle

Virtual alarm input 1: : idle

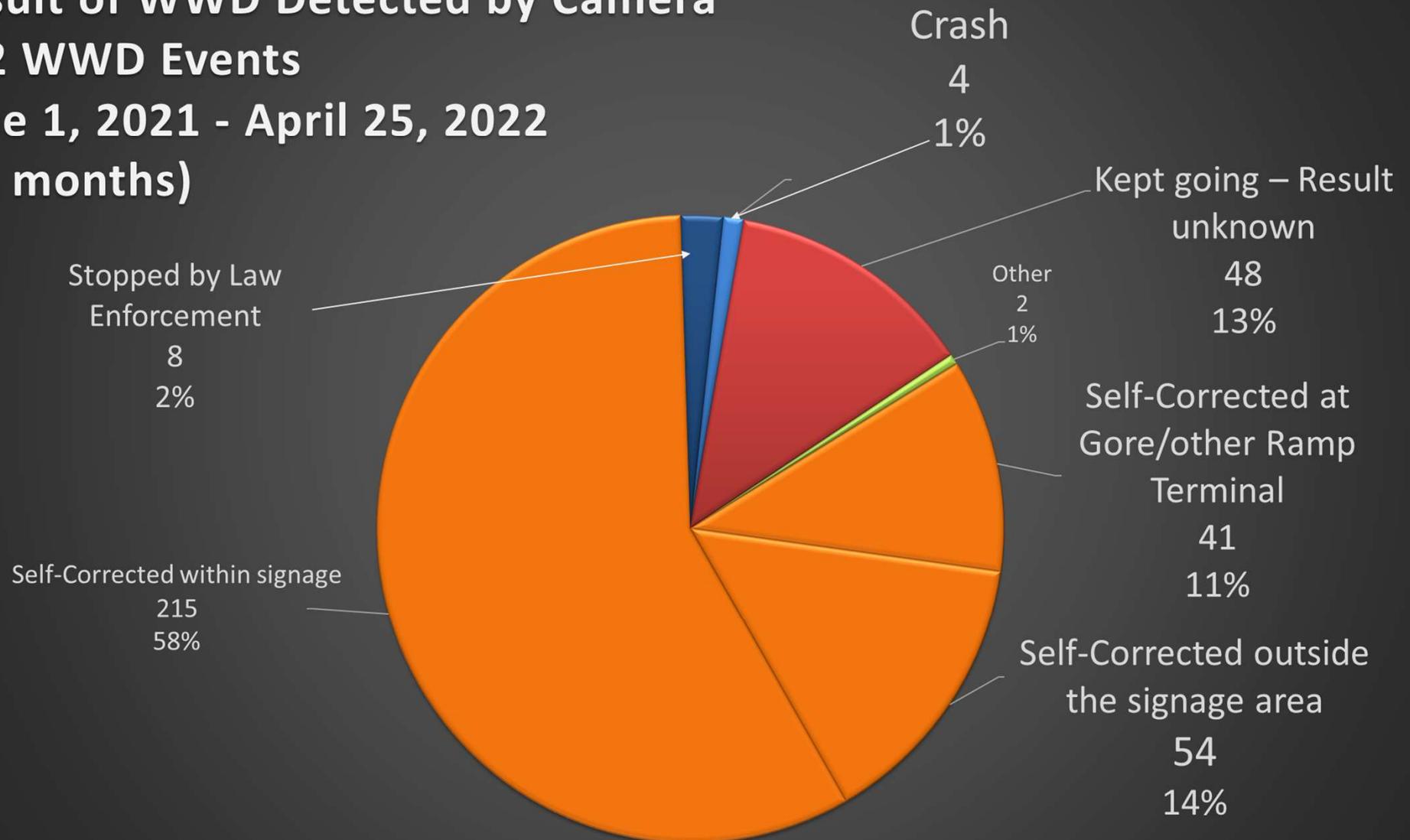
Virtual alarm input 2: : idle

Virtual alarm input 3: : idle



If you are only counting crashes, you might be missing some useful data.

Result of WWD Detected by Camera
372 WWD Events
June 1, 2021 - April 25, 2022
(11 months)

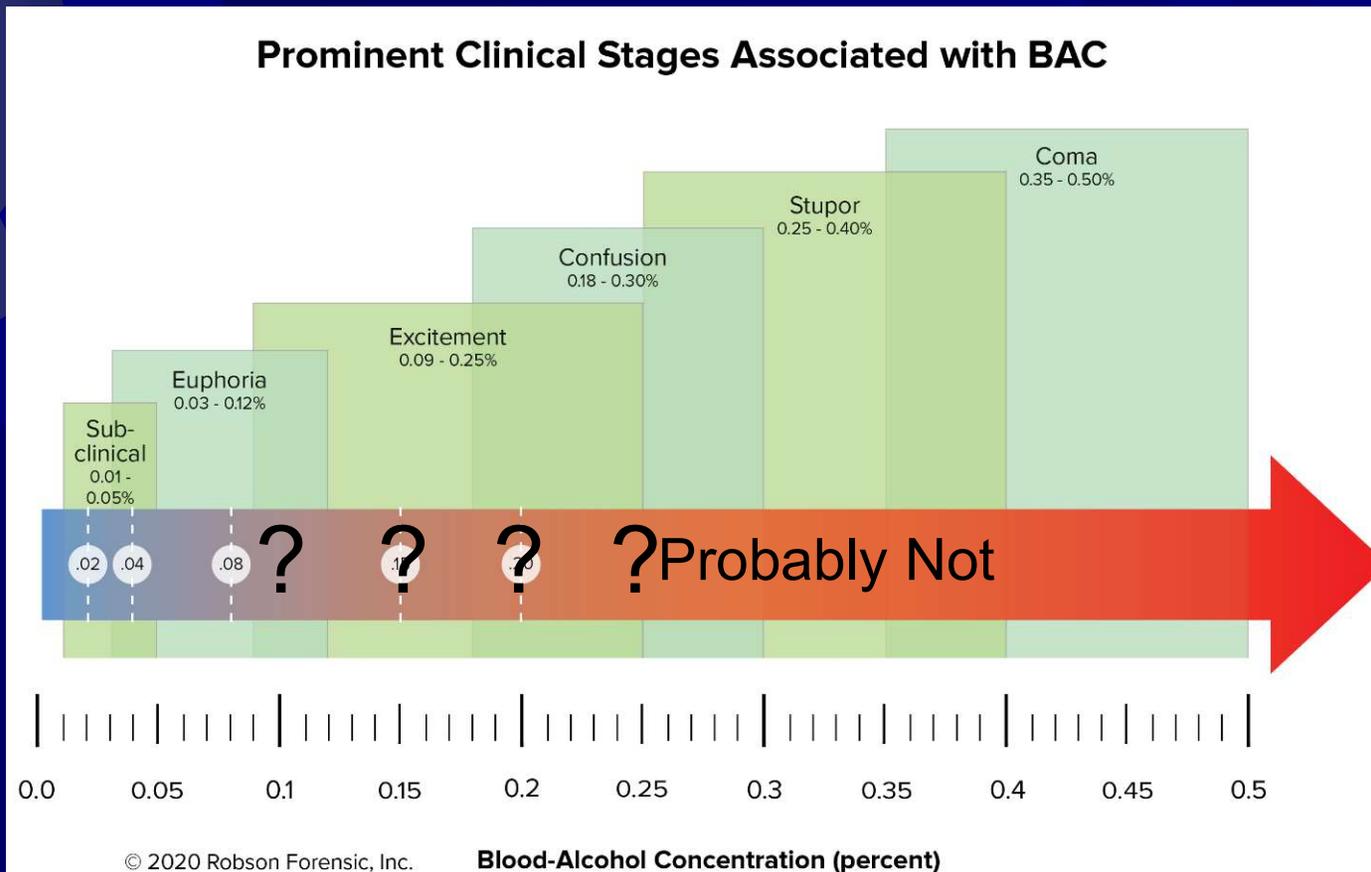




Hypothesis....

If you can solve the WWD problem for Daytime, non-drunks.... (85% that self correct).... Will it reduce the nighttime intoxicated WWD problem, (the other 15%)?

Prominent Clinical Stages Associated with BAC





ALARM:



Dyersville WWD

11/18/2020 11:03:19

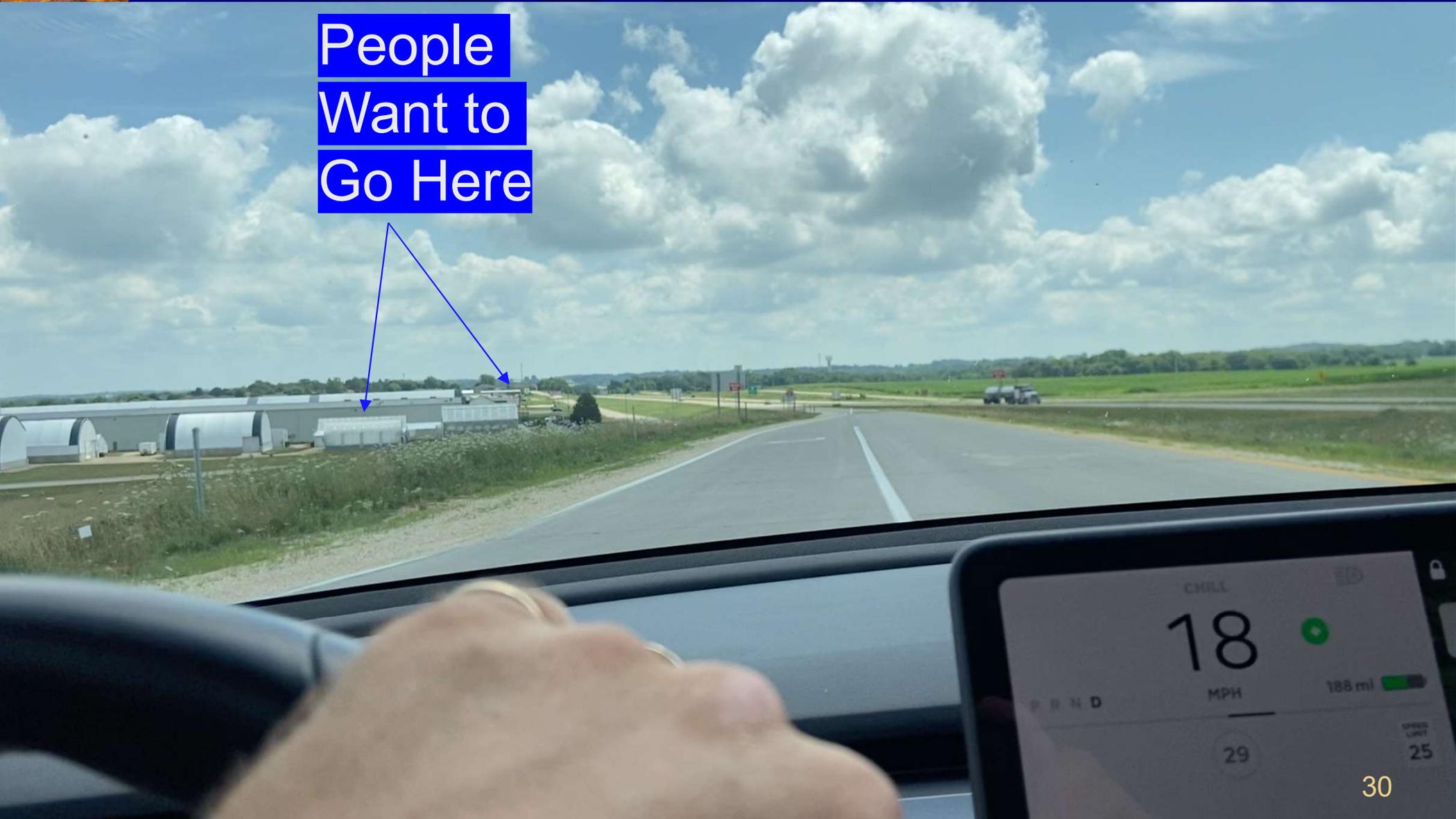
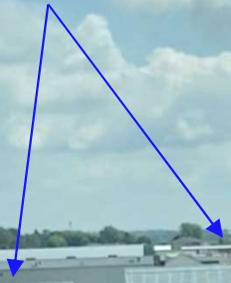


Wrong Way Driving Dyersville, Iowa



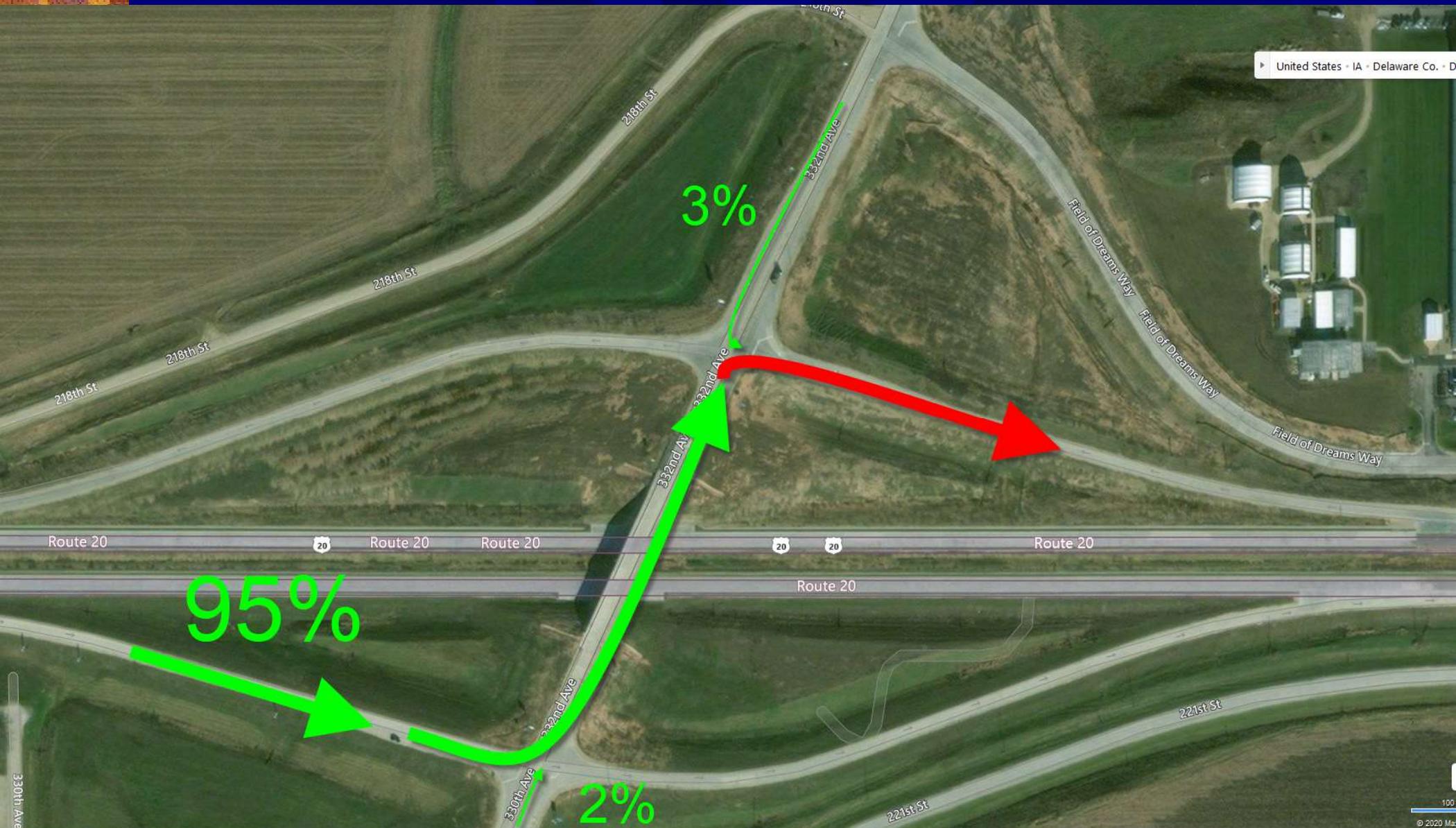
The Main Problem

People
Want to
Go Here





Where are they coming from?





But, How About a Barrel?

☀️ 7th Treatment was the Charm!... Sort of!





That afternoon.....



Dyersville WWD

12/17/2020 15:38:11

6 days w/o a WWD.... Then wind blew.



Within 90 min of barrel blowing over.....



Dyersville WWD

12/23/2020 14:21:06



Over Christmas & New Year



12/31/2020 18:53:33



01/06/2021 06:54:50



12/24/2020 14:37:02



Barrel Uprighted



01/06/2021 08:00:00



01/07/2021 08:00:00



What do you do when 1 barrel
is not enough???

WHAT DO WE
NEED?





Around 3pm+/- 2/26/2021

02/22/2021 16:44:44

02/16/2021 09:51:23

02/09/2021 10:58:48

01/28/2021 09:18:07

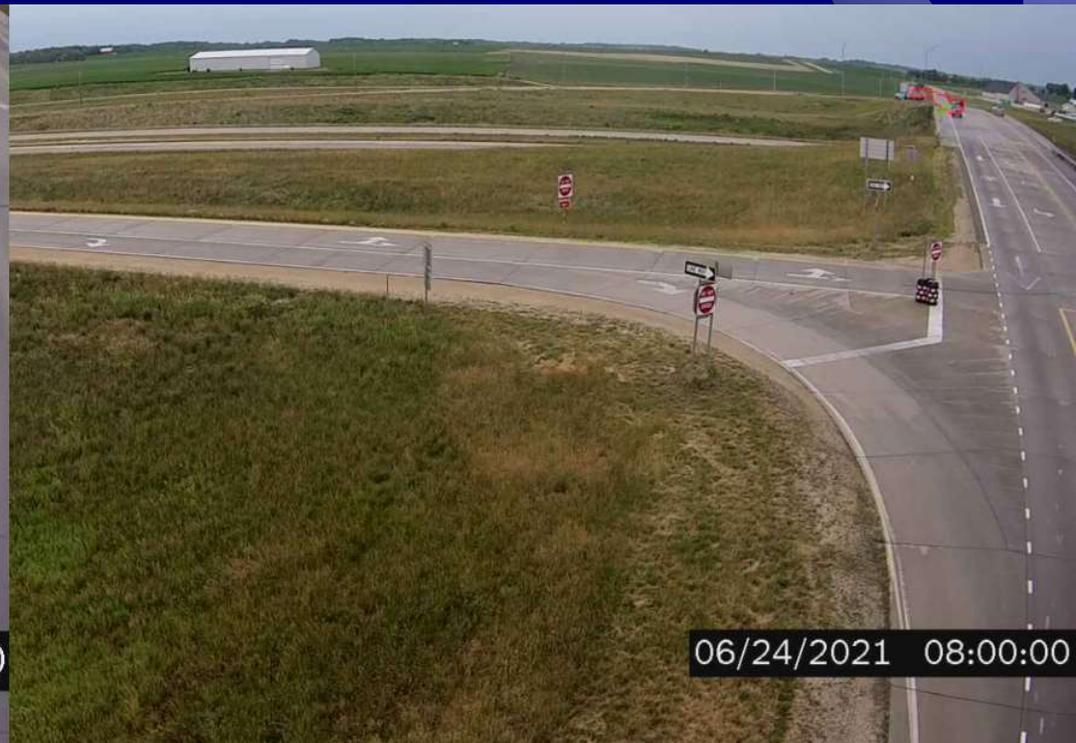
01/22/2021 16:06:31

**7 More Occurred
Until the Paint
Truck Arrived!!!**



Skip Dash Edge Line

- ☀ Treatment #8
- ☀ That'll fix it!! ;0)





Well, maybe not.....



07/06/2021 13:58:28



We have tried Everything.. ...Except the Kitchen Sink....





What is our missing “Kitchen Sink”???





Convert to an Island?





This is where it gets deep!







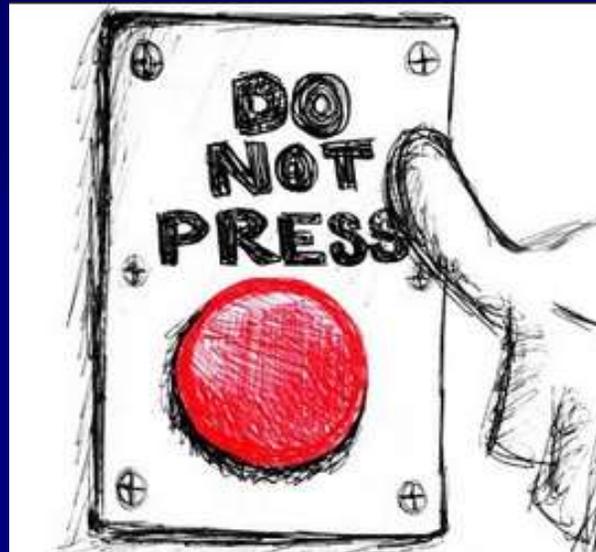
Dyersville WWD

02/16/2021 09:51:10



Psychological Reactance

- ✦ The urge to do something that is against authority.
- ✦ Why we don't have 100% seat belt usage.





Spring break trip to San Antonio

- ☀️ 2,000 mile round trip in the Tesla
- ☀️ With Amy & our 2 dogs





Texas Frontage Roads



Treatment #9

- ★ We found the “Kitchen Sink”
- ★ Installed 7/19/21
- ★ Still had some WWD, but HUGE difference.
- ★ 8/13/21
- ★ 8/18/21
- ★ 9/20/21
- ★ 3 in last 4 months



Did it work?





Common Problem
Turning WWD at a ramp when the driver really just wanted to get to "X"







Psychological Scotoma

Scotoma = Mental Blind Spot

Scotoma is a sensory locking out of the environment caused by conditioning or prior expectation. *(The Pacific Institute)*



It's the "truth as *I* perceive it"
based on:

- my upbringing
- my conditioning
- my prior expectation



Window

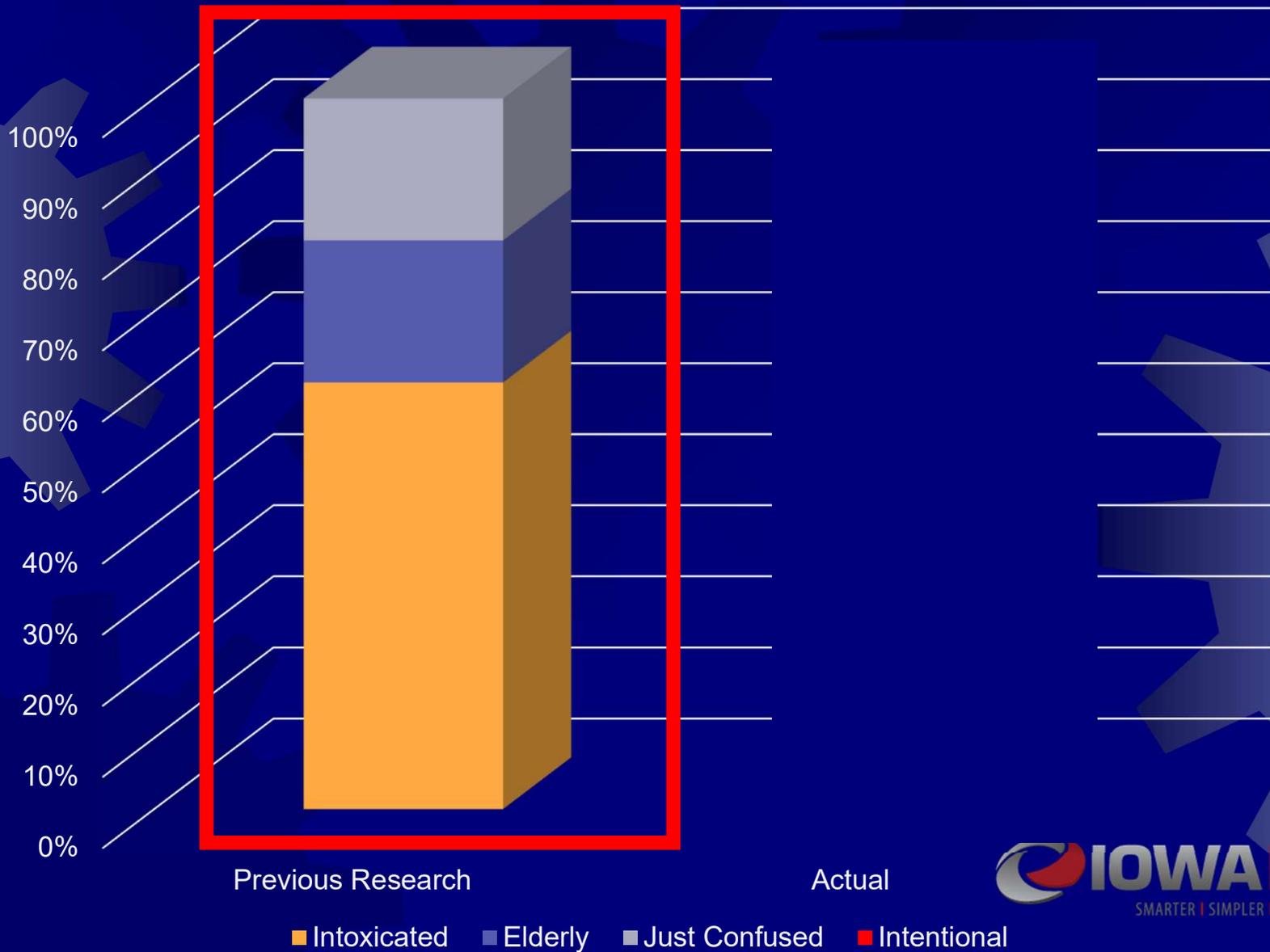


Scotoma



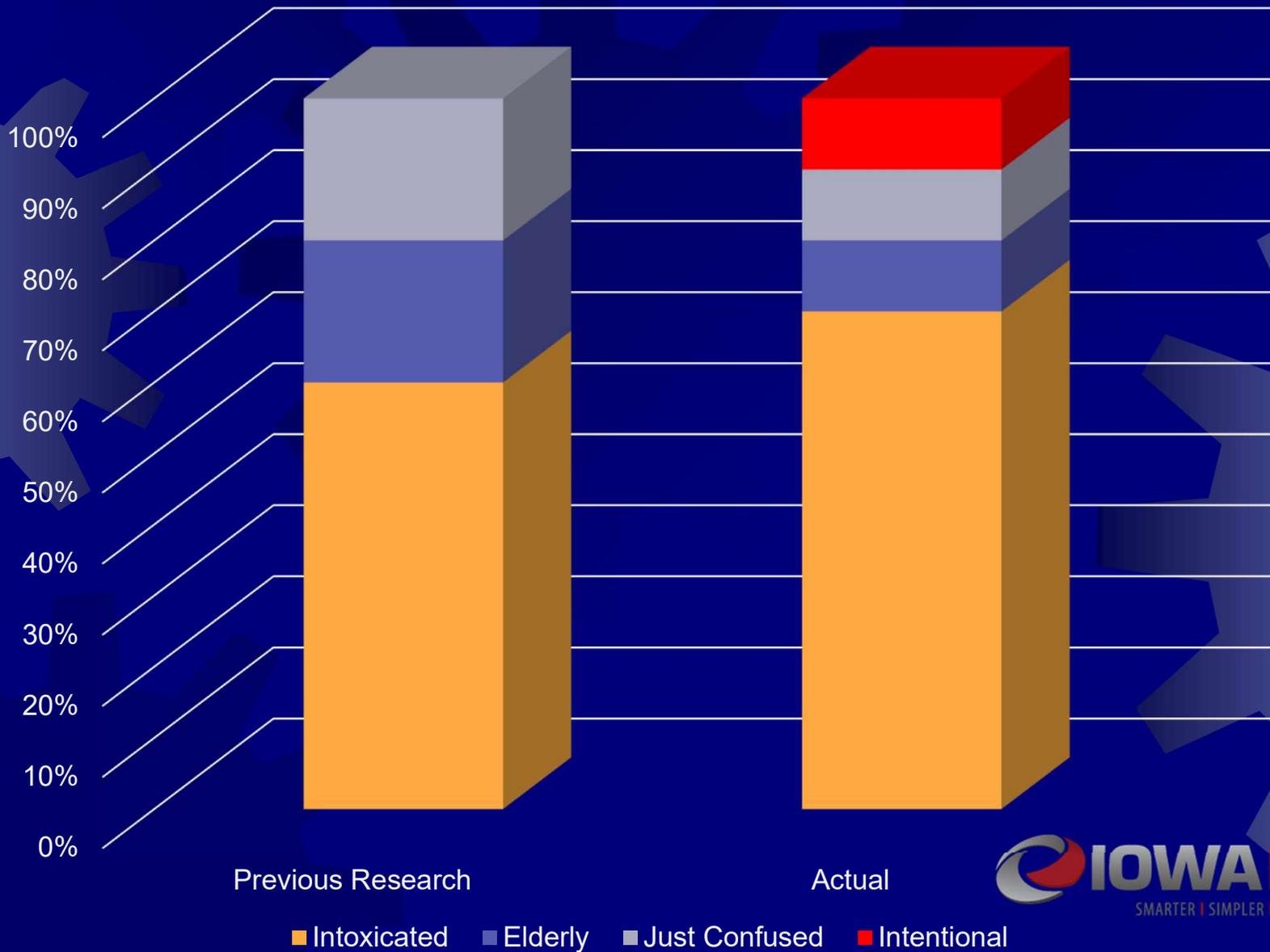


Who are the Wrong Way Drivers?





Who are the Wrong Way Drivers?



Lessons Learned



- ☀ Thermo cameras (that track vehicles) would eliminate a lot of false alarms (clouds, exhaust plums, shadows, wet pavement reflections) and would catch some that were missed at night due to headlight blooming and low light.
- ☀ Get best (highest) zoom possible
 - ☀ Ours were 3 to 10mm (not that great)
 - ☀ Next time I would get the 12 to 40mm
- ☀ You will get hundreds of false calls until you have “fine tuned it”.
 - ☀ Then you are probably missing some!



Cedar Rapids & Iowa City



Overhead DMS use

About 20 activations in the 1st 6 months of implementing





InTrans WWD Detection Software

Current Research Project

- Will use in locations where existing PTZ camera is already looking where a WWD may be entering the Highway
- Server based and Edge based (focus on cameras already on fiber)



OFFICE OF TRAFFIC & SAFETY



BoschWWD46_II@iowadot.us

BoschWWD46_IV@iowadot.us

BoschWWD47_V@iowadot.us



e-mail

e-mail

e-mail

Python Code

48 seconds

e-mail #1

e-mail #2



Phone Call



Read





Considerations:

“False positives” - alerts to drivers who are not driving the wrong direction

- Provide drivers with ability to override the warning?

What would the system or app communicate with this alert?

- E.g. “Turn around immediately”?

Construction Zones

Once “override” Shuts off for 15 min.

If “connected” it updates the map for everyone





- Similar to the Work Zone Data Exchange Initiative by Federal Highway Administration – Whereas work zone information from State DOT's can be "broadcast" using XML to tell 3rd party apps, and/or a (connected) car directly information about a work zone they are approaching.
- After a 911 center receives a call about a Wrong Way Driver is reported, why can't we start the process to enable the "broadcast" that information to 3rd party apps and/or a (connected) cars in the vicinity of the Wrong Way Driver?





To wrap things up, there is 1 more thing that I'd like you to know and share with your family, friends and co-workers.





Best False Call Ever!!!!



WWD61-NVTV05

10/08/2021 08:06:26



Questions?

