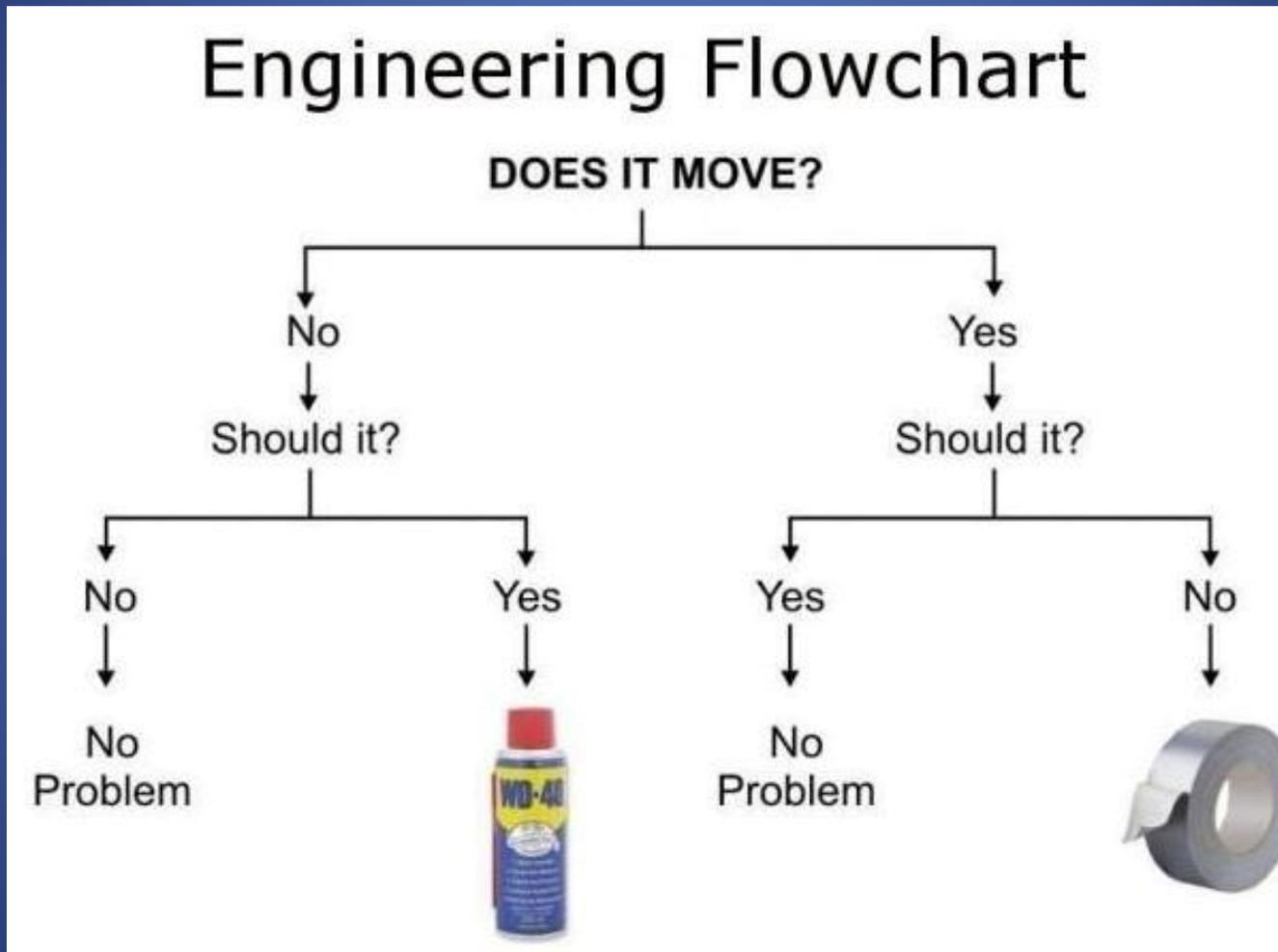


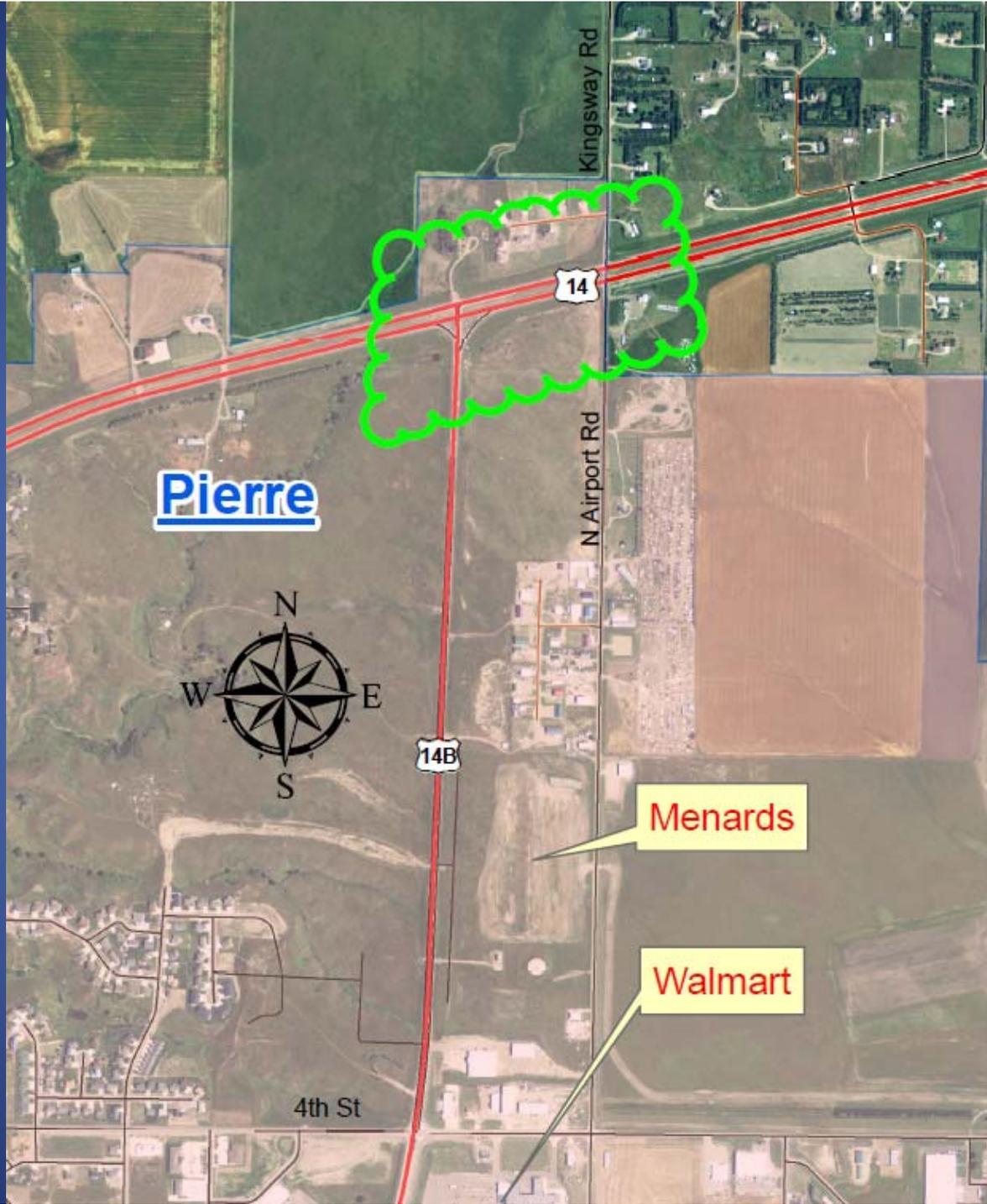
US14/US14B - Pierre

Engineering Flowchart



Mark Malone, PE

SD DOT



Pierre



Menards

Walmart

Why are we here?

- To discuss the intersection of US14/14B and nearby Kingsway intersection
 - ✓ Traffic volumes
 - ✓ Safety Impacts
 - ✓ Many questions regarding last summer's construction
- To involve public in the design process
- Exchange ideas – listen and discuss concerns



SDDOT Intersection Review



Traffic

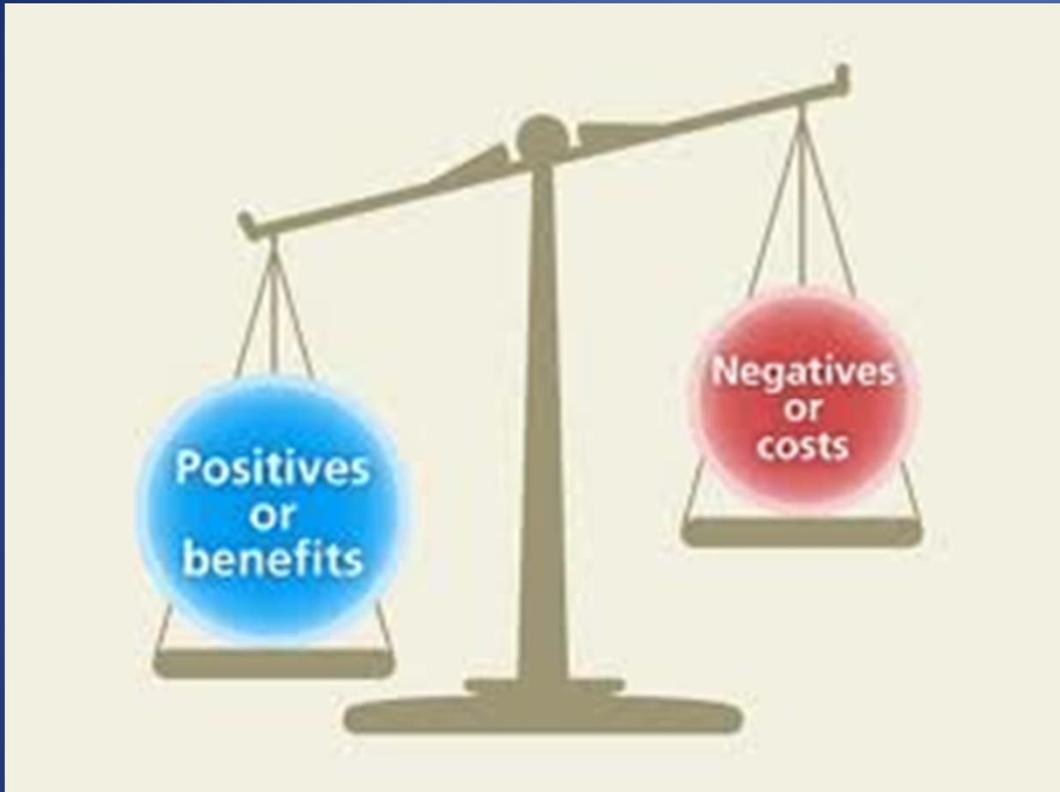


Crashes

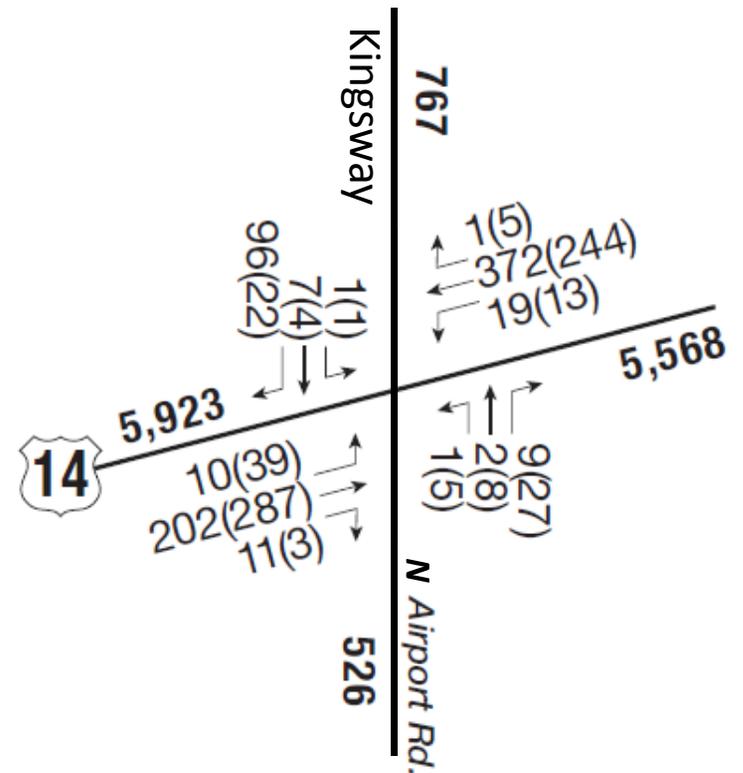
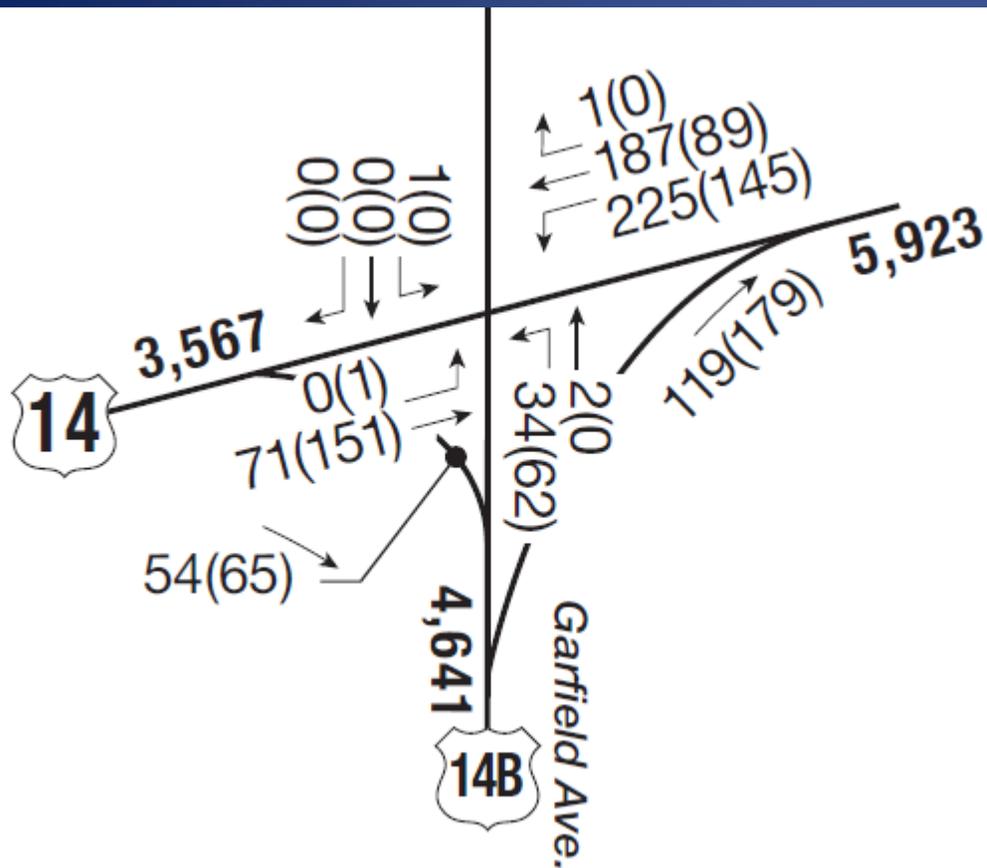


Costs

Evaluate Alternatives



Traffic Data



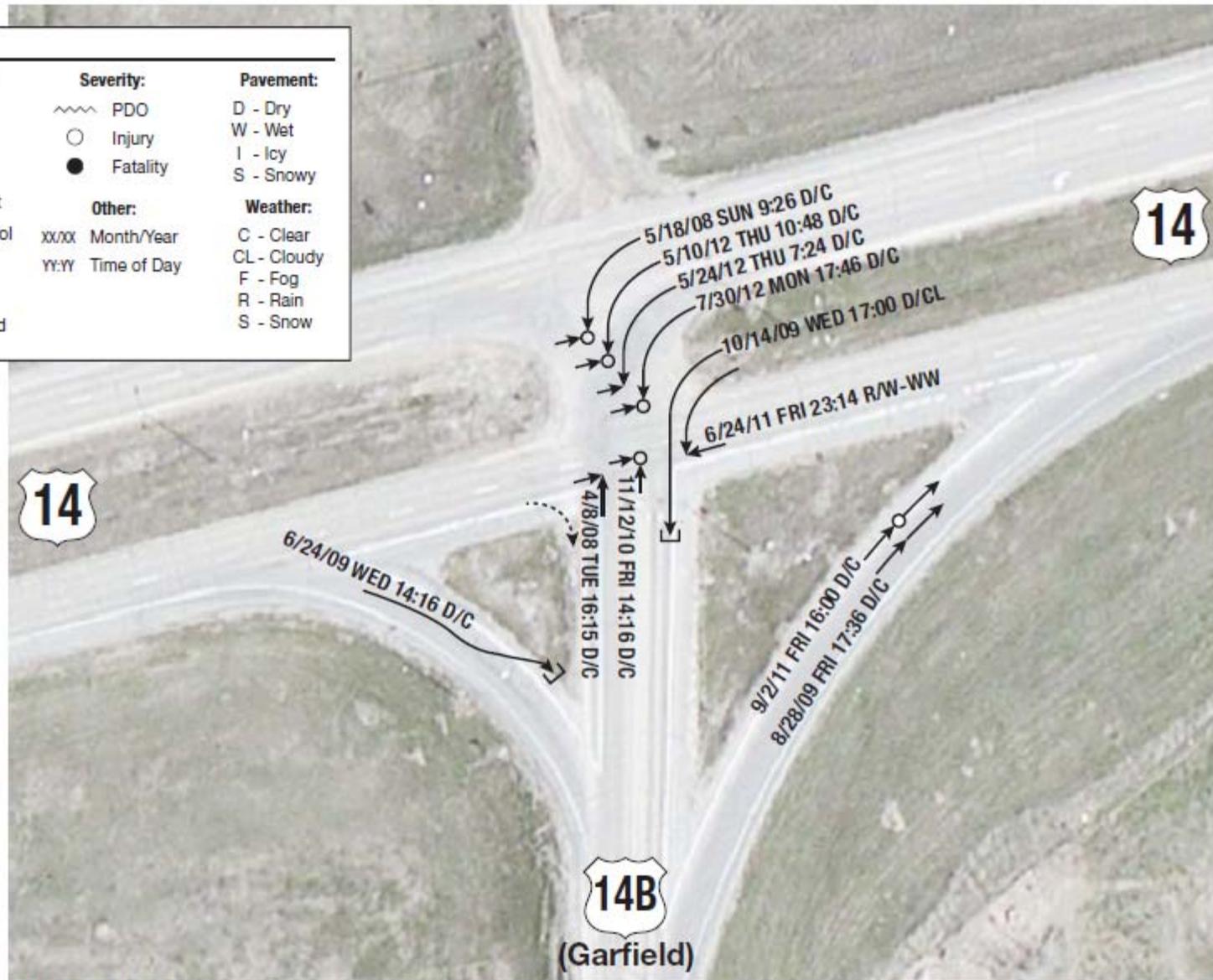
LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes

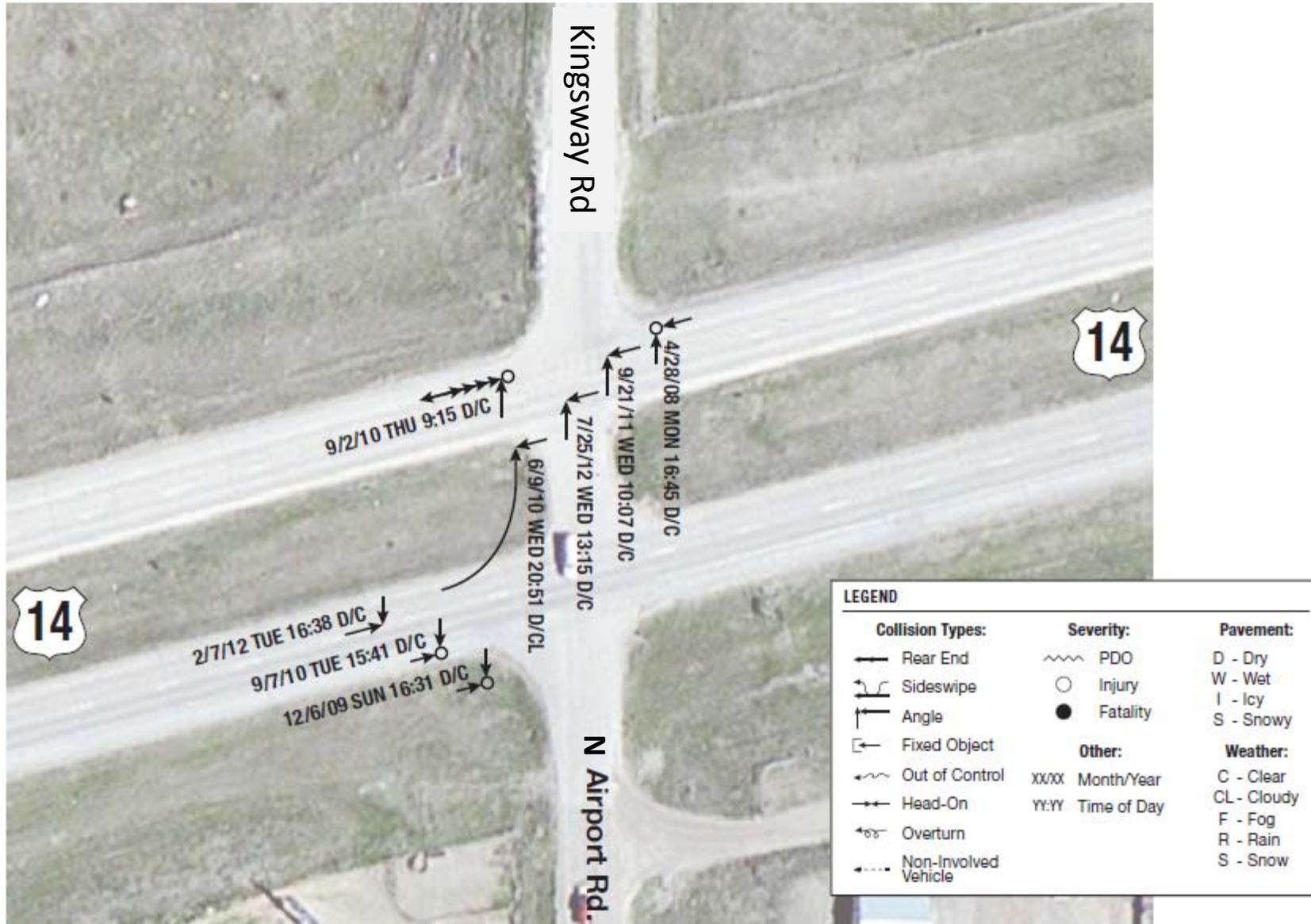
Crash Diagrams 2008-2012

LEGEND		
Collision Types:	Severity:	Pavement:
← Rear End	〰 PDO	D - Dry
↔ Sideswipe	○ Injury	W - Wet
↗ Angle	● Fatality	I - Icy
☐ Fixed Object	Other:	S - Snowy
←~ Out of Control	XX/XX Month/Year	Weather:
↔ Head-On	YY:YY Time of Day	C - Clear
↻ Overturn		CL - Cloudy
⋯ Non-Involved Vehicle		F - Fog
		R - Rain
		S - Snow



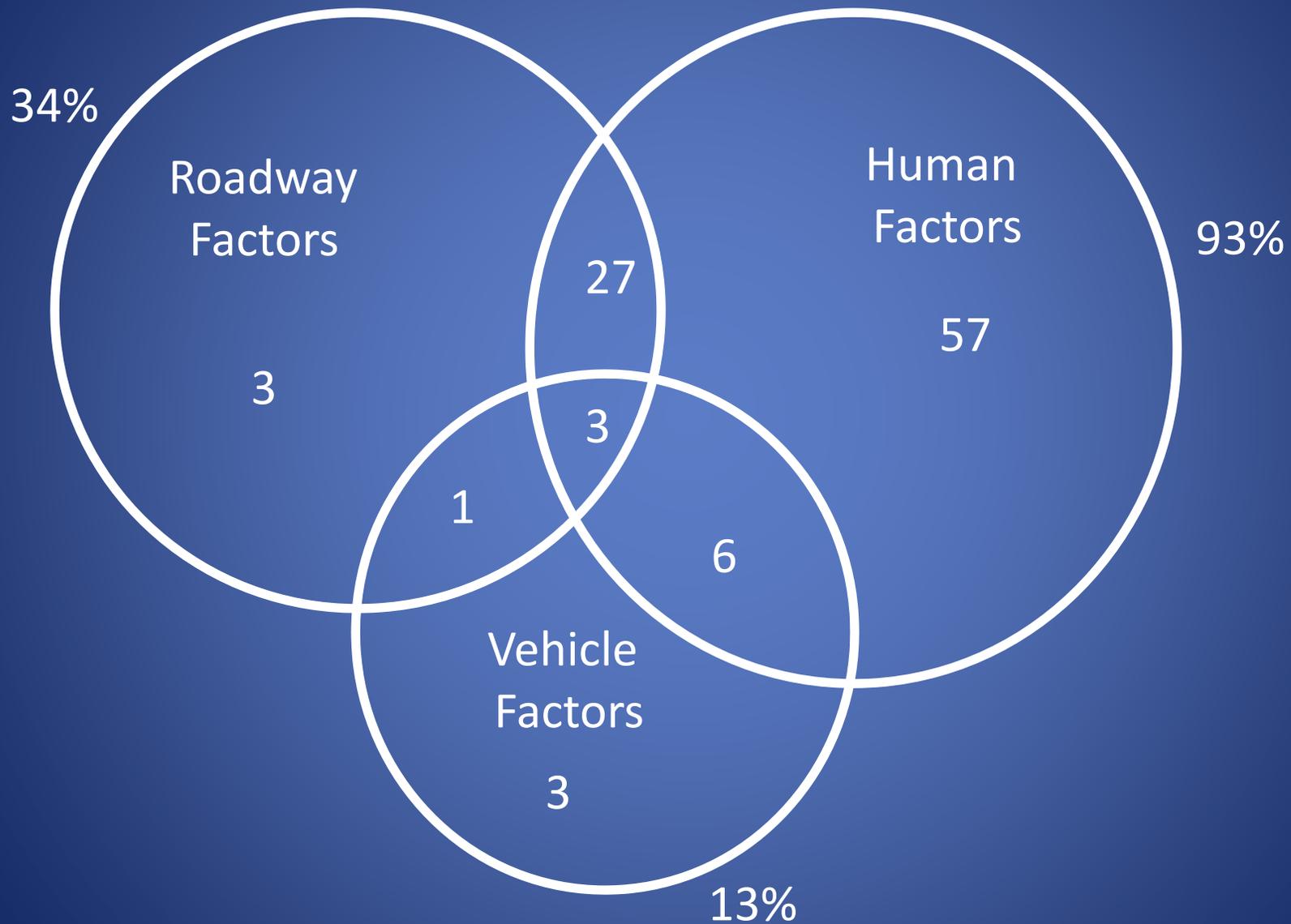
NOTE: Drawing Not to Scale

Crash Diagrams contd.



NOTE: Drawing Not to Scale

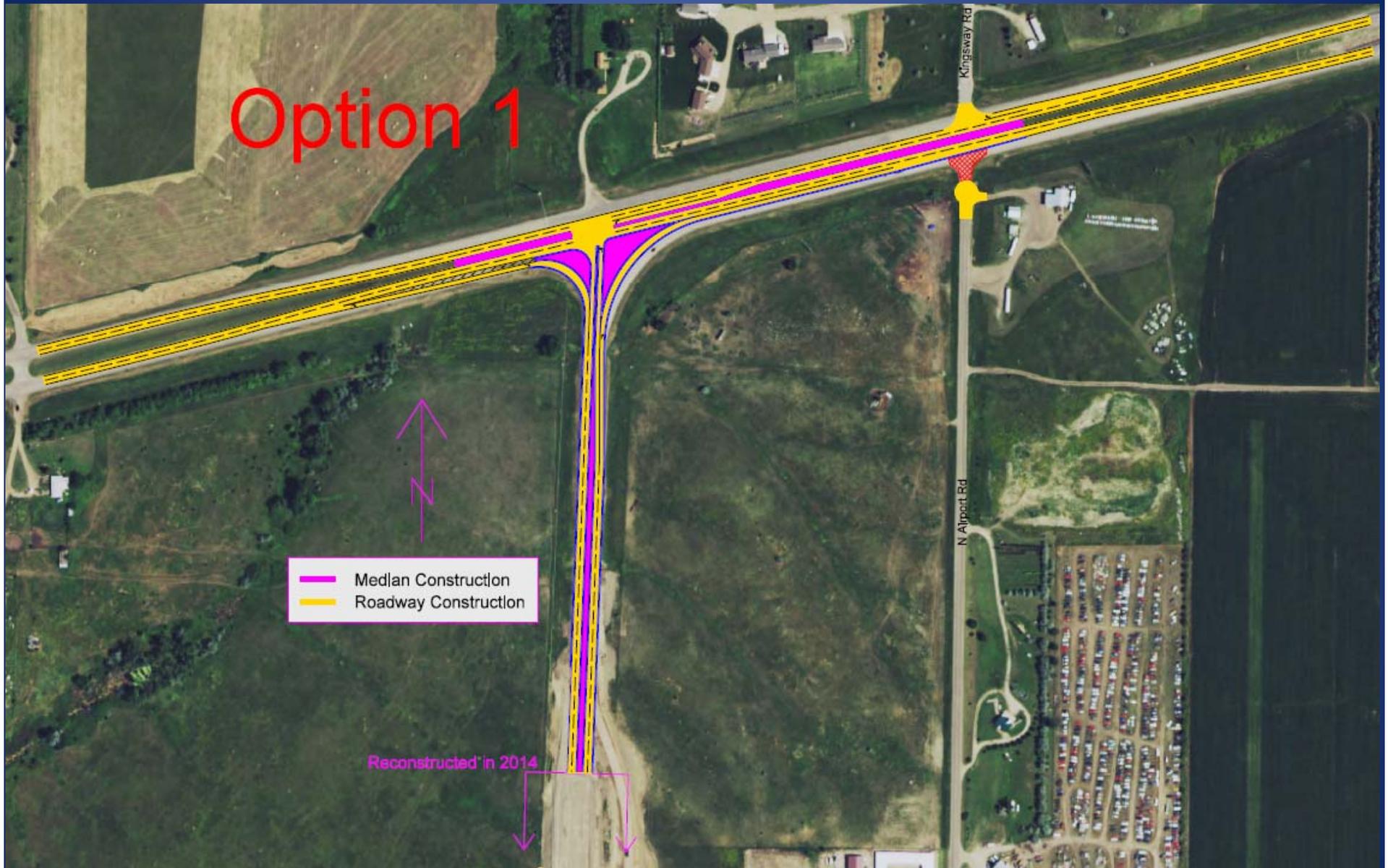
Crashes - Contributing Factors



Intersection Safety Study

- By Felsburg, Holt & Ullevig
 - Lincoln NE
- 12 Divided 4 lane intersections in SD
- This location had:
 - Highest traffic volume of intersections reviewed
 - Average crash rate (and severity)
- Reviewed and discussed many alternatives

Option 1



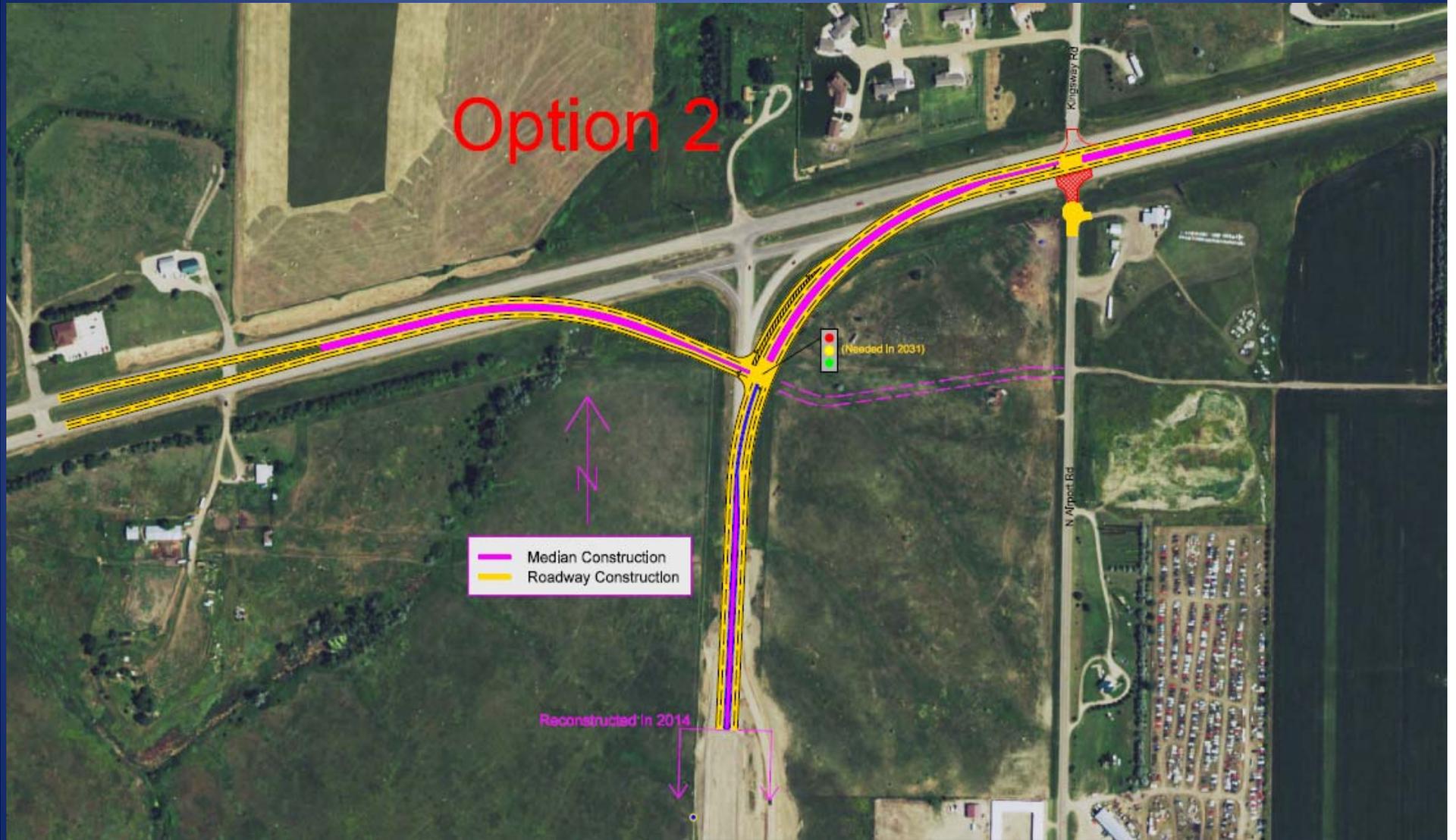
Option 1



- Eliminate left turns onto Kingsway
- Cul-de-sac N Airport Rd to Kingsway
 - ✓ Would increase traffic on US14B
- Eliminates NB left turn onto Kingsway
- Compresses intersections
 - ✓ Minimizes crossing distance US14/14B
- Added offset right turn lane
- Signal not anticipated
- Anticipated Posted Speed – 55 mph



Option 2



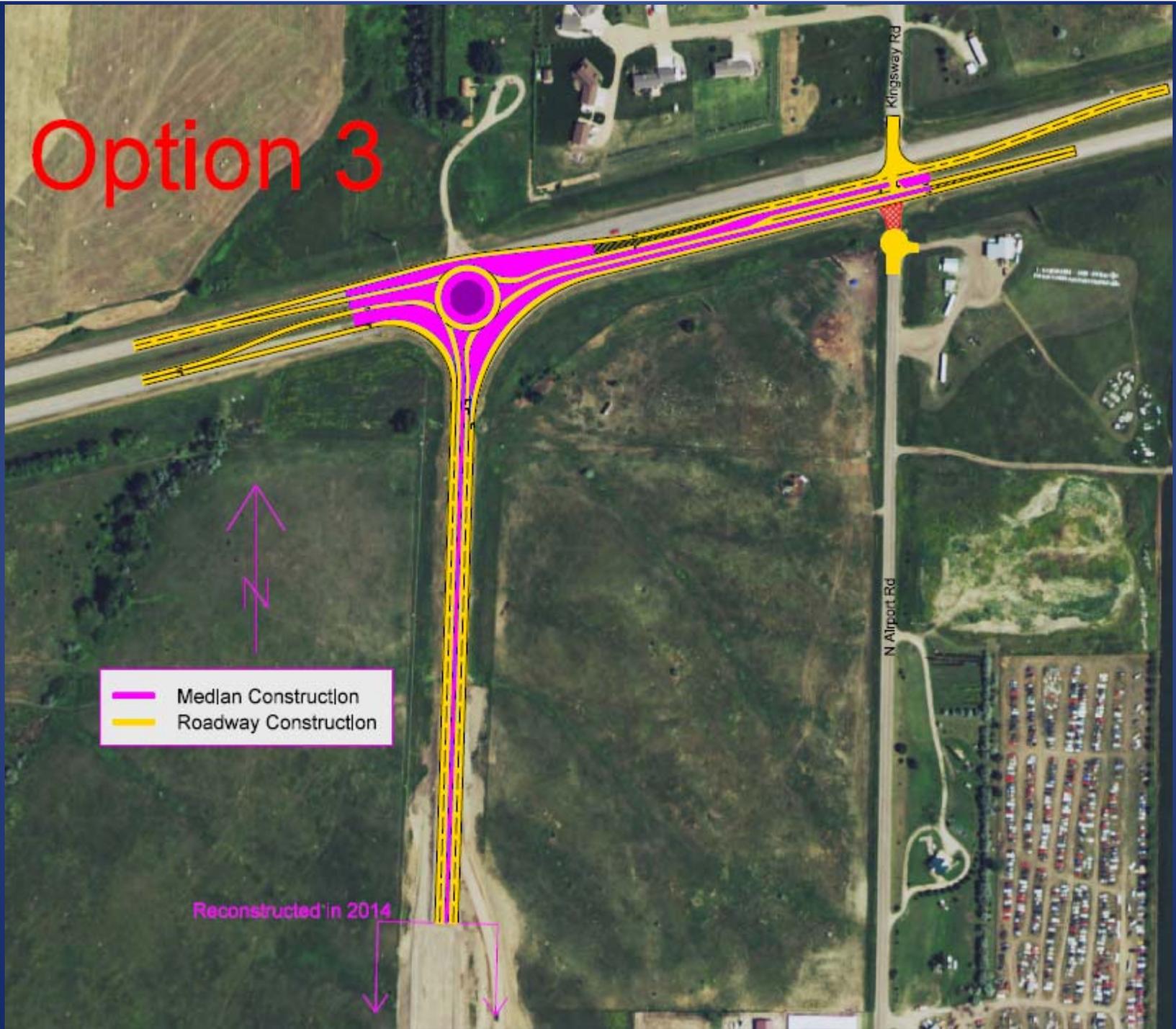


Option 2

- Improves traffic flow
 - ✓ Fuel & time savings (20 yr analysis): \$2.37M
- Signal anticipated in 2031
 - ✓ Generally reduces crash severity
- Full Access for Kingsway Ave
 - ✓ Eliminates weaving
- Cul-de-sac on N Airport Rd
 - ✓ Would increase traffic on US14B
- Offset Right turn lane
- Anticipated Posted Speed – 45 mph



Option 3





Option 3

- No significant change in travel delay/fuel costs
- Significant crash reduction expected
 - ✓ 20 yr analysis: \$5.98M
- Allows NB left turn onto Kingsway
- Full Access for Kingsway Ave
 - ✓ Eliminates weaving
- Cul-de-sac on N Airport Rd
 - ✓ Would increase traffic on US14B
- Anticipated Posted Speed – 45 mph



Roundabout Information



Insurance Institute for Highway Safety

- Before Construction
 - ✓ 31% in favor
 - ✓ 41% strongly oppose
- After Construction
 - ✓ 63% in favor
 - ✓ 15% strongly opposed



- Reasons cited for concern:
 - ✓ Safety concerns
 - ✓ Confusion on how to maneuver
 - ✓ ***Fear of the unknown***

Roundabouts, New Concept?

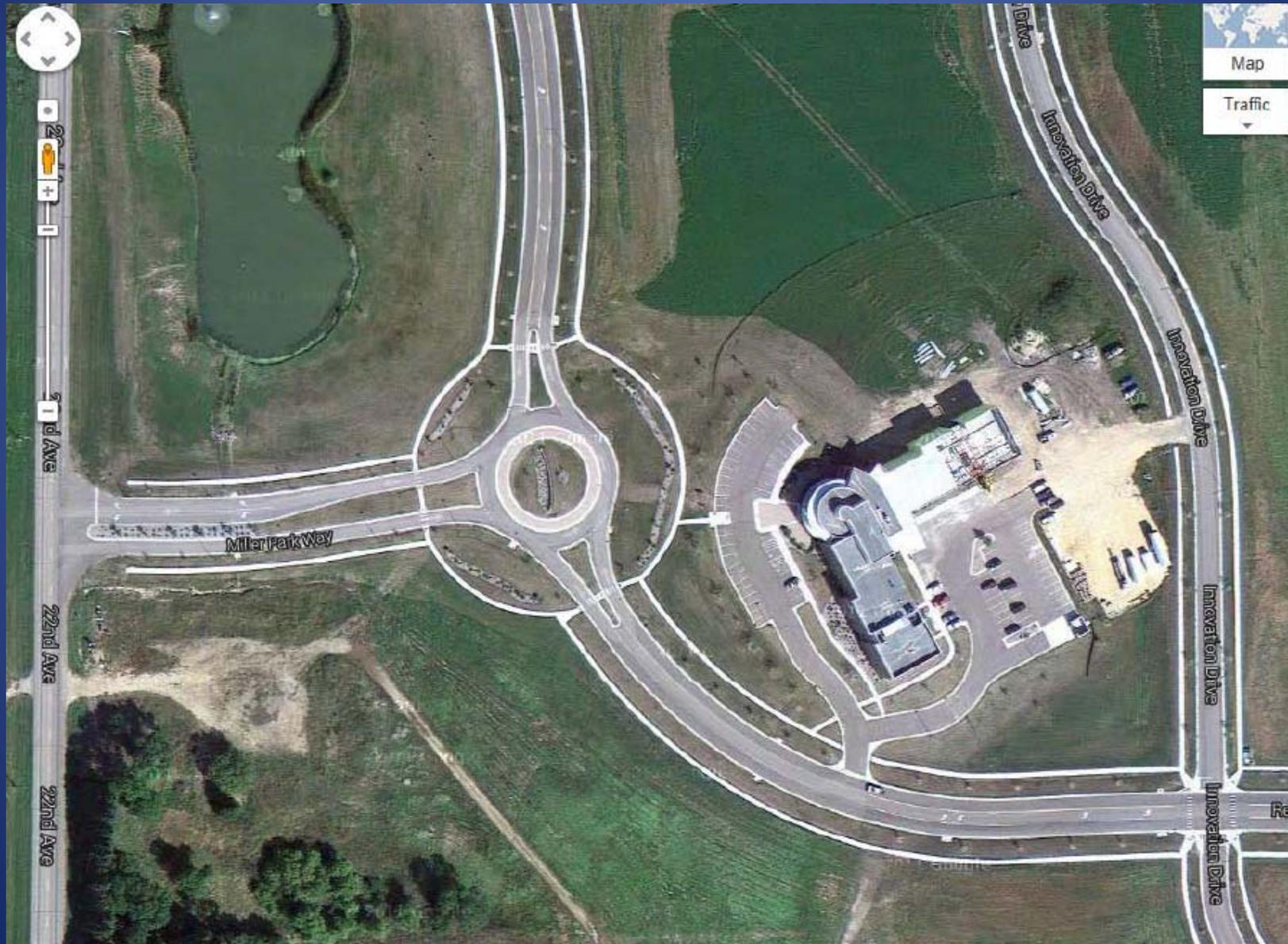
➤ NOT REALLY

- ✓ UK has an estimated 25,000
- ✓ France has more than 30,000
- ✓ USA – Currently there are about 3,500 in operation

- Brookings has one
- Sioux Falls has two
- Rapid City has two

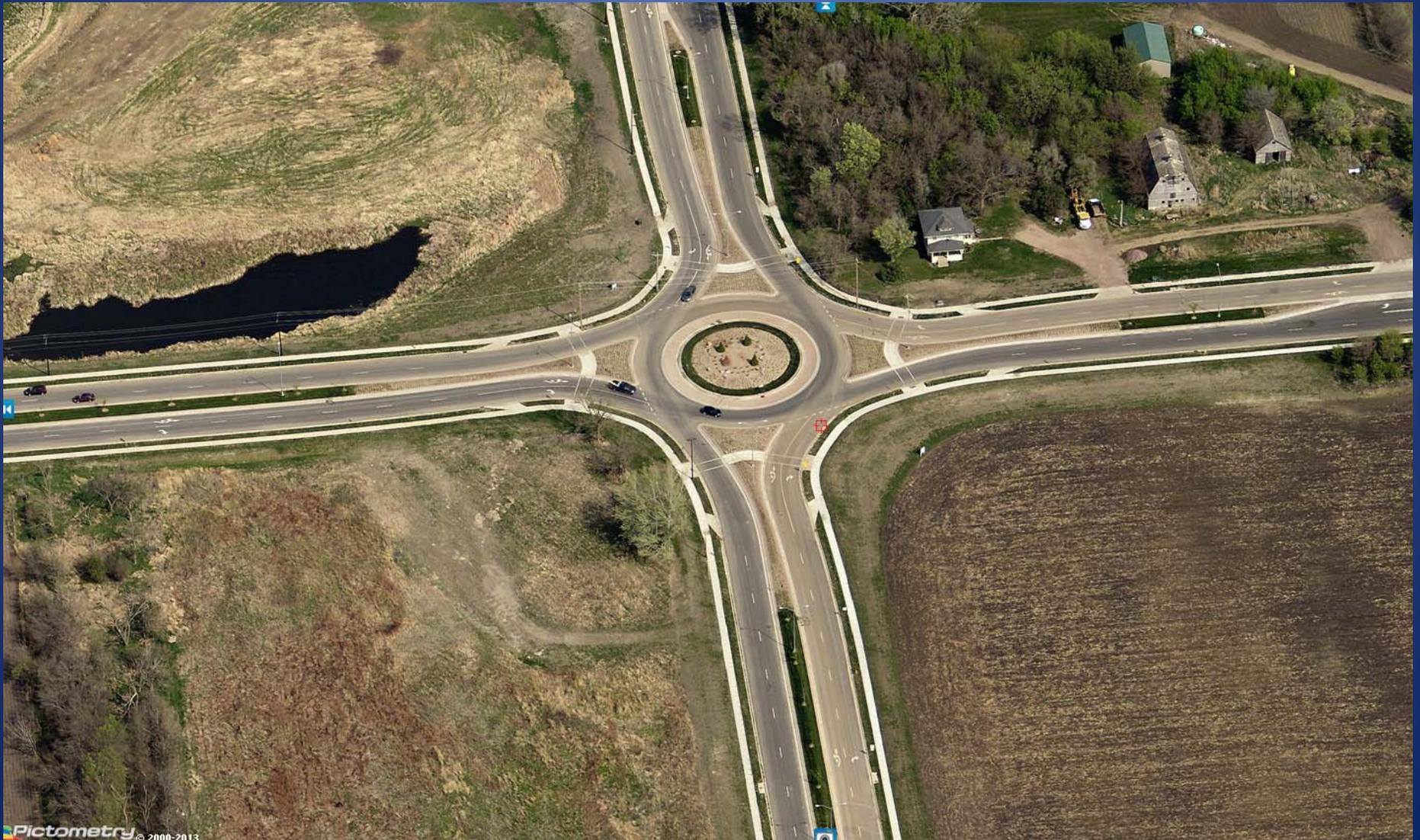


Brookings Innovation Campus



Sioux Falls

69th St & Southeastern Ave



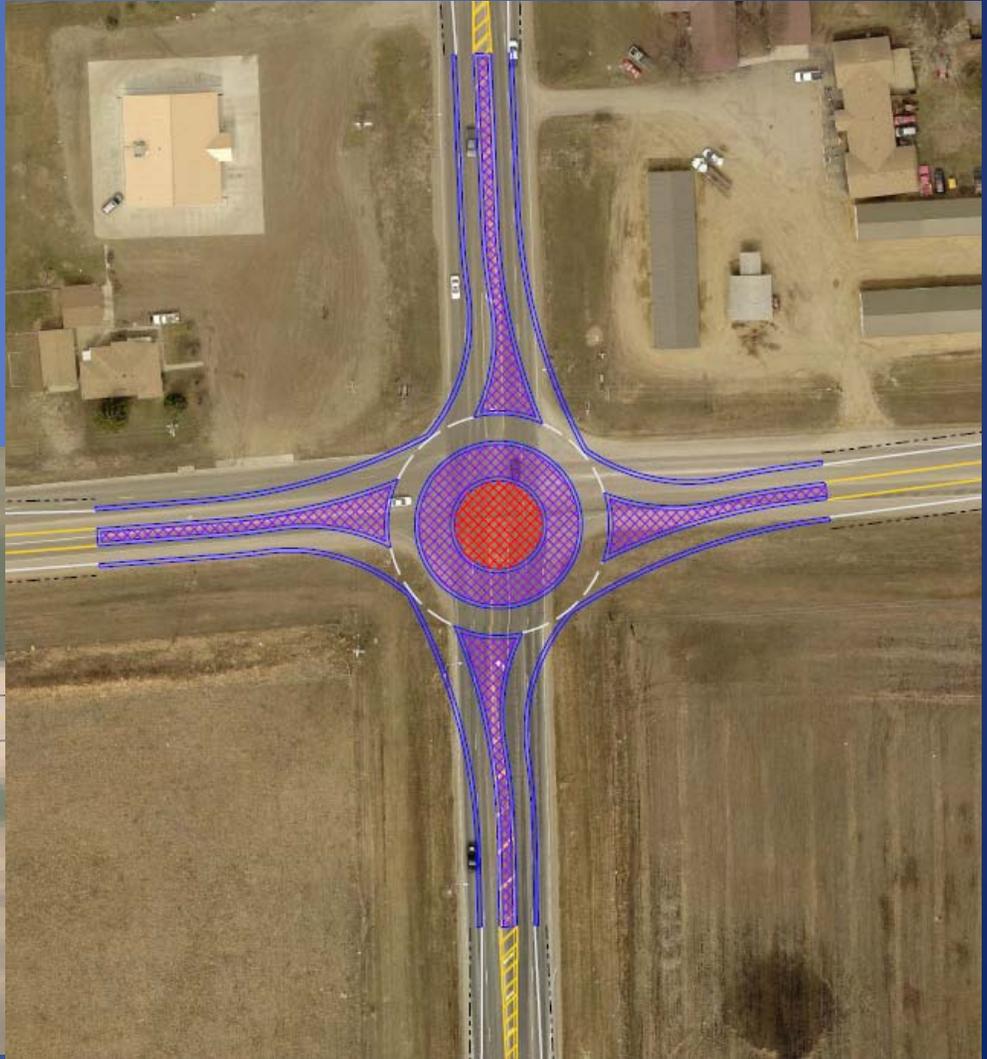
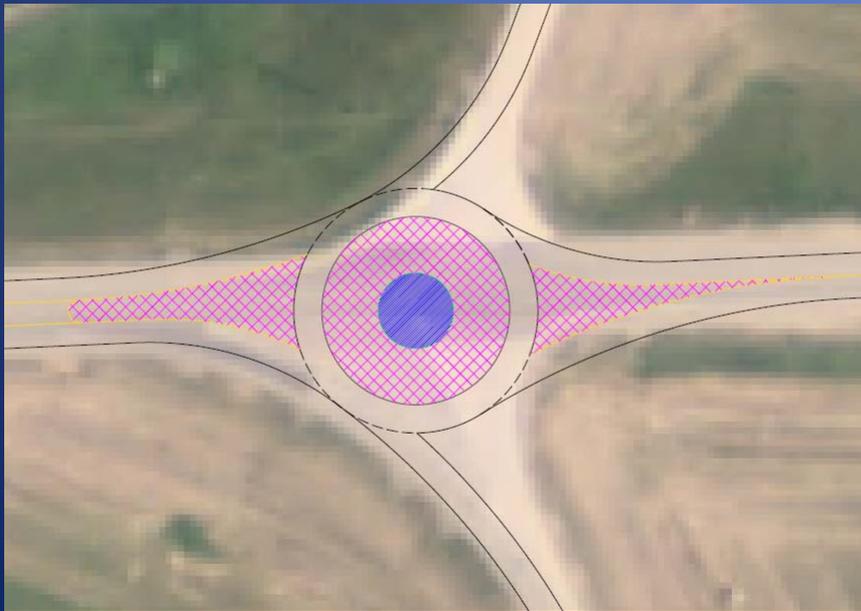
Sioux Falls

Career Ave at University Center



SDDOT Planned Roundabouts

- ~~Brookings – 2~~
- Sisseton – 2
- Watertown - 1



Roundabout – IS NOT

- Traffic Circle
- Rotory



Roundabout Principles

Splitter Island

Center Island

Truck Apron



Flared Entry

Yield Line

Counter Clockwise Flow

Rules of the road

Traffic Signal

1. If the signal is a red ball, come to a complete stop
 - a) After stopping, you may turn right but must yield to oncoming traffic; except if the sign says "NO TURN ON RED", you cannot
 - b) After stopping, you may turn left on red from a one-way street onto a one-way street but must yield to oncoming traffic
2. If the signal is a green ball
 - a) you may go straight or turn right, but only if the way is clear - you must yield to vehicles still in the intersection
 - b) you may turn left but must yield to oncoming traffic
3. If the signal is a yellow ball
 - a) you may go straight or turn right
 - b) you may turn left but must yield to oncoming traffic
4. If there is one signal head for several lanes, it applies to all those lanes; if there is a signal head for each lane, each lane is governed by its own signal head; and if there are multiple heads but not as many as there are lanes, generally a head centered above a lane governs that lane, a single head located above the line dividing two lanes governs both lanes, and a single head centered above three lanes governs all three lanes
5. If the signal for your lane is a red arrow pointing left or right, come to a complete stop
 - a) After stopping, you may turn right on red but must yield to oncoming traffic; except if the sign says "NO TURN ON RED", you cannot
 - b) After stopping, you may turn left from a one-way street onto a one-way street ; except if the sign says "NO TURN ON RED", you cannot
6. If the signal for your lane is a red arrow pointing up, you may not go straight
7. If the signal for your lane is a green arrow pointing left or right, you may turn in the direction of the arrow, after yielding the right-of-way to vehicles within the intersection, even if the red light is burning at the same time
8. If the signal for your lane is a green arrow pointing up, you may go straight, after yielding the right-of-way to vehicles within the intersection, even if the red light is burning at the same time
9. If the signal for your lane is a yellow arrow, it means the same thing as the yellow ball, but applies only to movement in the direction of the arrow
10. If the signal is a blinking red ball, come to a complete stop and then enter the intersection, except you must yield to other vehicles already in the intersection
11. If the signal is a blinking yellow ball, enter the intersection with caution, except you must yield to other vehicles already in the intersection
12. If none of the bulbs on the signal head are illuminated (power outage), come to a complete stop and then enter the intersection with caution, except you must yield to other vehicles already in the intersection

*special thanks to Ken Sides

Rules of the road

Roundabout

~~$$f(x) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$~~

1. Yield to traffic already in roundabout.

Roundabout Safety Facts

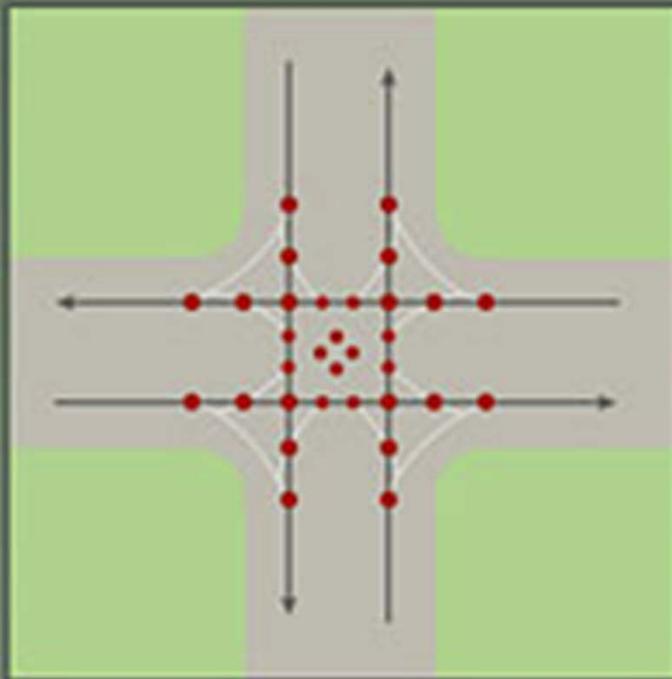
➤ According to Federal Highway Administration Intersection Statistics

- ✓ 90% reduction in fatalities
- ✓ 76% reduction in injuries
- ✓ 35% reduction in all crashes

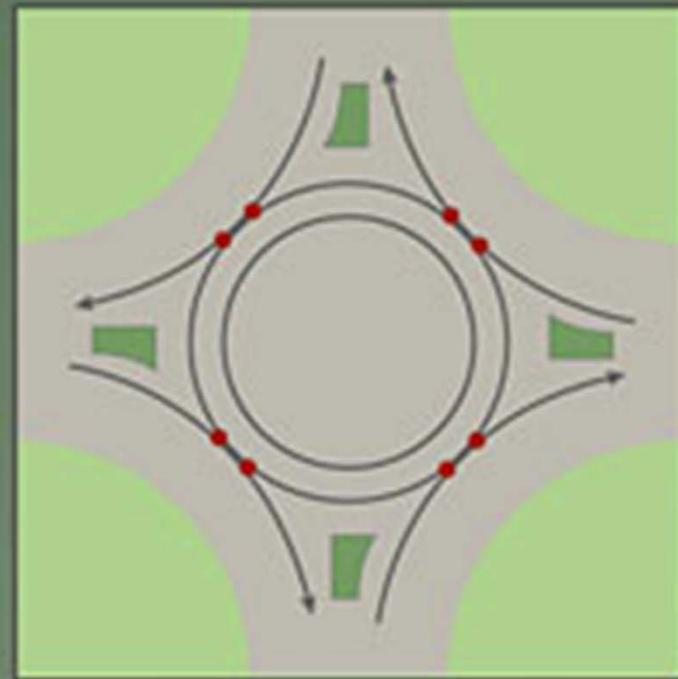


➤ Single Lane Roundabouts are the safest at-grade intersection possible

With roundabouts, head-on and high-speed right angle collisions are virtually eliminated.



[Traditional intersection]

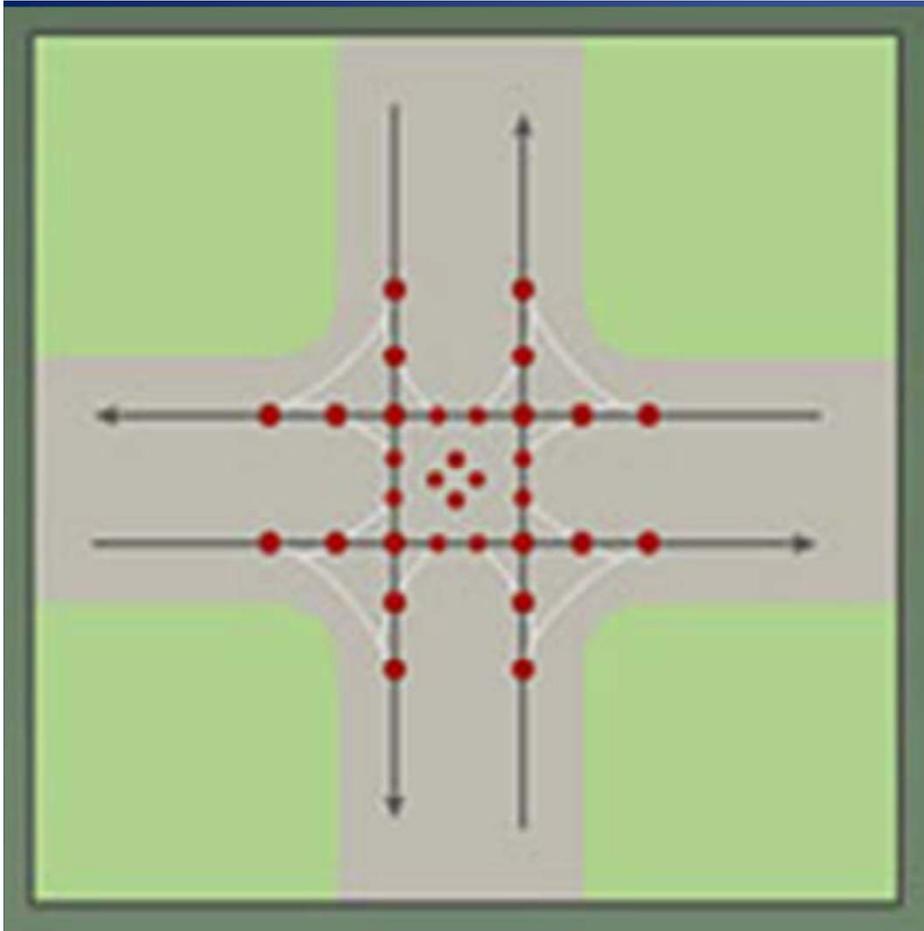


[Roundabout]

● Potential vehicle conflict point

32 CONFLICT POINTS

8 CONFLICT POINTS



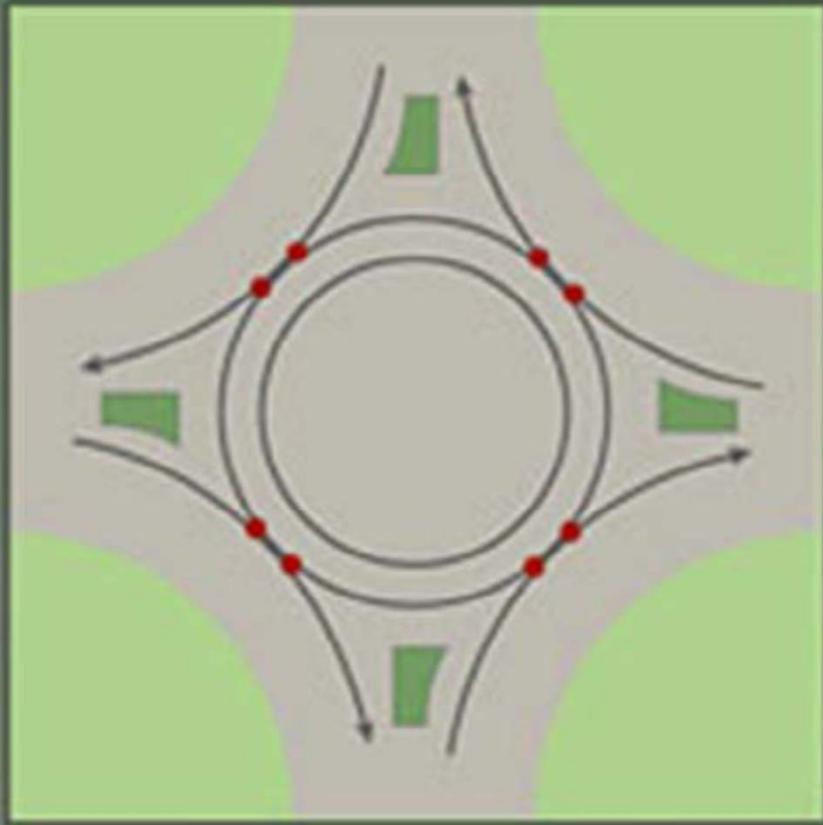
Potential:
High Speed Angle
Crashes



Rear End

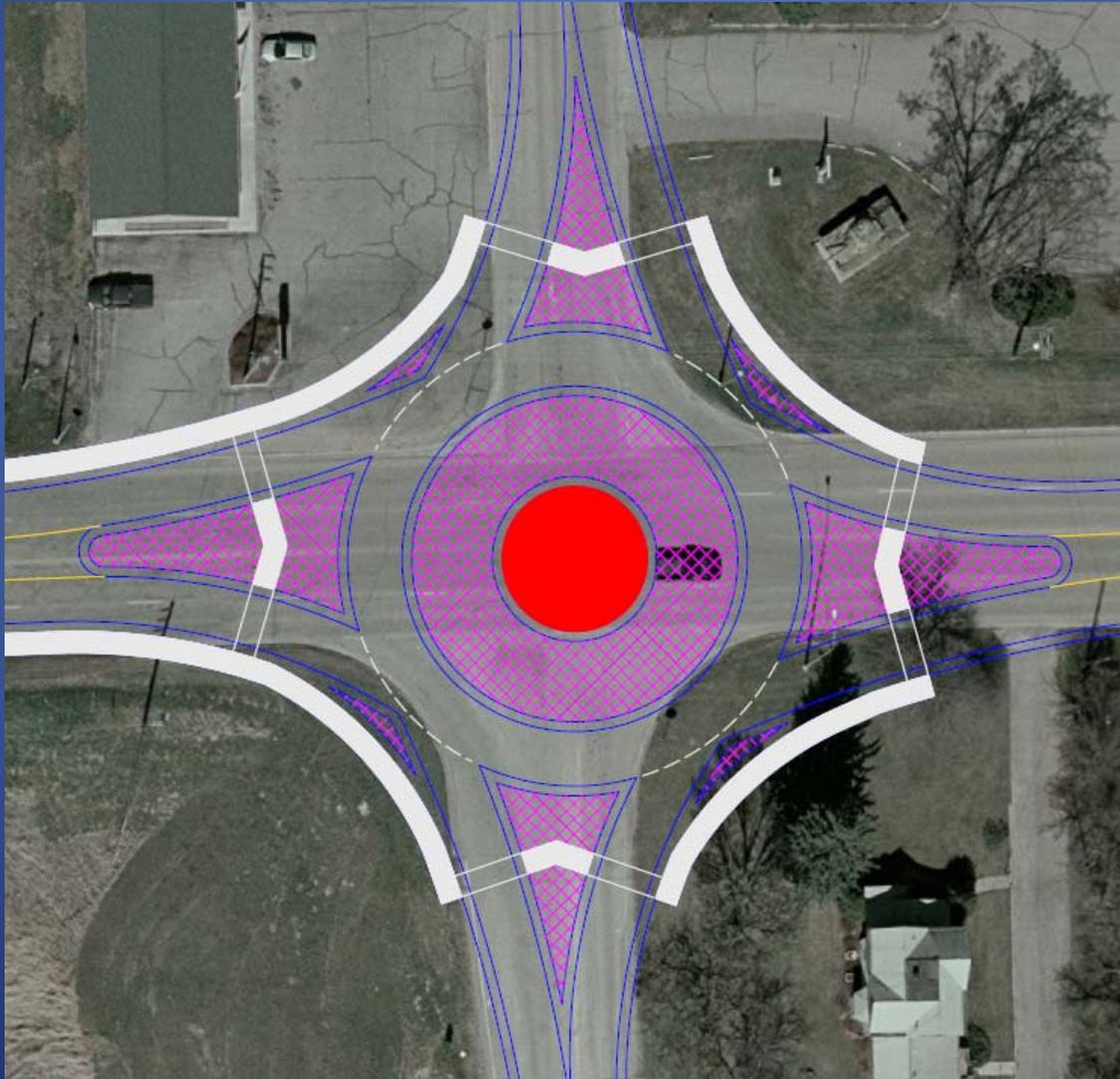


Sideswipe



Sisseton

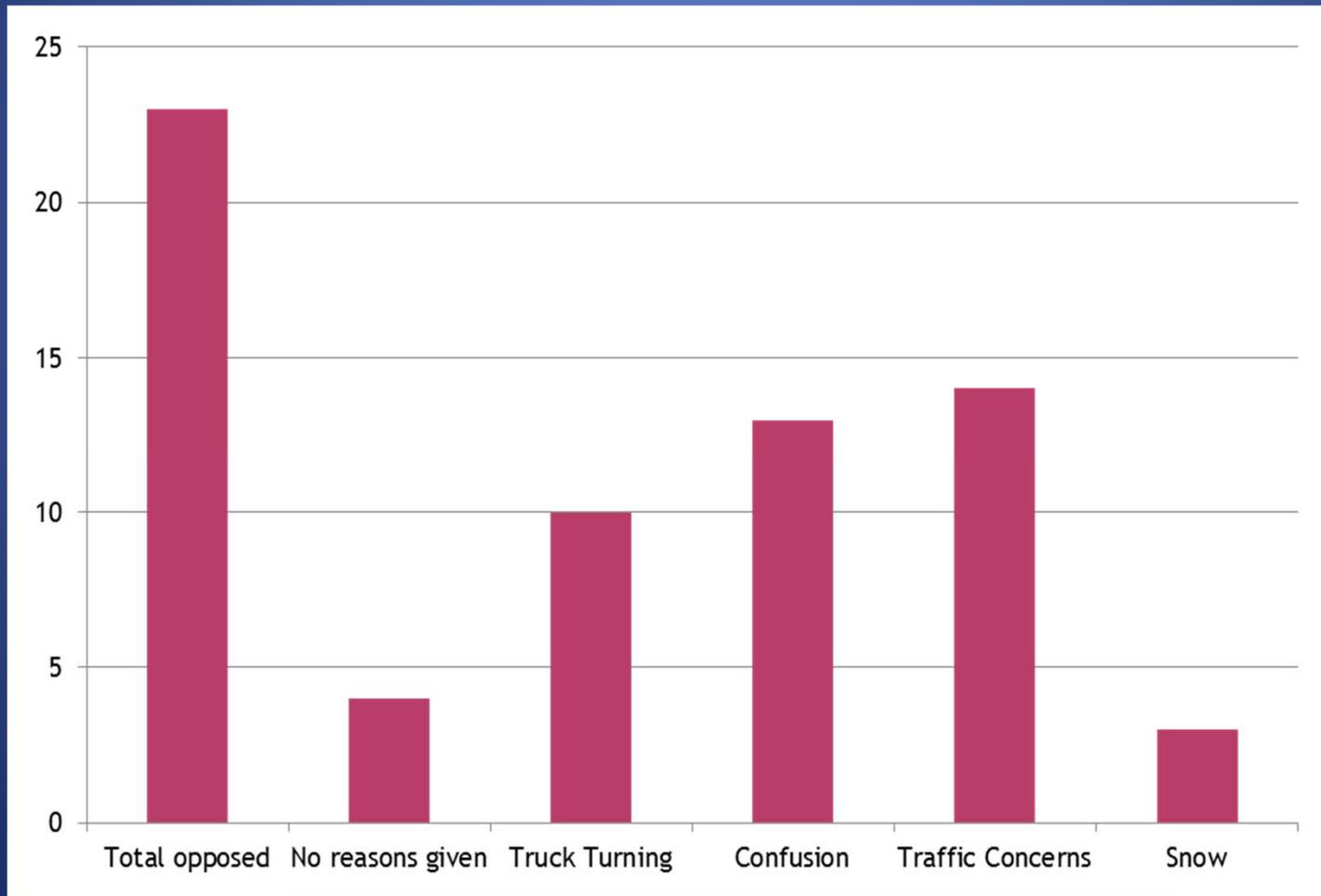
- Proposed Roundabouts in March 2013



Concerns Regarding Roundabouts

Why are folks opposed to Roundabouts?

- Most gave multiple reasons

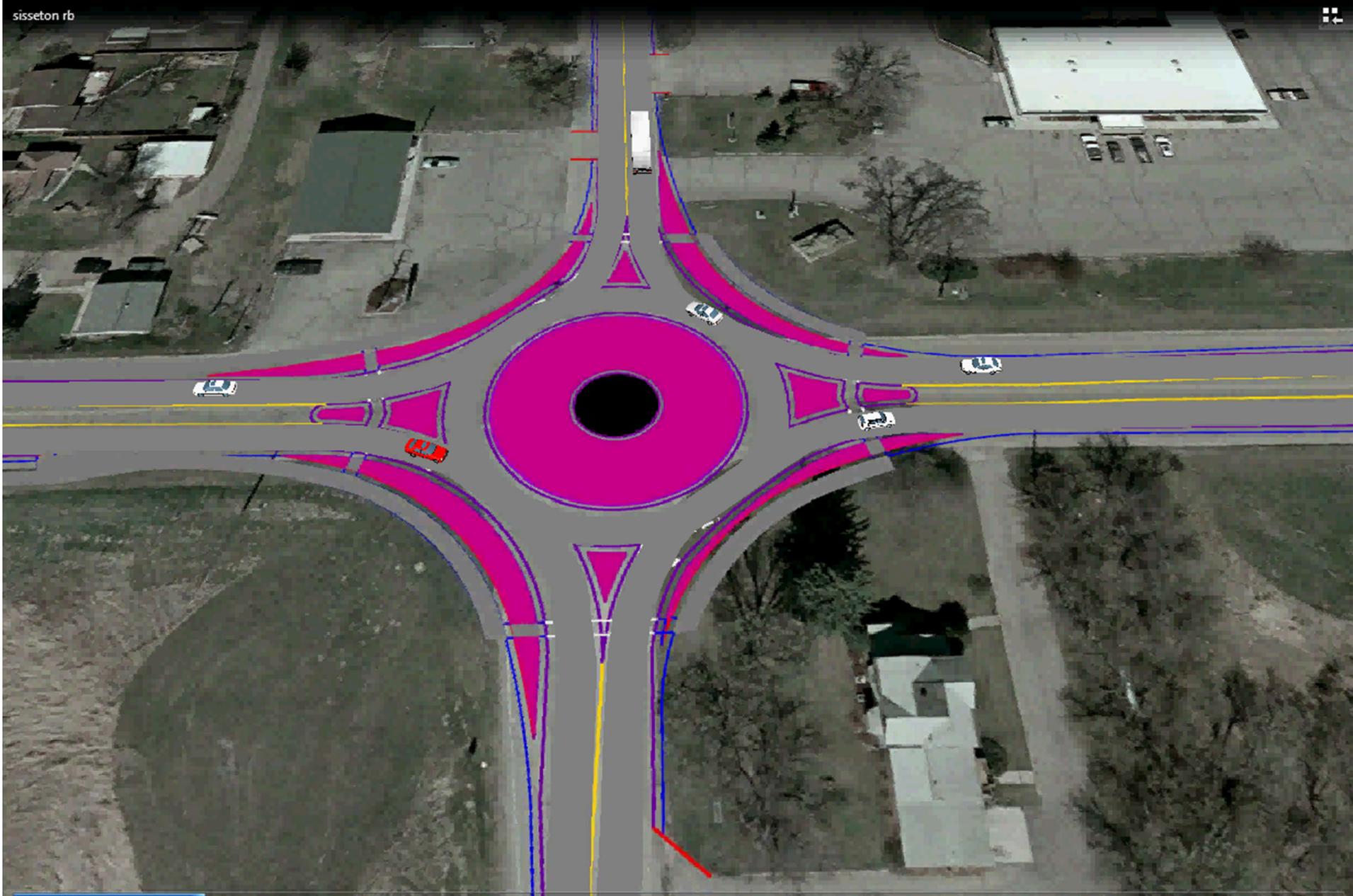


Traffic Concerns

- Roundabouts (single lane) can handle much more traffic than what is expected
 - ✓ up to 25,000 veh/day
 - ✓ Existing ~ 7,000 veh/day

- Traffic Engineering is a science and an art
 - ✓ Our traffic experts have sophisticated programs to aid in the analysis

sisseton rb



00:31



Driver “UN” familiarity

➤ SDDOT follow up meetings

- ✓ There are opportunities for outreach meetings for education on roundabouts

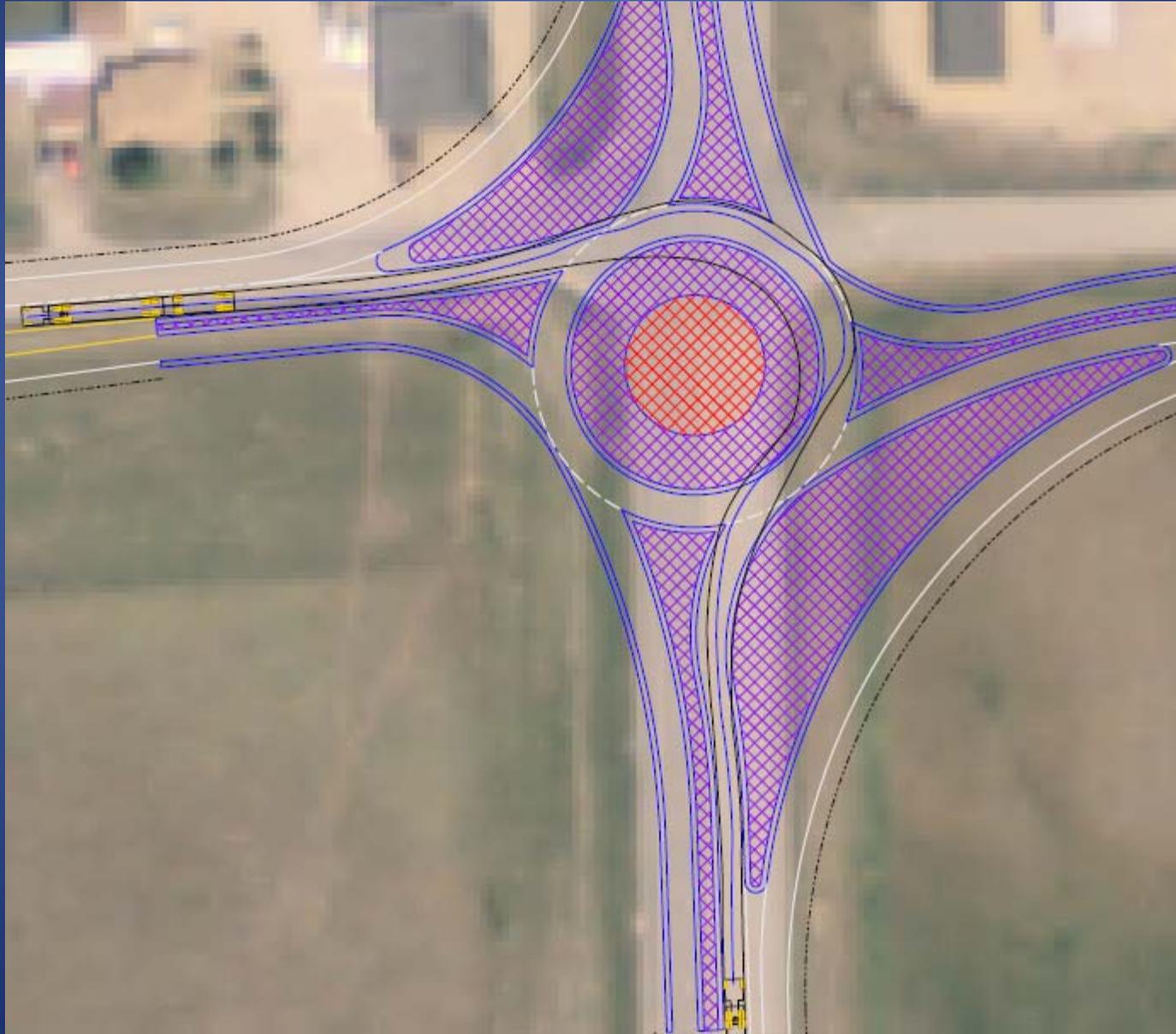
- ✓ Provide comments if this is desired for your community

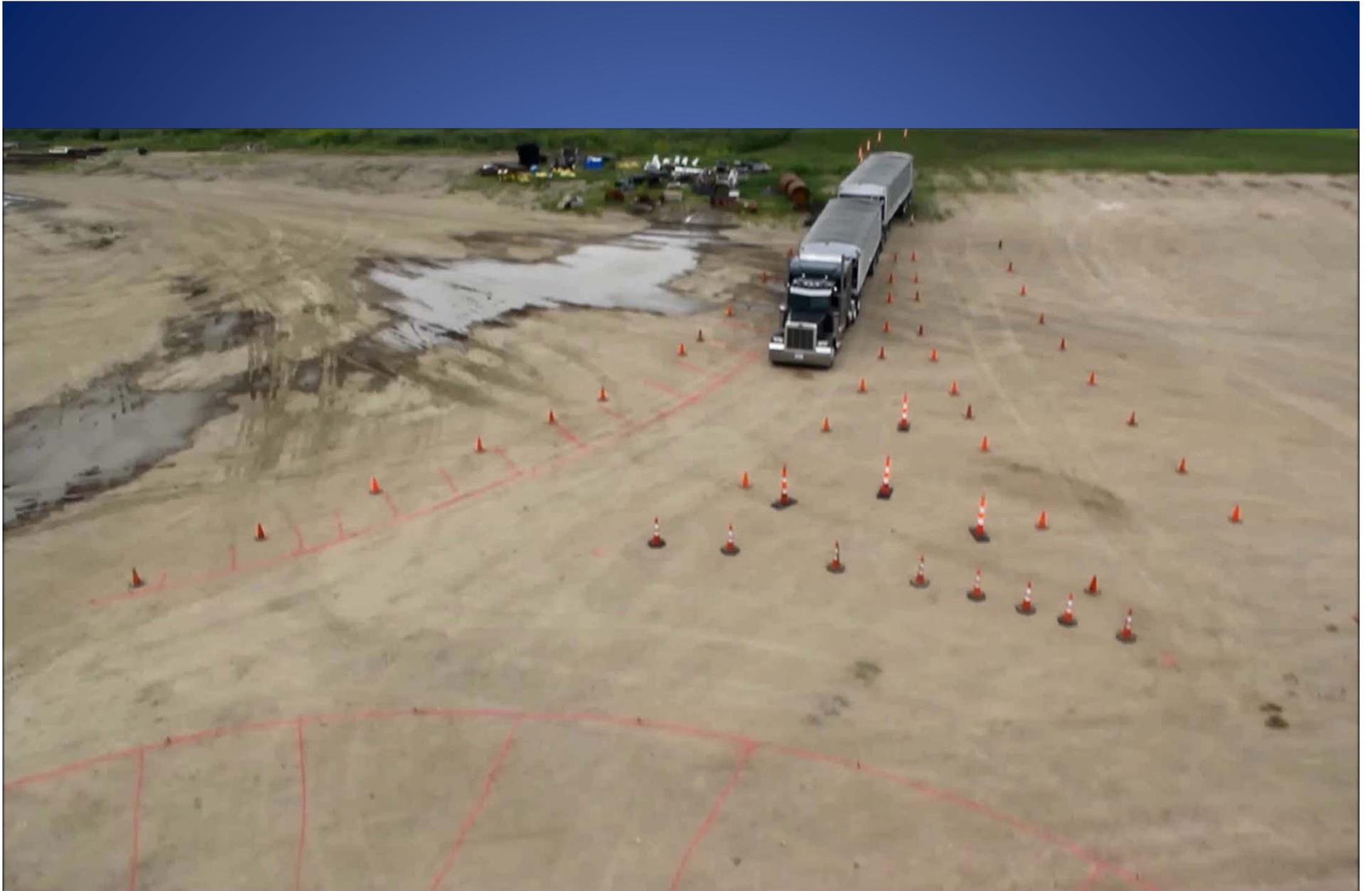


- More folks are becoming familiar as they drive through others

- Visit SDDOT Roundabout Website

Truck Turning Tracks







	Cost	Safety	Traffic
Existing		★ ★	★ ★ ★
Option 1	\$5.6 M	★ ★ ★	★ ★ ★
Option 2	\$6.8 M	★ ★ ★	★ ★ ★ ★ ★
Option 3	\$4.9 M	★ ★ ★ ★ ★	★ ★ ★

Scale 1-5: 1 is worst, 5 is best

Project Construction

- Construction currently scheduled for 2020 or beyond
 - ✓ Developmental STIP
 - ✓ Pending Funding & Scheduling
 - ✓ 1 construction season



Traffic During Construction

➤ Area/Region Offices currently reviewing options

- ✓ 1 Construction Season
- ✓ Minor Impacts
- ✓ Access to homes will be maintained



- Second Public Meeting
 - ✓ Present Preferred Alternative
 - ✓ Fall 2015
 - ✓ More detailed design, if possible



- Design will meet with affected landowners
 - ✓ Schedule is yet to be determined
 - Design Option Chosen
 - Right of Way Impacts



➤ Written Comments Due Mon. July 27, 2015

- ✓ Mail - 700 E Broadway Ave Pierre, SD 57501
- ✓ Email – mark.malone@state.sd.us
- ✓ Here - Now



Comments
encouraged!

➤ Website (project information)

- ✓ <http://sddot.com/dot/publicmeetings>

Q&A

You have

Questions

We have

Answers